Jaap Dronkers
Editor

Quality and Inequality of Education

Cross-National Perspectives

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The Gordian Knit Between Quality and Inequality of Education: A Cross-National Attempt to Unraveling

Jaap Dronkers

Introduction

Education is one of the pillars of modern societies. That makes education and its quality such a salient topic, not only in the eyes of policy makers, but even more in the eyes of parents. International indicators of the quality of education, schools, teachers, etc., have become important tools for the decisions of both parents and public policy makers. More knowledge about the actual quality differences in education and their causes with reference to international standards and comparison has become vital for policy makers and multinational firms to guide their decisions. A side effect of the international benchmarking of the educational systems of countries is the free availability of a large cross-national data set of the pupils of the involved countries, their parents and their schools for scientific analyses.

History

International comparisons of the educational and the societal achievement have a long history. The IEA studies (International Association for the Evaluation of Educational Achievement, initiated by UNESCO) implemented in the late 1950s were the first to allow research into the influence of characteristics of educational systems on the scholastic achievement of students. However, partly due to poor measurements and inadequate methods for analyses of the data, no clear effects of educational systems on educational achievement could be detected with IEA data. The very first IEA study, known as Pilot Twelve-Country Study, was conducted in 1959–1962 with samples of 13-year-old students in 12 countries (Foshay, Thorndike, Hotyat, Pidgeon, & Walker, 1962). Testing was carried out in five areas: mathematics, reading comprehension, geography, science, and non-verbal ability.

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In 1995, IEA completed data collection for the Third International Mathematics and Science Study (TIMSS). Forty-five countries participated in TIMSS, with more than half a million students encompassing five grades tested. The overall aims of the study were to measure the mathematics and science achievement in the various target populations and to identify the major in- and out-of-school influences on educational outcomes. TIMSS 1995 contributed to stabilization of the IEA cycle of studies in mathematics, science, and reading literacy. The subsequent data collection for TIMSS (at present known as Trends in Mathematics and Science Study) took place in 1999, 2003, and 2007.

With the emergence of the TIMSS (1995) and PIRLS (2001) studies, a new impetus for research into cross-national achievement differences emerged. Next to information on important individual background characteristics, these studies have provided copious information on a wide range of school and educational system characteristics. The various analyses with PIRLS and TIMMS data (Baker & LeTendre, 2005) established that early selection into secondary education has a significant influence on both the variation in scholastic performance and the average educational performance of pupils on the country level.

These results are supported by earlier analyses with other cross-national data sets (Rijken, 1999; Shavit & Blossfeld, 1993). The later found a significant influence of differentiation on variance in educational performance. Results indicate that countries that show high levels of educational differentiation also show a high variance in mathematical scores. Since schools in countries with highly differentiated systems are generally more homogeneous in composition, the opposite effect was found on the school level: The more differentiated the educational system, the less pupils within a school differ in educational achievement.

PISA

This long and fruitful tradition within the educational sciences got policy importance when the OECD started to collect comparative data about the educational skills of 15-year-old pupils in the OECD countries. Since 2000, the OECD has tri-annually conducted large-scale tests among 15-year olds living in its member states and partner states in order to assess the pupils' mathematical, reading, and scientific literacy. This now well-known PISA survey (Programme for International Student Assessment) is an internationally standardized assessment that was jointly developed by participating countries and administered to 15-year olds in schools. The aim of PISA is nicely summarized as follows: "Are students well prepared to meet the challenges of the future? Are they able to analyze, reason, and communicate their ideas effectively? Do they have the capacity to continue learning throughout life? Parents, students, the public, and those who run education systems continually ask these questions. PISA, a three-yearly survey (2000, 2003, 2006) of 15-year olds in the principal industrialized countries, provides some answers." In doing so, the OECD aimed to find out to what degree pupils near the end of compulsory education have acquired some of the knowledge and skills essential for full participation in society. Next to information on pupils' educational performance, PISA also provides information on their individual characteristics and the school they attend through respectively administering a student and a principal questionnaire, and since 2006, in some participating countries also a parent questionnaire. A growing number of educationalists (for instance Marks, 2005) and economists (for instance Wößmann, 2003) use these PISA data to measure the effectiveness of educational systems, to find the characteristics which contribute to effectiveness differences and to solve the problems of the cross-sectional nature of the cross-national data sets (Hanushek & Wößmann, 2005).

European Social Survey

A weakness of the PISA data is that they are restricted to the educational achievement of 15-year-old students. This makes it difficult to say something scientifically about the consequences of cross-national variances in educational achievement for the inequality in modern society: cultural and societal participation, labor market outcomes, income, family formation, etc. In order to stimulate also the cross-national analyses of the consequences of educational achievement, we use in this book also the European Social Survey, which has started in 2003. This European Social Survey is organized by the European Science Foundation and available since 2003. It is one of the best means available to compare the functioning of societies of the European Union. Although this European Social Survey is not totally suitable for cross-national analyses of consequences of educational achievement (the measurement of background variables is too general; there is too much emphasis on attitudes instead of actual behavior), it is the best for cross-European analyses.

Although sociological and economical questions are important in this book, there is also space for analyzing educational policies and the legal forms of educational systems. This is necessary, because these policies and legal forms create the opportunities and constraints of the various educational systems. This is relevant because, as a consequence of this international benchmarking by the OECD (PISA, but also their regular reviews of the national educational systems and the annual publication "Education at a glance"), OECD has become an international and independent policy learning centre that confronts the national governments with their responsibility for their educational system. The EU and its institutions have not developed extensively this policy learning role in the field of education, partly due to the very restricted role of the Union in educational affairs, even after the Maastricht Treaty that gave some role for the Union in educational affairs. But the European Social Survey can be used as a form of soft benchmarking of educational performance in Europe.

Topics of the Book

The book covers three general topics: Institutional arrangements and educational outcomes; Migration and educational inequality; and Education in Europe and Asia: analogies and differences. By selecting these three topics, the book covers on the one hand a broad field, but on the other hand, it has a clear focus as well.

The first topic of institutional arrangements is a classical topic in the educational sciences, because it addresses the effect of educational institutions and practices (tracking, segregation, and educational expansion) on educational outcomes. The new aspect of this book is that it introduces the international comparison in a rigorous way, which gives more insight.

The cross-national approach of the second option (migration and education) is relatively new. Migration is not a new phenomenon, but in Europe the cross-national perspective was invisible or neglected for a long time. This cross-national perspective is largely also missing in the USA, and the best known comparisons of the migration of the USA are with Canada and Mexico. Migration is one of the major challenges for European societies and education has an important role to play in the integration of these immigrants. But these educational aspects of immigration are not analyzed from an international perspective despite the fact that migration is not a national but an international phenomenon. The contributions analyze the various reasons for more or less educational success of immigrants in Europe and the USA. Sensitive topics like the relatively strong effects of the features of the countries of origin of immigrants, the effects of religious characteristics on outcomes and ethnic segregation in schools are not avoided. The last contribution of this part of the book discusses another neglected topic: native minorities within the boundaries of other nation-states within the European Union.

The third topic is hardly ever addressed: a European–Asian comparison of educational outcomes. The comparison of the Asian and European education gives vital information for the human capital development by the European education, especially because the Asian countries tend to perform far better educationally than Europe or Northern America. Despite this higher performance, most education comparisons are made between the USA and Europe, while the real educational challenge comes from Asia. The chapter with a comparison between Japanese and Korean High Schools shows that the relation between education and society can be quite different, even in bordering Asian nation-states.

Two Perspectives on Relation Between Education and Society

The comparative research presented in this book can also be distinguished based on their different perspectives on the relation between education and society:

The first perspective analyzes how and in which degree different characteristics of societies and educational systems influence the average educational achievements of (specific groups of) the pupils of those societies. The dependent variable in this perspective is the educational achievement of pupils and the independent variables are macro-variables of those societies. In order to avoid error of aggregation, in these analyses individual characteristics of pupils, parents, and schools will be intermediary variables that are being influenced, via offering opportunities and posing constraints to behavior, by these macro-variables. Having the data of so many countries and of more than one measurement year offers the possibility of a simultaneous multi-level analysis with data of various levels. A number of chapters are mostly written from this perspective: the influence of educational segregation on achievement, school-composition, tracking in secondary education, the role of grade retention, school regimes and ethnic segregation, and the comparison of Japanese and Korean High Schools and students.

The second perspective analyzes how and in which degree characteristics of schools, educational systems and societal macro-characteristics deepen and soften differences in educational outcomes of various groups of pupils. The dependent variable in this second perspective is also the educational achievement between pupils and the independent variables are the school- and parental characteristics, while the macro-variables of those societies and educational systems act as possible explanations of the variance between these school- and parental characteristics. A number of chapters focus on the influence of educational systems on the strength of inequality in a society: influences of national education policies, educational expansion, and social class returns in post-communist societies, educational achievement of second generation immigrant in European society, and the effect of parental background in the different educational systems of Germany and Japan.

The third perspective analyzes how and in which degree different characteristics of societies, their economies, and their educational systems are influenced by their education systems and characteristics of those societies. The dependent variable in this third perspective is the macro-variables of those societies while education is the independent variable. This third perspective is to a certain level the mirror of the first, reflecting the interdependent nature of education and society. Some chapters fit best in this third perspective: language and ethnic minorities living in neighboring countries and the intergenerational transmission of income and education in Japan and France.

Problems with the Analyses of Educational Systems

However, the analysis of educational systems is not an easy topic, due to a number of problems. Some of these problems are discussed briefly below and related to the chapters in this book. These problems are not unique for the analysis of educational systems, but show up in analyses of all types of human institutions. There are yet no solutions for these problems and one can even doubt whether some of the problems can ever be solved. Some of these problems (like the importance of individual behavior and the context) have a philosophical nature and cannot be solved only by scientific knowledge only. Other problems might seem to have a more scientific nature (like the importance of educational systems versus the characteristics of societies), but it is impossible to conduct experiments (both for practical and moral reasons) and thus get irrefutable scientific answers.

Educational Systems Provide Macro-Contexts for the Teaching and Learning, but They Do Not Determine the Outcomes

The first public objective of educational systems is to provide a systematic macro- and meso-context to schools, teachers, and pupils which helps them to teach and learn a number of useful cognitive skills and behaviors. An educational system is thus not a goal in itself, but it is the institution which makes systematic teaching and learning (as a part of the human socialization) possible, which can relate its outcomes to the wider societal context and makes it possible to influence schools, teachers, and pupils via this context. As a consequence of this hierarchical structure of individuals with contexts of increasing abstraction, the effects of the macro-characteristics like educational system on variations in individual skills and behavior are small (relative to less abstract contexts, like schools) and often indirect via other contexts (for instance school characteristics). The content of the taught skills and behavior can vary per wider societal context (depending on their usefulness), but reading and writing, arithmetic and mathematics, geography and history, science and biology, and techniques and housekeeping are thought in some way and often under disguised names in all modern educational systems as essential for the socialization. Not only skills and behaviors are learnt in schools, but also attitudes (like cooperativeness) and values (like honesty) which are seen by the wider society as important. Parts of some of these skills, behavior, attitudes, and values will also have been learnt within other social contexts (family; peer-group; work place), and the extent to which the latter happens will influence the effectiveness of teachers, schools, and educational systems. As a consequence, educational systems might vary in their effectiveness, depending on the specific skill, behavior, attitude, or value that is being taught, and on the importance of the other social contexts. So, due to this variation, it is difficult to say precisely how important educational systems are as a context for teaching and learning. It is clear that they have a significant and substantial influence, but they are in no way determinants of the outcomes of teaching and learning. The importance of individual characteristics and behavior is paramount in comparison with the influence of educational systems. The reader will find this motive in all chapters of this book: the individual variation is larger and more important for predicting outcomes than characteristics of educational systems. That relative unimportance of educational systems is an important lesson to be drawn from this book, which should make policy makers modest in using educational systems to reach political aims. However, it should be remembered that, even if a context like an educational system has modest influences on individual outcomes, no effective schooling is possible without the structure provided by educational systems.

Objectives of Educational Systems Relate Both to Outcomes Internal to Education and to Outcomes External to Education

Public objectives of education are both related to outcomes internal and external to education. Internal outcomes are diplomas, transitions from a lower school-type to a higher one, test-scores, etc. External outcomes of education are success not only at the entrance of the labor market (search duration, unemployment risks, level of job, and income), but also during the working life (trainability; unemployment risks, level of job and income; age of retirement). However, external outcomes are not only related to the labor market, but also to other domains of the life course, like family formation (class and ethnic group heterogamy) and health. Educational systems might show a different effectiveness, depending on the internal and external outcomes, and it is not necessarily true that the effectiveness for one such outcome is positively related to the effectiveness of another outcome. For instance, an educational system might have a high level of pupils leaving with a diploma, but the value of these diplomas might be very low at the labor market. The chapter on educational expansion gives an example of consequences of internal changes (field of study at the tertiary level) for external outcomes (social class inequalities in post-communist societies).

The Average Level of Outcomes Versus the Strength of Effects of Pupil Characteristics

Next to internal and external outcomes, another distinction of the public objectives of education is also possible. The first type of outcomes focus on the average level of all pupils on an outcome (for instance university entrance), the second type focus on the strength of an individual characteristic on that same outcome (the effect of parental class on the university entrance). It is not clear whether an educational system can produce both a high average level of an outcome and a small effect of background variables at the same time. An analogous problem is the relation between the average level of an outcome and the distribution of outcomes around that average: mean and standard deviation might be influenced in different ways by educational systems. This contradiction between quality (the level of outcome) and equality (the strength of the effect of social background) is a longstanding debate in education. Some chapters of this book address this problem, for instance not only the chapter on institutional tracking and achievement growth, but also the chapters about the Japanese and Korean high schools or the comparison between German and Japanese achievement in secondary education.

Outcomes of Education as Result of Characteristics of Educational Systems Versus as Results of Societal Characteristics

Characteristics of educational systems are strongly related with the features of their societies. As a consequence, characteristics of educational systems cannot be studied without taking into account the characteristics of their societies. Combined analyses of educational system and societal characteristics are possible (societal characteristics do not explain all educational system effects) and necessary (some educational system effects are societal differences) for the better understanding of the effectiveness of educational systems. The found "evidence" should address the relation between educational systems and societal environment and in the cross-cohort the relation between the change in the educational system and the change in the surrounding society. The chapters on the educational gaps between immigrant and native students in Europe and the way schools tackle ethnic segregation address indirectly this relation between educational system and surrounding society. But these chapters are only the beginning of a long line of research to disentangle educational and societal characteristics. The chapter on the effects of the mother tongue on pupils' achievement in parallel school systems illustrates the difficulty to disentangle these various effects, even in situations that seem so easy (like Swedish-speaking students in Finland).

School and Class Characteristics as Expressions of Educational Systems

Educational systems are the macro-context within which school's have to function. Educational systems might have hardly direct effects on outcome, but only by the way schools are shaped within a particular educational system. But characteristics of schools will be a more powerful explanatory variable than systems, because this meso-context is closer to the micro-process of teaching and learning by teachers and pupils. In order to avoid an overestimation of the direct effect of a characteristic of educational systems (for instance the degree of differentiation), we should try to include school and school-class characteristics as well (in this example the level of school segregation). On the other hand, characteristics of educational systems can have important indirect effects via school characteristics on outcomes. The chapters on educational and ethnic segregation underline the problems for development of a multi-level analytical model: pupils, teachers, school-classes, schools, regions, and societies. But both chapters indicate a way to tackle the complex problems with the disentangling of these multi-level effects.

The Geographical or Historical Range of Comparable Educational Systems

One of the problems of the analyses of effectiveness of educational systems is the geographical historical range of societies which should be included in the analyses.

If one takes all available countries of the world in the analysis, one might end up with a distinction between poor and rich countries, which is not very informative for the knowledge of educational systems. On the other hand, the educational systems of EU member states might not vary enough to find significant effects. Analyzing the educational systems of all OECD members might be a possibility, but the membership of this organization is more political than content-driven and thus contains strange outliers (Turkey, Mexico, and Japan), which might lead to flawed results. There is an analogous problem with cross-cohort analysis: the time span between the compared cohorts should be large enough for the full implementation of an educational change, but not so large that the differences can be attributed to non-educational changes. Various chapters illustrate the influence of historical and geographical variation of educational systems, but they also show that they can be compared. The easy answer of denying the possibility and relevance of comparing educational outcomes and systems, so often given by educationalists, is contradicted by the growing international interdependency of societies and the increasing competition between societies and their educational outcomes for the best educated students and scholars. Brain-drain is a kind of natural proof of this comparability of educational outcomes across all developed nations.

Specific Outcomes of Educational Systems for Specific Subpopulations

The effectiveness of educational systems might be quite different for different groups. Characteristics which promote more science and mathematics orientation among female pupils can have quite adverse and unintended effects on the educational achievement of boys (Luigi, Monte, Sapienza, & Zingales, 2008). The same holds for immigrant pupils and native lower class pupils: less differentiation seems to be beneficial for the educational achievement of the latter, but not for that of the former. The chapter on the educational attainment of second generation immigrants is an example of a combined analysis of macro-features of the origin and destination countries and the micro-characteristics of immigrants.

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Part I
Institutional Arrangements and Educational Outcomes

The Influence of Educational Segregation on Educational Achievement

Peter Robert

Introduction

Investigating the determinants of pupils' educational achievement is an increasingly important issue in educational research. School performance is widely considered as a relevant forecaster of future trainability and employability. This holds especially for those measures of achievement that are based on various external tests developed by experts instead of school marks given by pupils' own teachers. The PISA studies organized by the OECD represent a recent example of this kind of research. PISA aims to report on the school performance of 15-year-old pupils in different dimensions like reading, math or science "literacy" in cross-nationally comparative way. It has strongly declared policy goals by providing information on students' achievement, in fact monitoring the outcomes of the educational system since PISA is a replicated research, and by generating nationwide discussions on the results that can lead to governmental actions. The most important lessons national governmental officials, policy makers, experts in educational research but also teachers, parents, and students in each participating country can learn from the PISA results refer to the place of their own school system in the rank order of the countries regarding different fields of skills as well as the various correlates of students' achievement in the different countries.

While the mirror shown by the rank order of the nations with respect to their own place is a crucial descriptive information about the efficiency and functional activity of the school system in a given country, the determinants of the school outcomes, factors associated with pupils' measured knowledge and skills can, in fact, open the room for the national policy debates on how to change and improve the situation in the educational system. These factors form basically the complex

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environment of the learning activities. The broad set of conditions involves measures for circumstances and background information both for the home- and for the school environment. Pupils' family background characterized, e.g., by the level of parental education or by their labor force participation shows a large variety in every nation from the most disadvantaged to the most advantaged settings. At the same time, boys' and girls' cognitive abilities with a similarly large diversity vary relatively independently from their own social background and family circumstances. This is why schools have a functional role to counterbalance the possible home disadvantages of "talented" pupils with good cognitive abilities. Consequently, in addition to the home environment, the school environment is considered crucial for students' achievement. Research in the fields of education, social stratification, and status attainment proves clearly that the school systems of the modern societies vary a lot by the success and efficiency of how they are able to meet this requirement of compensating the social and cultural difficulties pupils can have in the school in comparison to other pupils who bring a larger stock of knowledge, skills, and social and cultural competencies from their own home environment. Lessons from these studies reveal the most significant shortcomings of the educational system where policy actions are needed for making the schools to work better in line with their functional roles.

It would be a naive belief to think that home environment and school environment develop independently. On the contrary, in most societies families "contribute" to creating and influencing the school environment to some extent in an active or inactive, direct or indirect manner. Parents from high-status families can actively influence educational environment in a school in a direct manner, e.g., by taking part in decisions in the school board, using their special skills or network potential to helping the school in fund raising, in preparing applications or influencing administrative decisions that have an impact on teaching circumstances in the school. High-status families also affect school environment in a more indirect way by simply making decisions on choosing or not choosing a school, by sending or not sending their offspring to a given school. The influence of the low-status families on educational environment is more "passive" and indirect by simply "being there" in the school since these families have usually no appropriate information on the possible educational options, and no formal or informal connections for making a real school choice. This process results in the varying social *composition* of the schools and this outcome has a strong impact on the school atmosphere. Apparently social composition of schools frequently reflects to the milieu at home when high-status parents try to ensure for their offspring the same advantageous circumstances they enjoy in the family and try to keep away low-status children from this environment as they do it in their everyday child raising practice as well. The phenomenon is known as school segregation and this is in the focus of the present analysis.

The chapter is organized as follows: first, the research objectives are outlined in more details by referring also to the theoretical background of the problem. Second, the research hypotheses are formulated. Third, measuring segregation and building models for investigating how segregation affects educational outcomes are shown. Then the results are presented and finally they are discussed in the light of policy consequences.

Research Objective, Conceptual Background and Policy Relevance

The analysis investigates how higher or lower degree of school segregation, homogeneous vs. heterogeneous grouping of students contributes to the differences in educational achievement (while controlling for individual demographic and social background characteristics). The issue is many times labeled in the literature as integration vs. differentiation as well. In order to provide an adequate theoretical basis for the research, a broad sociological concept to be quoted here can be the work by Coleman on *social capital* where network ties, peer influences, and investment into the child are the key notions. In this context, there is a general assumption that peer relationships affect students' academic performance (Coleman, 1960; Coleman et al., 1966). If this assumption holds, the social composition of schoolmates should matter for students' educational performance. Nevertheless, there is probably a difference between the public view and the policy maker's view on how this effect works in reality in the schools and what the consequences of this influence are for pupils' educational performance.

A typical public view can be that peers representing the same high level of the social and cultural milieu from home will stimulate each other in an atmosphere where skills, abilities, and good educational performance are valued. And on the contrary, peers coming from families with lower level of social and cultural milieu will produce a school environment where skills, abilities, and good educational performance are not valued so much and this will hinder even the performance of the talented pupils. This public view usually leads to support segregation in the school. There is a quite frequent opinion, especially among parents with a middle, upper-middle or even higher social standing that the integration of pupils with worse social background can decrease or even destroy educational climate and, consequently, school performance of students coming from better social circumstances will also turn to be weaker. Coleman (1988) argues that parents have high responsibility for generating human capital for their offspring and they have to invest into their children for the purpose of increasing their human capital. A possible form of this investment can be if parents choose schools for their children where they think that the appropriate and stimulating educational environment is ensured by the suitable social composition of schoolmates as well. This behavior is based, in fact, on the assumption of an existing peer influence with a particular direction leading to the fact that less segregated grouping of students is disadvantageous for the socially privileged children.[1]

[1] It is important to note that expected higher academic performance of the school is just one reason, which makes high-status parents to prefer to choose schools where other children are alike from

On the other hand, the majority of educational policy recommendations argue that heterogeneous grouping of students, less education segregation is best suited for students. The claim is again that children's performance at school depends on their peers as well and it is assumed that higher levels of social segregation lead to greater inequality in academic achievement. This kind of policy argument is even stronger for pupils who come from more disadvantaged families with less favorable social background. These pupils are expected to benefit from a less segregated educational environment because their achievement can be better if they can study in a more heterogeneous environment where they can have peers who come from families with higher social status. At the same time, there is an alternate approach in educational policy and also among teachers claming that teaching can be more efficient with pupils grouped more homogeneously and students can also achieve better if they are more alike each other – especially regarding existing skills and capabilities. This latter assumption leads frequently to curriculum tracking and ability grouping of the students.

A review of the relevant literature of previous studies shows that the most frequent approach of studying integration vs. differentiation occurs perhaps by race or ethnic origin. In line with the assumptions above, Coleman et al. (1975) found a trend for an increasing racial segregation of black students when white families departed from schools where stronger integration took place due to some policy-driven measures. In fact, the intended process of integration turned to an unintended process of segregation because families with higher social standing simply followed the public view described above and "voted" against integration as they took their children to another school. In consequence, the academic performance of black students, which used to be better in majority white schools, deteriorated – supporting the view of the policy makers on the usefulness of higher integration. Other studies on the same topic also confirmed the academic gains of African-American students in integrated schools (e.g., Entwisle & Alexander, 1992, 1994).

A similarly frequent and old issue in this type of research is the grouping of students on the ground of differentiation based on abilities and placing them in different schools or in different curricular tracks accordingly (e.g., Hauser & Featherman, 1976; Heyns, 1974; Kulik & Kulik, 1982; Oakes, 1985; Sorensen & Hallinan, 1986; Hallinan & Sorensen, 1987). Hallinan (1988) summarizes the findings that tracking and ability grouping have a negative effect on the achievement of lower track and ability group students and a weak to modest positive effect on the performance of higher track and ability group students. If this holds, then policy makers are right that integration can be beneficial for students who ought to "catch up," while other students who have some advantages benefit from segregation.

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the viewpoint of social and cultural background. In fact, they expect the peer effects even more widespread and are afraid of any other "bad" influence their offspring can learn from or experience with children with lower social standing. A recent study finds very limited peer effects on educational attainment but concludes that parents can still keep on considering the peer composition of the school when choosing among options because of the other advantages of the peer group being not necessarily of cognitive character (Gibbons & Telhaj, 2006).

A more recent and relevant broad concept being suitable for investigating school segregation is the organizational approach of schools and communities (Arum, 2000). This approach puts large emphasis on aspects of the broader environment, e.g., the role of neighborhood (which probably contributes to school segregation in accordance with the existing spatial segregation, especially when enrolment to education is based on school districts). In fact, the concept of schools as organizations has significant foregoing references (e.g., Bidwall, 1965; Meyer & Rowan, 1977) but communities around the school and differences in parental interaction with the school had strong contribution to the variance in academic performance for public and Catholic schools as well (Coleman & Hoffer, 1987). Institutional arrangements (Kerckhof, 1995) and legal regulations are also part of the environment being influential for school segregation and students' educational achievement. In a recent study, Buchmann and Dalton (2002) demonstrated how peer effects are influenced by the institutional context of the school system in different countries. They grouped 12 countries by the type of educational system regarding stratification and tracking and found that students' educational aspirations are less influenced by their parents or peers in countries where stratification and tracking of the school system are stronger.

Indeed, countries differ a lot in whether study programs or school compositions are based on different kinds of groupings of pupils resulting in more homogeneous or heterogeneous schools and how educational policy handles school segregation. Educational systems are usually characterized by higher or lower level of segregation depending – among others – on the role of tracking (e.g., academic vs. vocational tracks) in the school structure. On this ground, when investigating the extent of educational segregation Jenkins, Micklewright and Schnepf (2006) labeled Austria, Germany and Hungary as most segregated, while Finland, Norway, Sweden or Denmark as less segregated educational systems. In addition to vocational specificity as main determinant of tracking, in a broader sense the whole welfare regime concept and differences in the welfare regimes as formulated by Esping-Andersen (1990, 1999) can have an impact on policy intentions to making schools to play a stronger or weaker institutional role in compensating the inequalities pupils have and bring from home when they enter the educational system. Most probably, the Scandinavian countries with their social democratic welfare regime are in special position in this regard as well, while, e.g., the educational system in the Anglo-Saxon nations is more competitive under the conditions of a liberal welfare regime. This indicates that the national systems of education have strong policy responsibilities in line with the policy relevance of the issue (Postlethwaite, 1995).

Research Hypotheses About the Effect of Segregation

Unlike the quoted studies above, this analysis does not aim to deal with segregation based on race, ethnicity or ability. Instead the study focuses on homogeneity vs. heterogeneity with respect to social background like parental education and occupation. This means that the present research follows an approach stating that if schools are socially segregated it means that students from more affluent families are concentrated and being separated from pupils from low-status families who tend to concentrate in other schools.[2]

Along these lines, the general hypothesis can expect to find support for the major educational policy argument.

H1. Educational segregation decreases educational performance or, in other words, more heterogeneous grouping of students will increase their achievement.

In the next step, going into more details, further distinctions can be made between pupils with better and worse social background characteristics. Here two hypotheses are possible.

H2. Students coming from less advantageous families benefit from heterogeneous grouping and lower segregation; their performance is higher in such educational environment with higher integration.

H3. Heterogeneous grouping of students is detrimental for the achievement of students coming from families with better social standing; low level of segregation, higher integration decreases their school performance.

In addition to these three main hypotheses some further expectations can be mentioned like social origin has a direct effect on school performance, students with more favorable family background achieve better, while less affluent pupils achieve worse; boys achieve better on math test, while girls achieve better on reading test; the average math and reading scores are higher in schools in larger settlements. The hypotheses are worth to test on different sub-groups of the countries in accordance with the expected variation in the country-specific characteristics of the institutional settings within the national systems of education. For example, students' educational performance can be less affected by the higher integration in the Scandinavian countries where the educational system is probably more egalitarian anyway in accordance with the democratic welfare regime, but can be more affected in the Anglo-Saxon nations with a more liberal welfare regime. The Post-Communist countries have a school system where tracking plays a large role. On this ground, higher integration in schools can be assumed as having positive influence on educational outcomes. The Asian countries can perhaps be characterized by strong individual competition in the schools. This can lead to stronger peer effects as well.

[2] In fact, the PISA data used for the analysis would not make possible any other option either with respect to the available information. At the same time, in most societies ethnic or racial segregation is not independent from social segregation based on parental educational and occupational characteristics.

Research Design: Data, Measures, and Statistical Models

Data

The analysis is based on the *PISA 2003 data set*. The PISA survey has been carried out in most of the OECD plus in some other countries among students aged 15 years old. Both the methods and the most important findings are well documented in various OECD publications (e.g., OECD, 2004). A pooled file containing data from 41 countries are available on the Internet. Some countries have been left out from the analysis: France, Hong Kong and Macao-China because of the missing school location; Brazil, Mexico, Tunesia, and Uruguay because of the geographical location and the specificity of the national educational systems; and Lichtenstein because of the low N of cases. This means 33 countries with 215,485 pupils based on the original sample size in each country. The data have been weighted by the student weight, which is provided by the OECD and available in the original file. Since this weight makes up the observations to the real number of students in each country, the data have been adjusted back to the original sample size of the surveys in each country. In a next step, all variables to be used in the analysis were investigated from the viewpoint of missing cases. In order to avoid losing these cases, dummy variables were computed which indicate if no valid information is available for a given pupil on a given variable. By including these variables in the analysis, these cases remained in the data set.

Variables

The *dependent* variables of the analysis are the so-called plausible values for math and reading. The PISA 2003 data set contains 5-5 of them; taking into account the measurement errors emerging from the math and reading tests, 2×5 plausible value variables are assigned to each respondent for math and reading. Students' real achievement is a kind of average of these values. Nevertheless, the plausible values correlate at a very high level; for math, these correlations are around 0.920 and 0.921 and for reading they are a bit lower, around 0.851–0.853. When computing aggregate measures out of the plausible values, separately for math and reading,[3] they also correlated at a very high level with the input variables: 0.967–0.968 for math and 0.938–0.939 for reading. It seems to be reasonable to run all analyses twice, separately for math and reading, making a distinction between "real" and "human" fields of learning, though the aggregate measures for math and reading turned out to correlate at a level of 0.843.

[3] Various ways of aggregating could be applied: simple arithmetic means, principal axis factoring, and principal component analysis.

The *independent* variables contain five groups of measures.

1. For demographics, in case of gender females are coded as 1; age is taken as it was available in the PISA data set; grade level compared to modal grade expresses the possible repetition; and for family structure, single- and other forms of parenthood are contrasted to intact family as a reference.
2. The PISA data contain a categorical variable on the location of the school; four dummies were computed for village, small town, city, and large city, while town is the reference category. The school-size variable informs on the number of the students in the school. These variables serve control purposes.
3. For parental social background, two measures are available. HISEI is a parental socio-economic index (Ganzeboom et al., 1992); PARED is the highest parental educational level measured in years. In this way, the social and the cultural components of social origin are taken into account as direct and main effects influencing students' achievement.
4. Based on the same information on social background, four measures were computed in order to characterize the school from the viewpoint of social and cultural climate. On the one hand, the *mean level* of the parental socio-economic index and of the highest parental education has been computed and these means express how high or low the general level of the school is by these social and cultural parental indicators. On the other hand, the *standard deviation* for the parental socio-economic index and for the highest parental education has been computed. Both means and standard deviations are contextual variables and were computed on the school level within countries. The measures derived from an aggregation procedure were merged to each individual student.

   In fact, these standard deviation variables serve as simple measures for segregation as they express homogeneity vs. heterogeneity. Higher standard deviations for the parental status or education depict larger heterogeneity in the school and lower levels of segregation with respect to the social and cultural conditions, while smaller standard deviations for parental status or education show larger homogeneity for the school and stronger segregation in the social and cultural settings. In simple statistical terms, if there is a *positive* relationship between the predictors and the dependent variables (where higher value means better test scores and better performance), then lower segregation *increases* achievement. But if there is a *negative* relationship between the predictors and the dependent variables, then lower segregation (or higher integration) *decreases* achievement. In this way, the general hypothesis of the study will be tested.
5. The last group of the independent variables contains *interaction terms* between the two social background variables (parental socio-economic index and highest level of parental education) and the two segregation measures (standard deviations) derived from the aggregation procedure for occupation and education on the school level within countries. In fact, four interaction terms have been computed. For both continuous parental social background variables (HISEI and PARED) 2-2 dummies have been computed expressing that

the pupil comes from a family which belongs to the highest or the lowest 25% regarding the socio-economic status or the level of education in the family. Consequently, the interaction terms model the four situations.

5.1. Pupil from low-status family in a school segregated at low level = lowest 25% of the socio-economic status (HISEI) × standard deviation of parental occupation (HISEI) in the school;
5.2. Pupil from low culture family in a school segregated at low level = lowest 25% of the parental education (PARED) × standard deviation of parental education (PARED) in the school;
5.3. Pupil from high-status family in a school segregated at low level = highest 25% of the socio-economic status (HISEI) × standard deviation of parental occupation (HISEI) in the school;
5.4. Pupil from high culture family in a school segregated at low level = highest 25% of the parental education (PARED) × standard deviation of parental education (PARED) in the school.

The interaction terms serve to model how school segregation affects educational attainment for those students coming from better or worse social background. In simple statistical terms, if there is a *positive* relationship between the predictors representing students coming from low-status families (5.1., 5.2.) and the dependent variables, it means that these *low-status pupils benefit from lower educational segregation.* In this way the second hypothesis of the study will be tested. But if there is a *negative* relationship between the predictors representing students coming from high-status families (5.3., 5.4.) and the dependent variables, it means that these *high-status pupils achieve worse under the conditions of lower educational segregation in integrated schools.* In this way, the third hypothesis of the study will be tested.

Models

In the whole analysis, OLS regressions are applied where the math and reading are the dependent variables and they are predicted by the independent variables. The models are estimated for the full set of the selected countries ($N = 33$) and also for five subsets of the countries: EU19, Scandinavian, Anglo-Saxon, Post-Communist and Asian nations.[4] The unstandardized regression estimates are presented in the tables if they are significant at least $p < 0.05$ level. Fit of models is indicated by the adjusted R^2 values.

[4] Country groups: EU-19: Austria, Belgium, Czech R., Denmark, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Spain, Sweden, UK ($N = 110{,}792$); Scandinavian: Denmark, Finland, Iceland, Norway, Sweden ($N = 21{,}366$); Anglo-Saxon: Australia, Canada, New Zealand, UK, USA ($N = 57{,}561$), Post-Communist: Czech R., Hungary, Latvia, Poland, Russia, Slovakia, Yugoslavia ($N = 37{,}741$), and Asian: Indonesia, Japan, Korea, Thailand ($N = 25{,}925$).

Hypotheses 1–3 are tested independently in 6 models for the pooled file of the 33 countries, separately for students' reading and math performance:

1. Model H1.A-B refers to Hypothesis 1; model A is the direct and uncontrolled effects of the two segregation measures (standard deviation of HISEI and PARED);
2. Model B contains the same effects controlled for all other independent variables: the level of the school, the main effects of parental socio-economic background and education, gender, age, grade, school location, and school size;
3. Model H2.A-B refers to Hypothesis 2; model A is the direct and uncontrolled effects of the low-status/culture students in the low segregated schools;
4. Model B contains the same effects controlled for all other independent variables;
5. Model H3.A-B refers to Hypothesis 3; model A is the direct and uncontrolled effects of the high-status/culture students in the low segregated schools;
6. Model B contains the same effects controlled for all other independent variables.

The same analysis is replicated for the five country sub-sets.[5]

Finally, a full model including all independent variables is also estimated for the full set of countries as well as for all country groups.

Results

Before turning to the multivariate analysis of the educational achievement, it is worth to look at the bivariate relationships between the main predictors (see Tables 1 and 2). The zero-order correlations indicate that integration by status (parental occupational score) *increases* but integration by cultural conditions (highest level of parental education) *decreases* students' performance in general.[6] This pattern holds for both reading and math and for most of the country groups. The Anglo-Saxon countries deviate where even integration by social status decreases achievement, while lower segregation increases students' performance in the Post-Communist nations. It also seems that low-status/culture pupils do not benefit from integration (the correlation coefficients are negative). But the achievement of high-status/culture pupils has not deteriorated either in the integrated schools (the correlation coefficients are positive). This pattern is fully consistent for all country groups. Thus, at first sight the hypotheses in this regard seem to be not supported by the data – if no controls are taken into account. At the same time, both the level of the school

[5] All models are controlled for the country dummies. Reference countries: Canada for the full set model, Italy for the EU-19 countries, Finland for the Scandinavian countries, Canada for the Anglo-Saxon countries, Slovakia for the Post-Communist countries, and Indonesia for the Asian countries.

[6] It is important that this divergent pattern exists in the level of correlations, so this is not a consequence of any multicollinearity between these measures. In fact, the two segregation variables correlate only at 0.049 (see Table 19.)

Table 1 Zero-order correlations between school segregation and educational achievement: Reading performance

Explanatory variables	Full country set (33)	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
The effect of segregation						
–Parental occupation (std)	0.137	0.213	0.060	−0.026	0.114	0.036
–Parental education (std)	−0.222	−0.159	−0.072	−0.144	0.030	−0.436
Interaction terms						
Low status × low segregation	−0.177	−0.195	−0.170	−0.197	−0.179	−0.135
Low culture × low segregation	−0.189	−0.189	−0.144	−0.117	−0.106	−0.250
High status × low segregation	0.232	0.258	0.198	0.230	0.244	0.167
High culture × low segregation	0.146	0.152	0.116	0.156	0.200	0.107
The level of the school						
–Parental occupation (mean)	0.494	0.456	0.118	0.330	0.422	0.654
–Parental education (mean)	0.429	0.351	0.060	0.264	0.396	0.592
Parental main effects						
Occupation (status)	0.355	0.326	0.224	0.285	0.298	0.418
Education (culture)	0.311	0.249	0.168	0.212	0.266	0.377

as measured by the means of parental occupational score and the level of parental education, and the parental characteristics of the students at individual level have positive impact on achievement as one can expect. (Further correlations between the independent variables are shown in the Appendix Table 19.)

Testing Hypothesis 1

We assumed that heterogeneous grouping of students will increase their educational achievement. In Tables 3 and 4, the H1.A models show that – in line with the correlations – integration by status increases but integration by culture decreases educational performance in reading and math (controlled for country variation). When further control variables are added to the model (H1.B + the "full model"), the positive influence of status integration turns to insignificant (for reading) and even to negative for math. It seems that the expectation of policy makers that the lower level of segregation has a general favorable outcome for students' educational achievement does not hold.

Table 2 Zero-order correlations between school segregation and educational achievement: math performance

Explanatory variables	Full country set (33)	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
The effect of segregation						
–Parental occupation (std)	0.122	0.174	0.045	−0.034	0.091	0.015
–Parental education (std)	−0.270	−0.203	−0.066	−0.133	0.013	−0.516
Interaction terms						
Low status × low segregation	−0.179	−0.197	−0.190	−0.206	−0.194	−0.143
Low culture × low segregation	−0.205	−0.198	−0.154	−0.118	−0.154	−0.253
High status × low segregation	0.235	0.260	0.223	0.244	0.247	0.159
High culture × low segregation	0.158	0.165	0.134	0.187	0.247	0.110
The level of the school						
–Parental occupation (mean)	0.518	0.462	0.121	0.334	0.444	0.699
–Parental education (mean)	0.471	0.383	0.105	0.290	0.415	0.640
Parental main effects						
Occupation (status)	0.375	0.341	0.251	0.293	0.316	0.447
Education (culture)	0.342	0.276	0.189	0.235	0.303	0.406

All correlations are significant at least at $p < 0.05$.
Country groups: Full country set: See text ($N = 215{,}105$).
EU-19: Austria, Belgium, Czech R., Denmark, Finland, Germany, Greece, Hungary, Ireland, Italy, Latvia, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Spain, Sweden, United Kingdom ($N = 110{,}792$).
Scandinavian: Denmark, Finland, Iceland, Norway, Sweden ($N = 21{,}366$).
Anglo-Saxon: Australia, Canada, New Zealand, United Kingdom, United States ($N = 57{,}561$).
Post-Communist: Czech R., Hungary, Latvia, Poland, Russia, Slovakia, Yugoslavia ($N = 37{,}741$).
Asian: Indonesia, Japan, Korea, Thailand ($N = 25{,}925$).

Table 3 The effect of school segregation on educational achievement: Reading performance, full set of countries (33), $N = 215{,}105$

Explanatory variables[a]	Model H1.A	Model H1.B	Model H2.A	Model H2.B	Model H3.A	Model H3.B	Full model
The effect of segregation							
–Parental occupation (std)	5.092	(− 0.101)					(0.043)
-Parental education (std)	−21.898	−3.710					−2.799
Interaction terms 1							
Low status × low segregation			−2.182	−0.480			−0.553
Low culture × low segregation			−9.237	−1.448			−0.816
Interaction terms 2							
High status × low segregation					3.019	−0.092	0.194
High culture × low segregation					4.505	−1.374	−0.487
The level of the school							
–Parental occupation (mean)		2.979		2.968		2.960	2.993
–Parental education (mean)		4.264		5.240		5.072	4.302
Parental main effects							
Occupation (status)		0.655		0.522		0.699	0.443
Education (culture)		1.184		0.691		1.524	1.017
Missing occupation		−35.352		−36.769		−35.296	−36.308
Missing education		−36.887		−37.269		−37.269	−37.747
Demographics							
Sex = female		29.976		30.014		29.933	29.984
Age		−6.830		−6.793		−6.756	−6.809
Grade		34.690		34.717		34.662	34.616
Family							
–Single		−11.315		−11.366		−11.931	−11.295
–Mixed		−6.909		−6.998		−7.058	−6.924
–Other		−26.732		−28.816		−26.726	−26.763

Table 3 (continued)

Explanatory variables[a]	Model H1.A	Model H1.B	Model H2.A	Model H2.B	Model H3.A	Model H3.B	Full model
–Missing		−22.973		−21.537		−21.459	−22.538
School							
Location							
–Village		9.075		9.725		9.619	9.261
-Small town		6.457		6.747		6.666	6.494
–City		−2.096		−2.287		−2.202	−2.056
–Big city		−4.708		−4.905		−4.931	−4.602
School size		0.005		0.005		0.005	0.005
Missing school size		−5.345		−5.419		−5.467	−5.286
Constant	506.692	370.028	544.856	364.430	513.751	344.061	381.178
Adjusted R^2	0.209	0.419	0.208	0.419	0.216	0.418	0.419

Significance = $p < 0.05$, not significant estimates in brackets.
[a]Controlled but not shown by country dummies, reference is Canada.
Note: Models H1A-B refers to hypothesis 1, H2A-B to hypothesis 2, and H3A-B to hypothesis 3.

Table 4 The effect of school segregation on educational achievement: math performance, full set of countries (33), $N = 215{,}105$

Explanatory variables[a]	Model H1.A.	Model H1.B.	Model H2.A.	Model H2.B.	Model H3.A.	Model H3.B.	Full model
The effect of segregation							
–Parental occupation (std)	4.838	−0.244					−0.156
–Parental education (std)	−22.356	−2.395					−2.584
Interaction terms 1.							
Low status × low segregation			−2.286	−0.374			−0.516
Low culture × low segregation			−9.898	−0.493			(− 0.293)
Interaction terms 2.							
High status × low segregation					3.114	(0.078)	0.368
High culture × low segregation					6.060	(0.013)	0.721
The level of the school							

Table 4 (continued)

Explanatory variables[a]	Model H1.A.	Model H1.B.	Model H2.A.	Model H2.B.	Model H3.A.	Model H3.B.	Full model
–Parental occupation (mean)		3.073		3.057		3.049	3.084
–Parental education (mean)		5.468		6.181		6.134	5.519
Parental main effects							
Occupation (status)		0.673		0.568		0.648	0.403
Education (culture)		1.189		1.022		1.183	0.896
Missing occupation		−29.152		−29.984		−28.333	−29.494
Missing education		−30.071		−29.680		−29.324	−29.616
Demographics							
Sex = female		−14.526		−14.514		−14.542	−14.482
Age		−6.053		−6.016		−6.021	−6.092
Grade		37.075		37.078		37.098	37.104
Family							
–Single		−12.631		−12.692		−12.737	−12.625
–Mixed		−8.941		−9.081		−9.018	−8.873
–Other		−27.051		−27.140		−27.136	−27.115
–Missing		−24.611		−23.184		−23.144	−24.547
School							
Location							
–Village		10.705		11.264		11.175	10.791
-Small town		7.349		7.559		7.525	7.395
–City		−2.902		−3.004		−2.976	−2.922
–Big city		−6.171		−6.314		−6.366	−6.160
School size		0.006		0.006		0.006	0.006
Missing school size		−3.443		−3.514		−3.567	−3.430
Constant	516.483	361.613	550.859	352.345	517.196	344.994	378.150
Adjusted R^2	0.242	0.424	0.247	0.424	0.258	0.424	0.425

Significance = $p < 0.05$, not significant estimates in brackets.
[a]Controlled but not shown by country dummies, reference is Canada.
Note: Models H1A-B refers to hypothesis 1, H2A-B to hypothesis 2, and H3A-B to hypothesis 3.

Separate analysis by the country groups adds some variation to this result (Tables 5, 6, 7 and 8). The policy related hypothesis 1 is more supported in the Post-Communist countries for reading and to some extent for math, too, but it fails completely in the Anglo-Saxon and Asian countries – when controlled for the other independent variables.

Table 5 The effect of school segregation on educational achievement: Hypothesis 1. Reading performance, uncontrolled estimates, country groups

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
Parental occupation (std)	7.485	0.571	(0.197)	6.609	5.033
Parental education (std)	–22.002	–12.458	–17.796	(–1.051)	–21.975
Constant	441.056	565.197	567.429	378.607	397.704
Adjusted R^2	0.115	0.066	0.035	0.132	0.463

Table 6 The effect of school segregation on educational achievement: Hypothesis 1. Reading performance, controlled estimates, country groups

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
Parental occupation (std)	(0.029)	(0.025)	–0.823	0.739	–1.234
Parental education (std)	(–0.358)	–3.756	–5.491	1.531	–9.383
Constant	367.630	356.435	490.281	427.285	234.288
Adjusted R^2	0.385	0.240	0.266	0.403	0.566

Table 7 The effect of school segregation on educational achievement: Hypothesis 1. Math performance, uncontrolled estimates, country groups

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
Parental occupation (std)	6.875	(0.235)	(–0.084)	6.073	5.406
Parental education (std)	–21.588	–12.727	–16.735	–2.316	–26.271
Constant	438.287	571.948	574.172	417.456	348.277
Adjusted R^2	0.132	0.052	0.045	0.094	0.542

Table 8 The effect of school segregation on educational achievement: Hypothesis 1. Math performance, controlled estimates, country groups

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
Parental occupation (std)	–0.338	(–0.134)	–0.932	(0.267)	–1.476
Parental education (std)	1.133	–3.637	–2.257	1.658	–13.592
Constant	375.269	352.781	425.420	427.605	228.813
Adjusted R^2	0.377	0.181	0.248	0.363	0.625

Significance = $p < 0.05$, not significant estimates in brackets.
Estimates in Tables 5 and 7 are controlled but not shown by the country dummies only; estimates in the Tables 6 and 8 tables are controlled but not shown as in Tables 3 and 4 (column 2).

Testing Hypothesis 2

When students with poor social and cultural background can study in an integrated school environment, their educational performance is expected to be better. The negative estimates from the H2A models in Tables 3 and 4 do not confirm this policy assumption. The result persists even if various forms of the model are fitted to the data including the other predictor variables as well (H2B models + the "full model"). In this respect, there is not much country variation either (Tables 9, 10, 11, and 12). Only those pupils coming from families where parents belong to the lowest quadrate culturally can benefit from studying under less segregated and more integrated school environment if they live in the Anglo-Saxon countries.

Table 9 The effect of school segregation on educational achievement: Hypothesis 2. Reading performance, uncontrolled estimates, country groups

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
Low status × low segregation	–2.344	–1.913	–2.428	–2.042	–1.286
Low culture × low segregation	–9.754	–8.008	–7.302	–15.696	–7.136
Constant	493.573	558.137	543.991	482.733	396.492
Adjusted R^2	0.101	0.097	0.060	0.143	0.431

Table 10 The effect of school segregation on educational achievement: Hypothesis 2. Reading performance, controlled estimates, country groups

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
Low status × low segregation	–0.572	–0.296	–0.162	–0.181	–0.346
Low culture × low segregation	–1.732	(–0.620)	2.458	–5.000	–2.455
Constant	383.548	322.022	407.384	460.445	197.025
Adjusted R^2	0.386	0.240	0.264	0.404	0.560

Table 11 The effect of school segregation on educational achievement: Hypothesis 2. Math performance, uncontrolled estimates, country groups

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
Low status × low segregation	–2.405	–2.141	–2.537	–2.227	–1.595
Low culture × low segregation	–10.122	–8.309	–8.232	–17.873	–8.007
Constant	484.085	560.160	550.243	513.104	377.379
Adjusted R^2	0.130	0.090	0.078	0.122	0.512

Table 12 The effect of school segregation on educational achievement: Hypothesis 2. Math performance, controlled estimates, country groups

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
Low status × low segregation	–0.408	(–0.113)	(–0.105)	–0.258	–0.409
Low culture × low segregation	–0.607	(–0.083)	3.543	–3.359	–2.898
Constant	389.709	308.294	365.329	451.935	174.149
Adjusted R^2	0.377	0.181	0.247	0.364	0.616

Significance = $p < 0.05$, not significant estimates in brackets.
Estimates in Tables 9 and 11 are controlled but not shown by the country dummies only; estimates in Tables 10 and 12 are controlled but not shown as in Tables 3 and 4 (column 4).

Testing Hypothesis 3

A typical concern for families with better social standing is that their offspring will perform worse in the school if they study under integrated conditions where schoolmates come from less advantageous social background. This assumption is not supported by this analysis either. The interaction terms expressing that pupils coming from families where parents belong to the lowest quadrate either socially or culturally study in less segregated but more integrated schools turn out to be positive. This pattern mostly holds even if controlled for only the country dummies (H3A models in Tables 3 and 4) or controlled for any other independent variables (H3B models in Tables 3 and 4 + the "full model"). Nevertheless, in case of reading and in the EU-19 country-group – when the control variables are introduced – there is more probability that these pupils perform worse, given that the school is culturally integrated. In fact, the same result appears for the sub-set of the Scandinavian countries as well both for reading and math. At the same time, high-status/culture students in integrated schools do not seem to be in any danger in the Anglo-Saxon countries (Tables 13, 14, 15, and 16).

Table 13 The effect of school segregation on educational achievement: Hypothesis 3. Reading performance, uncontrolled estimates, country groups

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
High status × low segregation	3.254	2.383	2.721	2.658	2.783
High culture × low segregation	4.862	2.802	6.234	14.921	1.090
Constant	460.144	531.972	513.590	453.333	371.131
Adjusted R^2	0.110	0.093	0.072	0.173	0.440

Table 14 The effect of school segregation on educational achievement: Hypothesis 3. Reading performance, controlled estimates, country groups

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
High status × low segregation	–0.236	0.256	0.161	3.052	(–0.131)
High culture × low segregation	–1.608	–5.452	(0.146)	(–0.175)	(–0.696)
Constant	358.674	312.885	424.621	446.545	182.404
Adjusted R^2	0.386	0.242	0.264	0.403	0.560

Table 15 The effect of school segregation on educational achievement: Hypothesis 3. Math performance, uncontrolled estimates, country groups

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
High status × low segregation	3.321	2.697	2.782	2.581	3.057
High culture × low segregation	6.170	3.905	8.639	18.827	1.651
Constant	449.015	530.680	516.477	480.705	348.281
Adjusted R^2	0.143	0.091	0.095	0.153	0.518

Table 16 The effect of school segregation on educational achievement: Hypothesis 3. Math performance, controlled estimates, country groups

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
High status × low segregation	(–0.061)	0.437	0.292	–0.213	(–0.096)
High culture × low segregation	(–0.406)	–4.402	3.049	4.412	–0.930
Constant	378.886	309.669	396.611	446.233	157.303
Adjusted R^2	0.377	0.183	0.247	0.363	0.616

Significance = $p < 0.05$, not significant estimates in brackets.
Estimates in Tables 13 and 15 are controlled but not shown by the country dummies only; estimates in Tables 14 and 16 are controlled but not shown as in Tables 3 and 4 (column 6).

The Role of the Control Variables

The last columns of Tables 3 and 4 (for the full set of countries) as well as Tables 17 and 18 (for the sub-sets of the countries) display the full model with all independent variables. In accordance with the correlation coefficients, the control variables affect students' educational achievement as one can expect. Pupils perform better if the level of the school is higher socially or culturally as measured by the mean of the parental socio-economic index as well as by the mean of the parental education.

Students also achieve better if their parents have higher socio-economic status or school level.

Girls are better in reading and boys are better in math. Age turns out to be negative but only because its effect is controlled for grade. Grade has a stronger positive effect on school performance, indicating that grade repetition decreases

Table 17 The effect of school segregation on educational achievement: Full models Reading performance, country groups[a]

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
The effect of segregation					
–Parental occupation (std)	0.225	(0.064)	−0.865	0.907	−1.177
–Parental education (std)	(0.376)	(–1.367)	−6.612	1.642	−9.481
Interaction terms 1					
Low status × low segregation	−0.601	−0.414	−0.280	−0.340	(–0.146)
Low culture × low segregation	−1.476	(–0.178)	3.032	−7.891	−0.960
Interaction terms 2					
High status × low segregation	(0.056)	0.450	0.431	(–0.027)	(0.139)
High culture × low segregation	−1.138	−5.109	1.167	6.909	1.388
The level of the school					
–Parental occupation (mean)	3.115	0.839	2.931	3.104	3.575
–Parental education (mean)	5.962	(1.132)	(–1.035)	9.975	1.527
Parental main effects					
Occupation (status)	0.500	0.705	0.578	0.558	(0.113)
Education (culture)	0.893	4.658	2.734	−2.354	−0.594
Missing occupation	−46.252	−49.792	−28.603	−39.802	−27.568
Missing education	−37.132	−46.750	−21.939	−50.820	−28.622
Demographics					
Sex	29.358	40.228	31.198	28.247	23.149
Age	−10.665	(2.443)	−9.740	−19.771	(2.658)
Grade	39.607	46.295	36.097	33.456	15.139
Family					
–Single	−7.678	−12.626	−18.997	(–1.510)	−9.732
–Mixed	−4.753	−8.922	−11.359	−4.421	7.257
–Other	−27.551	−33.468	−45.265	−14.739	−11.420
–Missing	−17.157	(–6.2)	−8.881	−41.858	−27.168
School					
Location					
–Village	8.438	8.035	(–2.340)	11.075	5.437
–Small town	8.214	3.028	5.712	(1.540)	4.849
–City	(0.326)	(–0.202)	−7.367	−2.760	(–1.155)
–Big city	−6.842	8.892	−10.192	−3.121	−3.412

Table 17 (continued)

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
School size	0.007	(0.003)	0.008	0.014	0.005
Missing school size	−7.471	(2.691)	−4.090	(2.777)	12.437
Constant	375.304	341.114	492.344	479.264	243.656
Adjusted R^2	0.387	0.243	0.267	0.406	0.566

Significance = $p < 0.05$, not significant estimates in brackets.
Controlled but not shown by country dummies, reference with *bold.*
[a]Country groups:
EU-19: Austria, Belgium, Czech R., Denmark, Finland, Germany, Greece, Hungary, Ireland, **Italy,** Latvia, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Spain, Sweden, United Kingdom (N = 110,792).
Scandinavian: Denmark, **Finland**, Iceland, Norway, Sweden (N = 21,366).
Anglo-Saxon: Australia, **Canada,** New Zealand, United Kingdom, United States (N = 57,561).
Post-Communist: Czech R., Hungary, Latvia, Poland, Russia, **Slovakia**, Yugoslavia (N = 37,741).
Asian: **Indonesia,** Japan, Korea, Thailand (N = 25,925).

Table 18 The effect of school segregation on educational achievement: Full models Math performance, country groups[a]

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
The effect of segregation					
–Parental occupation (std)	−0.229	(–0.219)	−0.991	0.441	−1.421
–Parental education (std)	1.409	−1.876	−4.576	(1.157)	−13.930
Interaction terms 1					
Low status × low segregation	−0.470	−0.295	−0.330	−0.370	−0.178
Low culture × low segregation	−0.770	(0.385)	3.255	−6.422	−0.640
Interaction terms 1					
High status × low segregation	0.208	0.601	0.606	(0.001)	0.225
High culture × low segregation	(–0.284)	−4.014	3.559	7.687	1.806
The level of the school					
–Parental occupation (mean)	3.138	0.812	2.973	3.432	4.070
–Parental education (mean)	7.028	(1.744)	(0.888)	12.329	2.219
Parental main effects					
Occupation (status)	0.503	0.831	0.507	0.462	0.104

Table 18 (continued)

Explanatory variables	EU-19	Scandinavian (5)	Anglo-Saxon (5)	Post-Communist (7)	Asian (4)
Education (culture)	0.886	4.223	2.361	−1.242	−0.803
Missing occupation	−36.463	−42.755	−24.673	−28.745	−24.054
Missing education	−30.079	−39.454	−15.284	−34.867	−24.506
Demographics					
Sex	−17.536	−7.009	−10.090	−16.666	−11.149
Age	−11.217	(3.627)	−6.849	−19.775	(2.370)
Grade	42.464	50.553	36.584	38.417	14.816
Family					
–Single	−10.611	−16.382	−16.962	−2.498	−12.262
–Mixed	−10.611	−9.922	−12.252	−6.563	8.006
–Other	−27.129	−29.511	−40.288	−22.080	−13.950
–Missing	−23.399	−11.354	−3.505	−45.400	−38.063
School					
Location					
–Village	9.569	8.975	(–0.599)	14.888	8.498
–Small town	8.985	3.955	6.453	(2.041)	5.602
–City	(–1.148)	(–0.808)	−6.769	−5.687	(–2.253)
–Big city	−11.469	(7.058)	−9.738	−7.669	−3.680
School size	0.008	0.010	0.008	0.014	0.007
Missing school size	−7.033	(4.213)	(0.778)	(–3.399)	−16.424
Constant	385.032	341.097	444.427	479.681	240.179
Adjusted R^2	0.377	0.183	0.250	0.365	0.625

Significance = $p < 0.05$, not significant estimates in brackets.
Controlled but not shown by country dummies, reference with *bold.*
[a]Country groups:
EU-19: Austria, Belgium, Czech R., Denmark, Finland, Germany, Greece, Hungary, Ireland, **Italy,** Latvia, Luxembourg, Netherlands, Poland, Portugal, Slovakia, Spain, Sweden, United Kingdom ($N = 110{,}792$).
Scandinavian: Denmark, **Finland**, Iceland, Norway, Sweden ($N = 21{,}366$).
Anglo-Saxon: Australia, **Canada,** New Zealand, United Kingdom, United States ($N = 57{,}561$).
Post-Communist: Czech R., Hungary, Latvia, Poland, Russia, **Slovakia**, Yugoslavia ($N = 37{,}741$).
Asian: **Indonesia,** Japan, Korea, Thailand ($N = 25{,}925$).

educational achievement.[7] In contrast to intact family background, any other family settings decrease the performance of pupils. From the multivariate model it seems that students achieve better in small settlements but this is again because of the

[7] Age has a slight positive correlation with reading (0.060) and with math (0.070), while grade has a much stronger positive correlation: 0.250 with reading and 0.224 with math. The correlation between age and grade is 0.245.

control of the other independent variables.[8] All variables, which indicate that given information is missing for given student have negative effect on educational achievement.

Explanatory Power of the Models

The adjusted R^2 values are included for all models in all tables in the analysis. The models explain the variance of the reading and math performance by about 42% (for the full set of countries). The explained variances are somewhat smaller for the Scandinavian and the Anglo-Saxon countries, the extremes are 18% (math performance in the Scandinavian nations) and 25% (math performance in the Anglo-Saxon countries). Previous studies on the PISA data usually revealed that educational achievement is relatively strongly affected by social background in some former socialist countries, especially in Hungary. This pattern does not show up here: the adjusted R^2 values are 41% for reading and 36% for math in this country group. In the EU-19 countries, the same values are 39 and 38% for reading and math, respectively. In fact, the adjusted R^2 values are the highest for the Asian countries: 57 and 62% for reading and math, respectively.

Discussion

This analysis aimed to investigate the role of educational segregation in educational achievement of 15-year-old pupils. PISA 2003 data were used for this goal. Previously Jenkins, Micklewright and Schnepf (2006) used the PISA data for a similar purpose but in a more descriptive manner; they investigated the rank order of OECD countries from the viewpoint of the degree of school segregation. The present analysis had a different focus when developing a multivariate causal model and studying how educational segregation influences students' achievement in math and reading.

Educational segregation can be measured in different ways. This analysis computed measurements for segregation by aggregating student level information on parental socio-economic status and highest level of parental education. The aggregation procedure was carried out for the schools within the countries. The standard deviation of the parental characteristics was considered as a measure for segregation: higher deviation means higher integration and lower segregation; lower deviation means lower integration and higher segregation. In a next step, interaction terms were computed between the segregation variables and the parental social status and the parental educational level variables in order to investigate the possible different

[8] The bivariate relationship between school location and students' achievement clearly shows that performance increases from villages to large cities significantly though not linearly.

impact of segregation for those children coming from families with higher or lower level of social background.[9]

The first hypothesis on the effect of educational segregation took the point of the majority of policy makers assuming that low segregation will improve educational achievement. In practice, this means *positive effect* of the segregation measure applied here: the higher the standard deviation and the higher the degree of integration and the lower the level of segregation, the better the educational achievement. The second hypothesis went beyond the first one assuming that children of families from lower social background (lower level of parental socio-economic status and education) can benefit from the less segregated educational environment. In practice, this means *positive effect* of the related interaction term: the higher the standard deviation and the higher the integration and the lower the segregation in the school where the student with poor social and cultural background studies, the better the educational achievement. The third hypothesis took the point of the more affluent families who claim that heterogeneous educational environment and stronger integration of low-status children can decrease the performance of pupils from families with higher social and cultural status. In practice this means *negative effect* of the related interaction term: the higher the standard deviation and the higher the integration and the lower the segregation in the school where the student with affluent social and cultural background studies, the worse the educational achievement.

The hypotheses were investigated for a pooled data set of 33 countries as well as for sub-sets of the countries. The sub-sets of the countries were defined in accordance with some assumptions related to variation of the educational as well as the welfare system in these countries. The results are summarized in Fig. 1 where + and – signs indicate the positive and negative effects. (An estimate can be non-significant as well.) The effects are presented both as uncontrolled (= the equation contains only the predictor variables for the given hypothesis and the country dummies) and as controlled (= the equation contains the predictor variables for the given hypothesis controlled for the country dummies as well as the other independent variables). In the case of the so-called "full model" the equation contains all of the predictor variables for the three hypotheses controlled for the country dummies and all of the other independent variables.

For the first hypothesis on the effect of school segregation, the uncontrolled estimates for integrated school by parental status supported the assumption on the positive impact of heterogeneous grouping. But integrated schools by educational and cultural homogeneity did not increase students' achievement. As demonstrated, this diversity in the economic–cultural integration cannot be attributed to a high level of collinearity between economic and cultural homogeneity of the school environment. Nevertheless, when the effects are controlled for the other independent variables, the first hypothesis by the policy makers turned to fail. This holds

[9] This simple solution of defining segregation is unusual in the measurement literature, which puts larger focus on the statistical background of the problem. For an early overview of segregation indices, see Duncan and Duncan (1955) for a more recent one, James and Taeuber (1985).

Explanatory variables	Full set	EU-19	Scandi-navian (5)	Anglo-Saxon (5)	Post-com-munist (7)	Asian (4)
Hypothesis 1.						
Reading						
Uncontrolled: status	+	+	+	ns	+	+
culture	–	–	–	–	ns	–
Controlled: status	ns	ns	ns	–	+	–
culture	–	ns	–	–	+	–
Full model: status	ns	+	ns	–	+	–
culture	–	ns	ns	–	+	–
Math						
Uncontrolled: status	+	+	ns	ns	+	+
culture	–	–	–	–	–	–
Controlled: status	–	–	ns	–	ns	–
culture	–	+	–	–	+	–
Full model: status	–	–	ns	–	+	–
culture	–	+	–	–	ns	–
Hypothesis 2.						
Reading						
Uncontrolled: low status	–	–	–	–	–	–
low culture	–	–	–	–	–	–
Controlled: low status	–	–	–	–	–	–
low culture	–	–	ns	+	–	–
Full model: low status	–	–	–	–	–	ns
low culture	–	–	ns	+	–	–
Math						
Uncontrolled: low status	–	–	–	–	–	–
low culture	–	–	–	–	–	–
Controlled: low status	–	–	ns	ns	–	–
low culture	–	–	ns	+	–	–
Full model: low status	–	–	–	–	–	–
low culture	ns	–	ns	+	–	–
Hypothesis 3.						
Reading						
Uncontrolled: high status	+	+	+	+	+	+
high culture	+	+	+	+	+	+
Controlled: high status	–	–	+	+	+	ns
high culture	–	–	–	ns	ns	ns
Full model: high status	+	ns	+	+	ns	ns
high culture	–	–	–	+	+	+
Math						
Uncontrolled: high status	+	+	+	+	+	+
high culture	+	+	+	+	+	+
Controlled: high status	ns	ns	+	+	–	ns
high culture	ns	ns	–	+	+	–
Full model: high status	+	+	+	+	ns	+
high culture	+	ns	–	+	+	+

Fig. 1 Summary of the results: the effect of school segregation on educational attainment

especially for the Anglo-Saxon countries with liberal welfare regime or the Asian counties – unlike as assumed. But in accordance with the expectations, integrated schools increase educational achievement in the Post-Communist countries where the school system is highly tracked anyway.

The analysis failed to confirm the second hypothesis. Unlike what policy experts assume, students coming from poor social background do not benefit from studying in more integrated schools. This result holds for all country groups with the exception of the Anglo-Saxon one. Economic heterogeneity in the schools does not help but larger cultural diversity of the school has a positive impact for less affluent students. This has been expected for these countries with liberal welfare regime.

The analysis failed to confirm the third hypothesis either. It seems that affluent families need not have too much concern for their offspring because more integrated schools will not deteriorate their educational achievement. Surprisingly and unexpectedly, this danger appears only for those students who come from highly cultured family and study in culturally integrated schools in the Scandinavian countries; their educational achievement is affected negatively under these conditions.

Apparently, educational segregation and its influence on students' educational achievement is a research topic being highly relevant for educational and social policy, especially under the circumstances when education plays a major role in the inheritance of social inequalities from one generation to the next. There is a large amount of conventional knowledge related to the hypotheses of this chapter. In this light it is quite astonishing that lower segregation did not seem to increase educational performance and even not for those disadvantaged students who expected to benefit from integration of schools at most. At the same time, the analysis brought good news to affluent families who could have concern for their offspring because of integration of schools.

This research intends to be a contribution to a very alive discussion on the topic of educational segregation. It is definitely important to continue the investigation about the economic–cultural diversity of school integration that seems to have inconsistent impact on pupils' educational achievement. It is uncertain how much the present results are influenced by the way how the segregation measures were defined in the analysis. Thus, experimenting more with other definitions and measures of school segregation is a next task as well. An obvious further step can be to separate public and private schools and even distinguish between government-dependent and private independent schools as demonstrated by another analysis of the PISA 2000 data (Dronkers and Róbert, 2008).

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Appendix

Table 19 Zero-order correlations between school segregation and social background measures in 33 countries

	1	2	3	4	5	6	7	8	9	10
The effect of segregation										
1. Parental occupation (std)	1.0	**0.049**	**0.116**	**–0.060**	**0.221**	**0.096**	0.236	0.242	0.123	0.143
2. Parental education (std)		1.0	**0.075**	**0.327**	**–0.075**	**0.135**	–0.440	–0.587	–0.229	–0.347
Interaction terms										
3. Low status × low segregation			1.0	**0.235**	**–0.313**	**–0.203**	–0.221	–0.117	–0.665	–0.247
4. Low culture × low segregation				1.0	**–0.237**	**–0.321**	–0.301	–0.323	–0.342	–0.735
5. High status × low segregation					1.0	**0.364**	0.301	0.205	0.746	0.336
6. High culture × low segregation						1.0	–0.179	0.130	0.367	0.555
The level of the school										
7. Parental occupation (mean)							1.0	0.795	0.521	0.471
8. Parental education (mean)								1.0	0.414	0.592
Parental main effects										
9. Occupation (status)									1.0	0.487
10. Education (culture)										1.0

All correlations are significant atleast at $P < 0.05$.

Institutional Tracking and Achievement Growth: Exploring Difference-in-Differences Approach to PIRLS, TIMSS, and PISA Data

Maciej Jakubowski

Introduction

This chapter applies difference-in-differences (DD) methods to assess tracking effects using data from international educational surveys of 4th graders (PIRLS 2001, TIMSS 2003) and 15-year olds (PISA 2000 and 2003). We define tracking system as the one where at some point students are separated into schools which differ in educational program or objectives. One could name it "institutional tracking" to distinct it from the ability tracking or all kinds of within and between school segregation. In most countries, students are tracked into different programs in secondary schools, but countries differ in the timing of tracking. The fact that none of the countries separate students into different programs in primary schools (earlier than the 4th grade) makes possible examining tracking effects using difference-in-differences approach by comparing differences in achievement between primary and secondary school students among tracking and non-tracking countries, namely, between countries which track 15-year-old students and countries which do it later. This idea was first explored by Eric Hanushek and Ludger Woessmann who assessed tracking by implementing DD method to analyze country-level results from PIRLS, PISA, and TIMSS. This chapter builds on this work providing robustness checks of their results and proposing new method based on the student-level micro data.

Hanushek and Woessmann claimed that there is no gain in mean performance from tracking and that tracking increases educational inequalities. Specifically, they showed that standard deviation of scores in secondary schools in tracking countries is higher than in non-tracking countries controlling for score variation in primary schools in these countries. We checked in several ways whether these results are

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robust. Using individual data, we restricted the samples from different surveys to make them more comparable, or put in other words, to make them representative to the same population. Then, we repeated Hanushek and Woessmann country-level regressions on these samples additionally controlling for average age differences among primary and secondary school samples. We found that the country level regressions are not robust to these restrictions put on the original samples. Then, we applied DD regression to the micro-level student data where adjustments for grade, age, and other covariates were straightforward. We confirmed the negative impact of tracking on mean performance; however, it was also found that this effect is stronger for Eastern European countries which are in majority tracking countries. Thus, it was argued that tracking was confounded with the effect of policies common in Eastern European, mainly Post-Communist, countries. Moreover, we tested whether tracking affects similarly students with different family background. It was expected that students from privileged families cannot be negatively affected by tracking, while there should be strong negative effect for students from low-educated families, who usually study in the vocational track. We found using DD method that tracking effects similarly affect students despite their family background, which makes the DD approach doubtful in this case. We conclude that tracking was confounded with the effect of policies common in Eastern Europe and there is no evidence in international data for the negative impact of tracking in other countries.

The chapter is organized as follows. Section “Methodology and Previous Research” discusses methodology and previous research. Section “Data” describes data used in the study and the set of countries considered. Section “Checking Robustness of the Country-level Difference-in-Differences Approach” discusses analysis within the difference-in-differences framework proposed by Hanushek and Woessmann. Section “Student-Level Difference-in-Differences Approach” reports the analysis with different DD method. Section “Summary and Conclusions” concludes.

Methodology and Previous Research

The main benefit of the difference-in-differences approach is that one takes into account changes within units of interest only (states, countries), which limits the bias caused by unobserved or not controlled differences between these units. Simple comparisons of achievement in tracking and non-tracking countries would be heavily biased if countries differ in other characteristics correlated with outcomes, which is usually the case. Surely, tracking and non-tracking countries differ in many aspects affecting student achievement. Using DD approach to estimate tracking effects, we don’t have to care about differences between countries in early achievement or other stable features. However, we still have to consider other characteristics which affect achievement growth or make outcomes in two periods incomparable. Thus, there are two main problems with this approach. First, one needs fully comparable samples in both periods, or in other words, one needs samples representative to the same population. Second, dynamics of achievement growth should be exactly the same in tracking and non-tracking countries in the absence of tracking. Put it differently, in the absence of tracking, countries who currently track students and those who don't should have exactly the same achievement growth, conditionally on observable characteristics included in the DD model. This assumption is demanding and hardly testable. One should consult papers which propose theoretical models of tracking and discuss the dynamic of achievement under different assumptions (e.g., Brunello & Giannini, 2004; Brunello & Checchi, 2007; Eisenkopf, 2007). However, any empirical tests of this assumption are difficult to apply. In what follows, we concentrate on the first assumption and only indirectly address the second by showing that tracking could be confounded with other factors affecting diversity in achievement growth between countries.

Usually DD models are estimated using linear regression. Let t be a dummy indicator of time and d a dummy indicator of treatment (tracking). Consequently, interaction term dt indicates treated units (secondary school students in tracking countries). DD estimator of tracking can be obtained by estimating the following equation:

$$Y_{ij} = \beta_0 + \beta_1 t + \beta_2 d_j + \beta_3 d_j t + \varepsilon_{ij} \tag{1}$$

where β_3 is the DD estimate of interest. Note that index i denotes students, while index j denotes countries. Subsequently, we will call this model "student DD regression." In this model, it is easy to control for any kind of individual, school or country characteristics as well as for heterogeneity of effects on groups of students. Detailed specification of similar regression used in this study is given in result tables (Tables 8 and 9).

Hanushek and Woessmann in their seminal paper used quite different specification, which assumes linear relation between outcomes from $t = 0$ and $t = 1$. They estimated the following equation using country-level data:

$$\overline{Y}_{1j} = \beta_0 + \beta_1 \overline{Y}_{0j} + \beta_2 d_j + \varepsilon_j \tag{2}$$

where β_2 is believed to be the DD estimate of interest, and $\overline{Y}_{1j}$ and $\overline{Y}_{0j}$ are country mean outcomes in $t = 1$ and $t = 0$, respectively (e.g., mean achievement in PISA and mean achievement in PIRLS). In this case, DD estimate of tracking effect is the difference in intercept between tracking and non-tracking countries in the regression where primary school achievement linearly affects secondary school achievement. Subsequently, we will call this model "country-level DD." In theory, it is possible to add additional explanatory variables affecting achievement independently from tracking. In practice, small number of countries in the sample importantly limits this option. The advantage of this model is that one can use any kind of country-level statistic to estimate the impact of tracking on this statistic. Hanushek and Woessmann estimated the effect of tracking on score dispersion by substituting mean achievement with standard deviation of achievement in the equation (2). They claimed that this way it is possible to assess whether tracking affects not only mean performance, but also educational inequality.

We tested the robustness of Hanushek and Woessmann approach by applying their method to different achievement scales, including controls for mean age differences between samples and countries, and by restricting samples from PISA, PIRLS, and TIMSS. Restrictions assured comparability of populations for which samples should be representative. Thus, we restricted samples to non-migrant students and to students in modal grades (with controls for age differences). The analysis was focused on mean performance but we also present results for the analysis of score dispersion.

As we already mentioned, there are two crucial assumptions in the DD approach. Let us discuss them not in general, but in relation to characteristics of the surveys used in this research, namely PIRLS, TIMSS, and PISA.[1] First of all, it is assumed that samples of students collected at $t = 0$ and $t = 1$ are fully comparable and representative to similar population of students, which differ only by the fact that one is in primary, while the other is in secondary school. In other words, it is assumed that students sampled in PIRLS have similar distribution of characteristics to those sampled in PISA. As we show in this, this assumption is violated because of discrepancies in the study design between PIRLS (or TIMSS) and PISA. The crucial point is that in PIRLS (or TIMSS) the population of interest is defined by grade, while in PISA the age criterion is essential. Thus, the surveys are representative to difference populations and one has to adjust for it to obtain unbiased estimates of causal effects of tracking in the DD method. That can be done in the regression by incorporating important characteristics into the model and by making them interact with time. In this case, the model could satisfy the assumption that samples are representative to similar populations conditional on the set of included covariates. This chapter implements this strategy controlling for sample differences in age, grade, gender, immigrant status, and family background.[2]

The second assumption is often called "the same time effect." To identify treatment effect, it is needed that baseline response of those treated would be the same as in the control group (untreated) in the absence of treatment. In our case, it means that, in the absence of tracking, achievement growth between primary and secondary education would be of the same magnitude in tracking and non-tracking countries. As we already pointed out, this assumption is hard to test directly, because we do not observe secondary school student performance in the tracking countries in the absence of tracking. We do not know what would be the potential outcome of students in tracking countries if instead of tracks they would be placed together in comprehensive schools. It is very doubtful that these countries would expect the same achievement growth as in non-tracking countries because of diversity of

[1] For general discussion of the DD approach to cross-sectional and other types of data, see: Lee and Kang (2006) and Meyer (1995).

[2] In regression we adjust for mean differences in covariates (all of them were coded as categorical variables). We employed also matching methods, which balanced the distribution of covariates in the samples. The results were nearly identical and we do not present them here. Additional results are available upon request from the author.

educational systems and societies. One solution to this problem is to employ additional controls for country differences. In our case, we use several student variables and country fixed effects to control for unobservable characteristics. However, we are fully aware that, if the dynamic of achievement growth differ among countries, then the DD method would fail and fixed effects are not able to control for this. Especially, if there are already differences in the dynamic of achievement growth before international surveys of achievement are conducted, then the DD method cannot estimate the overall impact of tracking policies (see Eisenkopf, 2007).

Although we are not able to test the "same time effect" assumption directly, we provide several other checks to see whether the hypothesis that differences in achievement growth are caused by tracking policies is valid. More precisely, we look at heterogeneity of tracking effects. The idea is based on simple observation that in tracking countries almost all students with privileged family background are placed in comprehensive tracks. For those students, tracking could have only positive effect, e.g., because of peer effects, or at least they should expect similar achievement growth as students in non-tracking countries who are all in comprehensive system. It is unlikely to observe negative impact of tracking on these students because they are not tracked into vocational or semi-vocational programs (see Brunello & Checchi, 2007, for theoretical arguments of this expectation, and Dustmann (2004) or Schnepf (2002) for empirical analysis for Germany). Although in DD model we cannot just compare students who actually are in academic tracks to those in vocational tracks (because we don't know their factual achievement in primary school), we can separately estimate tracking effects for students with privileged and unprivileged family background to test the validity of the DD model. If these effects are of similar magnitude, which means that difference in achievement growth between tracking and non-tracking countries is the same despite student background, the validity of the DD approach could be questioned. In this case, it is highly plausible that we confound tracking with some other policies or factors, which are differently distributed between tracking and non-tracking countries. The last part of the chapter shows that achievement growth was much lower in Eastern European countries, which constitute the majority of tracking countries in our samples. Thus, the argument follows that tracking effects were confounded with policies common in Eastern European countries.

Heterogeneity of tracking effects was tested using additional interactions in the student-level DD regression model presented in equation (1) (see Gruber, 1994). Family background was measured by parental education (available both in PIRLS and PISA, but not in TIMSS) or the number of books at home (available both in TIMSS and PISA). Let $\mathbf{x}_{\mathrm{ij}}$ be the vector of individual and country characteristics we want to control for and g_{ij} be the dummy variable indicating group, which we believe is affected by treatment (here $g = 0{,}1$ but it is straightforward to generalize this model to account for more than 2 groups). Then equation in general form could be written as follows:

$$y_{ij} = \beta_0 + \beta_1 t + \beta_2 d + \mathbf{x}'_{\mathbf{ij}}\boldsymbol{\beta}_{\mathbf{3}} + \beta_4 dt + \beta_5 t g_{ij} + \beta_6 d g_{ij} + \beta_7 dt g_{ij} + \varepsilon_{ij} \quad (3)$$

where, for example, *dt* is the interaction term of treatment and time, while *dtg* is the interaction term of treatment, time and a chosen student group. Now, the parameter β_7 is of interest and estimates the difference in the impact of tracking on groups defined by $g = 0$ and $g = 1$. We define $g = 1$ to indicate students from low-educated family background (shortly "low background") who are in majority in vocational schools. Thus, we expect the coefficient for *dtg* to be significantly negative, which will confirm that tracking have strongly negative impact on student from low-educated families (note that in this model it is still possible that achievement growth in tracking countries will be lower, even for students from well-educated families). In the regression we control for overall mean differences in performance between tracking and non-tracking countries ($d = 0$ and $d = 1$) as well as between surveys ($t = 0$ and $t = 1$). Moreover, we control also for differences among groups of students between surveys and countries. In fact, it is straightforward, and in some cases highly advisable, to interact all observable characteristics with indicators of time and treatment group to exclude the possibility of confounding changes in these characteristics with treatment effects (see Meyer, 1995). In the final regressions presented in tables 8, 9, and 10, we interacted all categories of family background with time and tracking. In addition, we employed country fixed effects and dummies for age and grade categories to control for different sampling design in PISA, TIMSS, and PIRLS. Variables and their interactions are clearly described in the result tables.

Tracking effects were previously discussed in many papers, some of them using data from international surveys. For example, Brunello and Checchi (2007) analyzed the data from IALS, while Hanushek and Woessmann (2006), Ammermueller (2005), and Waldinger (2006) used similar data sets and approaches to those in this chapter. Findings from IALS are ambiguous suggesting negative impact of tracking on performance, but positive effect on earnings.[3] Using international surveys of student achievement, Hanushek and Woessmann, as well as Ammermueller, found that tracking negatively affects student performance and increases inequalities. The same data were reanalyzed by Waldinger who found that tracking has no effect on the relation between family background and achievement, and concluded that there is no evidence of its negative impact on equity. Although the same data sets were used in this study, these papers focused on the robustness of findings to diverse definitions of "tracking" and different modeling approaches. Our research emphasizes that difference-in-differences approach requires comparability of data collected in different moments of time and proposes ways to adjust for discrepancies between PIRLS, TIMSS, and PISA. These issues were not addressed in previous studies but we found them to be crucial.

Papers analyzing tracking policies within countries are more numerous. Meier and Schütz (2007) provide good review of these works and conclude that impact of tracking is ambiguous, with some researchers finding negative, some positive and, in most cases, insignificant effects (see also Brunello & Checchi, 2007, for an overview

[3] Brunello and Checchi focused on mobility and measured how tracking changes the relation between family background and several outcomes.

of several studies). The most interesting papers explore natural experiments to assess tracking. They are usually based on difference-in-differences approach benefiting from the variation in timing of tracking across country or variation in timing of reforms introduced to eliminate or postpone tracking. For example, Maurin and McNally demonstrate that opening the academic track to the bigger number of students increased educational attainment in Northern Ireland controlling for the change in achievement in neighboring England where no reform was conducted at that time. Mühlenweg (2007) uses different time of tracking in German states to compare the impact of later and earlier tracking on educational outcomes. She reports that although overall effect of tracking is insignificant, there is positive impact of later tracking on low achieving students. Interestingly, she founds that timing of tracking is not affecting high achieving students. Pekkarinen (2005) explores the fact that reform in Finland, which replaced early tracking system with comprehensive schools, was introduced sequentially, starting in the north provinces, and implemented several years later in the south. Using again difference-in-differences strategy, he demonstrated that the reform positively affected girls, but had negative impact on boys from disadvantage families, increasing the gender gap not only in educational outcomes but also in wages. The only natural experiment on tracking we are aware of was conducted in Kenya and analyzed by Duflo, Dupas, and Kremer (2008). They found that tracking positively affects student performance regardless of their ability. The effects were relatively strong and persisted over 1 year. Although this study cannot be straightforwardly generalized to developed countries, it suggests that results based on non-experimental data could be unreliable.

Data

This study uses international data sets provided by organizers of PIRLS, TIMSS, and PISA. Data as well as documentation are accessible online (for PIRLS and TIMSS, see http://timss.bc.edu; for PISA, see www.pisa.oecd.org and links available there). All results in this chapter were obtained from these data sets. They slightly differ from the original reports because the sample of countries and score standardization is different. However, in all cases, ranking of countries was preserved. We used data only for countries that took part in both PIRLS and PISA or TIMSS and PISA. That importantly limited the number of countries to consider. However, data from some countries were not used in official reports, for example the Netherlands in PISA 2000 or UK in PISA 2003, but we decided to analyze them. Moreover, we separated the data for England and Scotland using indicators given in the data sets and treated them as two distinct countries recognizing separate school systems in these countries (and the fact that surveys were organized independently). We also used Flemish Community data for Belgium because only those are available in TIMSS.

Table 1 reports countries considered in three comparisons studied here indicating which country was considered as tracking or non-tracking. Tracking dummy was created based on the data from Eurydice (see www.eurydice.org only for European

Table 1 Countries participating in surveys of primary and secondary school students

PIRLS and PISA 2000	PIRLS and PISA 2003	TIMSS 2003 and PISA 2003
Non-tracking countries:	*Non-tracking countries:*	*Non-tracking countries:*
Argentina	Canada	Australia
Canada	England	England
England	Hong Kong	Hong Kong
Hong Kong	Iceland	Japan
Iceland	Latvia	Latvia
Israel	New Zealand	New Zealand
Latvia	Norway	Norway
New Zealand	Scotland	Scotland
Norway	Sweden	Tunisia
Scotland	Turkey	United States
Sweden	United States	
United States		
Tracking countries:	*Tracking countries:*	*Tracking countries:*
Bulgaria	Czech Republic	Belgium (Flemish Community)
Czech Republic	France	Hungary
France	Germany	Italy
Germany	Greece	Netherlands
Greece	Hungary	Russian Federation
Hungary	Italy	
Italy	Netherlands	
Macedonia	Russian Federation	
Netherlands	Slovak Republic	
Romania		
Russian Federation		
23 countries, 218,013 observations	20 countries, 210,693 observations	15 countries, 152,777 observations

countries), OECD (see OECD, 2006, Table A7.1) and information from countries' national Web sites or experts. The classification reproduces that used by Hanushek and Woessmann (2006) (see Ammermueller, 2005, for different categorization of tracking policies).

Average achievement scores are given in the appendix in Table 11, separately for each country and survey. It has to be emphasized that all achievement scores were re-standardized to have mean 500 and standard deviation 100 among countries considered in this analysis. Thus, statistics are quite different than those published in official reports. In TIMSS and PIRLS standardization was conducted for all participating countries while in PISA only for OECD countries (and in 2000 only 28 out of 30 OECD countries were participating). Restandardization was needed to make results from different surveys comparable in the group of countries investigated in this research. Nevertheless, the linear transformation could not change the ranking of countries and discrepancies in absolute scores are small. Part of the results presented in the chapter was obtained from subsamples. In this case, because excluded observations could affect score distribution and final results, standardization was repeated for subsamples in the same way as for the whole sample, hence in each subsample mean was also equal to 500 and standard deviation was 100.

Organizers of PIRLS, TIMSS, and PISA use similar methodology to produce achievement scores for all students. Details are given in the technical documentation (see Martin, Mullis, & Chrostowski, 2004, for TIMSS; Martin, Mullis, & Kennedy, 2003, for PIRLS; and OECD, 2002, 2005, for PISA). The most important fact is that achievement scores are available as a set of five plausible values assigned to each individual. Ideally one should repeat any analysis five times and final estimate should be calculated as a mean of five plausible values estimates. We followed this strategy only in the case of variance estimation. In the analysis of average performance we used the first plausible value provided in each data set. This way one can obtain unbiased point estimates but standard errors will not take into account variability among plausible values (imputation of student achievement). However, we did several checks to find out that imputation variance is negligible in our case and couldn't change any of our conclusions.[4]

The covariates used to control for student background were constructed from variables collected in each survey, which were analogous but differently coded. After some recoding, we obtained similar categories for parental education and number of books at home – main covariates controlling for family background. We were also able to construct dummies for gender and migrant status (separate dummy for being born outside the country of the test and speaking the language of the test). It was not possible to use other variables because they were dissimilarly defined or not present. Description of the common variables is presented in Table 12 in the Appendix, separately for each survey, tracking, and non-tracking countries.

Data used in this chapter were collected in multistage sampling surveys. In PISA each country separately conducted sampling following general rules. Schools were primary sampling units with about 35 students randomly chosen in each school at the second stage. In PIRLS and TIMSS similar rules were applied but within sampled schools one or two classes were randomly chosen. There are two points related to sampling design, which are important for the research presented in this chapter. First, one has to use survey weights to obtain population parameters; however, for the pooled sample with data from many countries, the weights were recalculated to have the same sum in each country. This way each country contributes equally to the final results (these are so-called senate weights). Second, students in schools are alike, which makes traditional standard errors incorrect. Clustering of students within schools could be taken into account using multilevel models with random effects, as proposed in survey manuals. Instead, we calculated cluster-robust standard errors in the linear regression. Thus, our estimates are representative for the group of countries considered and statistical inference takes into account the sampling design.

[4] Our experience with PISA tells that imputation variance inflates standard errors by several percents only.

Checking Robustness of the Country-Level Difference-in-Differences Approach

In their seminal paper Eric Hanushek and Ludger Woessmann (2006) proposed the difference-in-differences approach to assess the effects of tracking on achievement growth and distribution. They used country-level statistics (mean, standard deviation, and differences between percentiles) to estimate simple regressions where PISA or TIMSS 8th graders' results were used as dependent variable (outcomes in secondary schools). Among independent variables, they included PIRLS or TIMSS 4th graders' results as a proxy of early achievement (outcomes in primary schools) and tracking dummy indicating countries where secondary school students are separated between schools with different educational programs.

In this section, we check the robustness of their results using the same method and data from PIRLS, TIMSS, and PISA. We start with estimates obtained for original samples end up assessing tracking effects for all possible achievement scales. Then, we put several restrictions on samples to make data from different surveys more comparable. We test whether tracking effects are similar if one excludes migrants from the sample. After that, recognizing the fact that surveys have very different grade and age distributions, we limit the samples to modal grades while controlling for average age difference between surveys. Finally, we put the restrictions altogether and compare results with those obtained for the original samples. The second part of this section concentrates on educational inequalities. Using approach similar to that of Hanushek and Woesmann, it was analyzed how tracking affects the change in achievement scores dispersion in considered countries. Again, we started with original data set and compared results with those obtained from the restricted samples.

To ease comparisons, we replicate the analysis of Hanushek and Woessmann but using individual student data sets with scores re-standardized to have mean 500 and standard deviation 100 among analyzed countries. Thus, results have to be different because they used statistics presented in the official reports, which were obtained after different standardization approaches (among OECD countries in PISA and among all participants in TIMSS or PIRLS). We compared all domains tested in PISA: reading, mathematics, science and problem solving with those tested in PIRLS (reading) and TIMSS (mathematics and science). Problem solving was tested only in PISA 2003 and we related results in this domain to math and science in TIMSS. The results are presented in Table 2.

The results are qualitatively similar to those obtained by Hanushek and Woessmann. Thus, our methodology is comparable with their approach. They interpreted these results as showing strong negative impact of tracking on average reading literacy. Results for mathematics, science, and problem solving are not significant, but given the smaller sample and negative signs one could conclude that they support the claim that tracking has at least no positive effect on overall average achievement in these subjects. In fact, similar claim was made in the original paper.

Table 2 Country-level DD regression on overall mean achievement in several literacy domains

	PIRLS and PISA		TIMSS 2003 and PISA 2003			
	2001/2000 Reading	2001/2003 Reading	Mathematics	Science	Problem solving and mathematics	Problem solving and science
Tracking	−35.35***	−26.75***	−17.54	−8.01	−19.65	−11.67
	(11.74)	(7.83)	(17.04)	(10.80)	(16.96)	(16.66)
4th grade achievement	0.66***	0.49***	0.66***	0.57***	0.72***	0.71***
	(0.14)	(0.12)	(0.13)	(0.09)	(0.13)	(0.13)
Constant	183.59**	261.18***	174.33**	215.60***	144.59**	145.41**
	(69.61)	(60.47)	(66.05)	(42.64)	(65.76)	(65.74)
Adj. R-squared	0.554	0.537	0.613	0.748	0.659	0.658
N	23	20	15	15	15	15

** $p < 0.05$, *** $p < 0.01$

Typically research on PIRLS, TIMSS, and PISA solely concentrates on achievement in main domains (reading, math, and science). However, international surveys usually produce literacy subscales measuring achievement in several cognitive or content "subdomains" of the main domains. For example, the PISA 2000 data set contains plausible values of overall achievement in reading and at the same time three sets of plausible values in reading literacy subdomains: retrieving information, interpreting texts, reflection, and evaluation. Regardless that students were not tested in all subdomains, the plausible values for every student were imputed.[5] Using scores in subdomains, we are able to test whether tracking effects are robust to differences in measured outcomes. This is especially important in the DD approach applied here where tests developed by different teams of researchers and based on distinct assumptions are compared. Any systematic differences between tracking and non-tracking countries in the content of subject-specific knowledge of students could heavily bias the results. Thus, within each main domain, all subdomains tested in PIRLS, TIMSS, and PISA were related to each other. The subscales created in PISA 2000 were already mentioned. These were related to PIRLS subscales in reading: reading for literary experience, and reading to acquire and use information. In PISA 2003 we have four separate overall literacy scales for reading, science, mathematics, and problem solving. However, given that mathematics was a main domain tested in 2003, it was possible to construct four mathematics literacy subscales: space and shape, uncertainty, change and relationship, and quantity. Those could be related to TIMSS 2003 five subscales measuring content in mathematics: number, patterns and relationships, measurement, geometry, and data. Additionally, there are three subscales in cognitive domains in mathematics: applying, knowing, and reasoning, as well as separate scores for life, physical, and earth sciences. PISA 2003 produced also scores in over-curriculum domain called problem solving, which was related here to overall and subscale scores in mathematics and science from TIMSS 2003.

Summing up, it was possible to compare several pairs of subdomains tested in PIRLS, PISA, and TIMSS:

- 6 in reading literacy for PIRLS/PISA 2000,
- 2 in reading for PIRLS/PISA 2003,
- 32 in mathematics for TIMSS 2003 and PISA 2003,
- 3 in science for TIMSS 2003 and PISA 2003,
- 11 relating problem solving measured in PISA 2003 to all subscales in mathematics and science in TIMSS 2003.

We made no attempt to hypothesize a way subdomains should be related to each other. Instead, all possible pairs were compared to check whether estimated tracking effects are robust to differences in measured constructs and discrepancies in

[5] For details of how plausible values in subscales were constructed, see: OECD (2002, 2005) and Martin et al. (2003, 2004).

countries' curricula. The results are presented in the Appendix (see Tables 13, 14, 15, and 16). All estimated effects of tracking on reading literacy were negative, highly significant and varied from –25 to –43 (from ¼ to almost ½ of score standard deviation). Among 32 estimated effects of tracking in mathematics, only 2 were positive. In science all tracking coefficients were negative. The same for problem solving when related to all subdomains in science and mathematics in TIMSS 2003. In the cases of TIMSS 2003 and PISA 2003, none of the estimated coefficients were significant at the 10% level, however, these estimates were obtained from the sample of 15 countries only. It is worth noting that in all regressions early achievement was highly correlated with achievement in secondary school regardless the subject and subscale employed, supporting the plausibility of DD approach.

Great cohesion of these results demonstrates robustness of the sign of tracking effects to diversity of tested subjects and psychological constructs. However, it seems that the magnitude of tracking effect depends on which construct is measured through the test. The lowest estimates were nearly –½ of standard deviation but the highest were close to 0. Nevertheless, these results are in line with the main conclusion of Hanushek and Woessmann that tracking has no positive effect on average achievement.

We now turn to the analysis restricted to the sample of native students. It could be claimed that immigrants should not be considered in the assessment of tracking effects because we do not know whether some of them had primary education outside a country of the test or were in this country for a very short period of time. Moreover, if tracking effects do exist, then they should affect native students in a similar manner.[6] Therefore, results should be qualitatively the same for native students only. Following these arguments, all students who were born outside a country of the test were excluded from the sample. Additionally, students who do not speak a language of the test at home were also excluded.[7] Results of estimation based on this sample are given in Table 3. Comparing to results presented in Table 2, it is clear that restricting samples to native students weakened the effects of tracking, with estimates much closer to zero now.

As we already mentioned, PIRLS and TIMSS are distinct from PISA in one key feature. The goal of the latter is to assess achievement of 15-year-olds, so the population of interest is defined according to students' age, while the former compare achievement of 4th graders regardless of their age. While in PIRLS or TIMSS data sets we have students in the 3rd or 5th grade in just few countries,[8] in PISA students are in anything between the 7th and 12th grade. In PIRLS and TIMSS the

[6] It could be that migrants are forced into vocational tracks, which makes tracking effects even more negative. However, even in this case, tracking effects should be observable for native students if some of them are in vocational tracks.

[7] The language criterion could be criticized if multilingual countries are considered. However, nearly the same results were obtained using the place of birth criterion only.

[8] In fact, PIRLS and TIMSS are testing the *upper of the two adjacent grades that contain the largest proportion of 9-year-olds at the time of testing* (see Martin et al., 2003, p. 54). Thus, in some countries, students are in different grades than 4th. However, it doesn't change the fact that

Table 3 DD estimates based on the sample restricted to native students

	PIRLS and PISA		TIMSS 2003 and PISA 2003			
	2001/2000 Reading	2001/2003 Reading	Mathematics	Science	Problem solving and mathematics	Problem solving and science
Tracking	–27.62**	–16.85*	–8.53	0.33	–10.73	–3.17
	(12.42)	(8.42)	(17.18)	(11.42)	(16.93)	(16.67)
4th grade achievement	0.61***	0.44***	0.63***	0.55***	0.69***	0.69***
	(0.15)	(0.12)	(0.13)	(0.09)	(0.13)	(0.13)
Constant	203.21**	285.07***	184.78**	223.29***	155.08**	154.48**
	(77.24)	(62.22)	(65.13)	(44.16)	(64.17)	(64.47)
Adj. R-squared	0.461	0.413	0.613	0.732	0.664	0.662
N	23	20	15	15	15	15

**$p < 0.05$, ***$p < 0.01$

youngest students are 6 years old and the oldest is 15 years old with important differences in average age between countries. These differences should be taken into account to make achievement in countries more comparable. This is especially true in the empirical approach used in this study because one could presume that tracking and non-tracking countries systematically differ in the grade-repetition policy which affects the sample of students in secondary schools. Moreover, age distributions in countries involved in PIRLS or TIMSS are quite diverse and noticeably differ between tracking and non-tracking countries (see Table 12 in the Appendix).

Additionally, in PISA some countries sampled students who were still in primary schools. In most cases, the number of such students was small, but for example in the Czech Republic almost half of the students tested in PISA 2003 were still in primary education. Having in mind that this country was considered as the tracking one, it is obvious that taking into account whole sample assumes that primary school students were already affected by tracking, even if they were still in the comprehensive school. One could claim that existence of tracking in secondary school can affect student achievement even in primary school but presumptions of this kind should be carefully tested.

To produce comparable estimates of early achievement, these differences have to be taken into account. Thus, we imposed restrictions on grade and age excluding students who were not in the modal grade or were older or younger by more than 6 months than the average student, separately in each country. In effect, students who were still in primary education, but were tested in PISA, were not considered, because they were not in the modal grades. However, even with these restrictions, systematic differences in age distribution between surveys and countries remained. Figure 1 demonstrates that the difference in average age (in months) in PIRLS 2001 and PISA 2000 is strongly related to similar difference in mean achievement. Although there are several outliers, the relation is even more evident after their exclusion.

Thus, the difference in average age of students tested in PIRLS and PISA strongly affects the difference in mean achievement between PIRLS and PISA. In some countries, average difference in the age of students tested in PIRLS and PISA was higher by 1 year than in others. To take an extreme example, the average age of students tested in PIRLS in Iceland was 116.7 months, while in Latvia 132.6 months. Similar numbers for PISA 2003 were 188.4 for Iceland and 190.6 for Latvia. This means that average age difference between PIRLS and PISA 2003 was 71.7 in Iceland, while it was only 58 months in Latvia. One could reasonably expect that this will strongly affect differences in achievement because of longer period of learning between surveys in Iceland. In fact, this is clearly the case and not taking it into account will bias any estimation based on the country-level DD model. The figure demonstrates also that age differences are dissimilar in tracking and non-tracking countries. One could also consult estimates of the mean age in Table 12. On average, students

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population of students is differently defined than in PISA. That has obvious consequences on age and grade distributions.

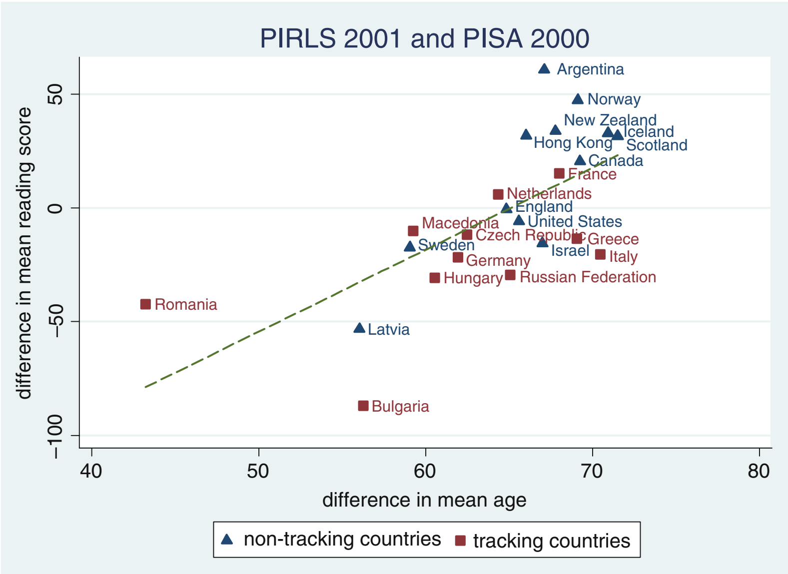

Fig. 1 Differences in age and differences in average achievement between PIRLS and PISA 2003

in non-tracking countries were considerably younger in PIRLS 2001 and slightly older in PISA 2000. Similar differences, but of lower magnitude, could be found in TIMSS 2003 and PISA 2003, and PIRLS 2001 and PISA 2003.

We take age differences into account by running country-level DD regression with two regressors: early achievement and the difference in average age. Moreover, we ran these regressions on the samples restricted to modal grades and ±6 months around the average age in each country. Results are presented in Table 4. Please note positive and significant coefficients of the difference in average age in all comparisons, which confirms that discrepancies in age distribution have to be considered. Comparing these results to those obtained from the original sample, with no correction for age and grade, we see that in the case of PIRLS and PISA tracking effects are still negative but became closer to zero and are no longer significant. In the case of TIMSS and PISA, all coefficients of tracking became positive but insignificant. These results make earlier conclusions based on original samples doubtful. It is no longer clear whether there is any visible impact of tracking when age and grade differences are taken into account.

Finally, we estimated DD regression with all restrictions and modifications applied at the same time. Thus, we narrowed the sample to native students, who speak at home in the language of the test, from modal grade and who are within the ±6 months brackets around the average age in each country. We also included mean age difference among regressors. Original test scores were again re-standardized to have mean 500 and standard deviation 100 in the restricted sample of students

Table 4 DD country-level regressions with correction for grade and age differences between countries

	PIRLS/PISA		TIMSS/PISA 2003			
	2000 reading	2003 reading	Mathematics	Science	Mathematics/problem solving	Science/problem solving
Tracking	–17.98	–11.49	5.09	13.48	1.90	10.22
	(14.21)	(10.22)	(10.56)	(11.41)	(8.66)	(13.54)
4th grade achievement	0.62***	0.73***	0.61***	0.42***	0.69***	0.63***
	(0.16)	(0.19)	(0.09)	(0.10)	(0.07)	(0.11)
Difference in age	2.94**	2.77*	6.11***	3.18**	5.45***	4.77**
	(1.09)	(1.43)	(1.27)	(1.38)	(1.04)	(1.64)
Constant	15.59	–40.02	–210.49*	78.30	–201.44**	–127.36
	(110.18)	(164.31)	(105.87)	(113.96)	(86.85)	(135.22)
Adj. R-squared	0.505	0.387	0.811	0.604	0.880	0.697
N	23	20	15	15	15	15

$^{**}p < 0.05$, $^{***}p < 0.01$

in each survey. This way we assured that excluded students did not affect score distribution.[9]

The results are unlike those based on original statistics. Estimates of tracking effects derived from PIRLS and PISA remain negative, but are now much closer to zero and insignificant. Estimates derived from TIMSS and PISA are all insignificant and practically non distinguishable from zero. In all cases, early achievement is highly correlated with achievement in PISA, with noticeably smaller coefficient for science. Note also that country mean age differences between PIRLS/TIMSS and PISA are positively and significantly correlated with achievement growth. New results make it clear that there is no evidence on the impact of tracking on mean performance. It seems that earlier results were driven by dissimilarities in the survey design between PIRLS, TIMSS, and PISA, mainly by systematic differences in age distribution. Thus, claims made by Hanushek and Woessmann that tracking have negative effect on mean performance cannot be maintained using their approach and data sets.

In their paper Hanushek and Woessmann suggested that tracking increases inequalities measured by the change in country-level dispersion of student scores between primary and secondary school. They used the same DD approach, but mean performance was replaced by standard deviation of scores or other similar statistics (e.g., interquartile range). Except the PIRLS/PISA 2000 comparison, they found that tracking effects were positive, which means that dispersion of scores in secondary schools in tracking countries was higher than in non-tracking countries controlling for the dispersion of scores in primary schools. Despite the fact that most coefficients were insignificant, it was argued that great coherence of results proved that tracking increases inequalities. These results were quite influential and widely cited, thus, it seems important to test their robustness. We did it using the framework developed above. In the next section, we also provide results for different approach where the impact of tracking on equity is analyzed through interaction of tracking policy and family background.

Student literacy dispersion is much more difficult to measure than mean performance, especially if high or low performing students are numerous in some countries or if countries differ a lot in a shape of score distribution. Scores are measured with the greatest precision in the middle of literacy distribution and less precisely at the extremes. It was also shown that distribution of scores depends on methodological choices made by test organizers (see Brown, Micklewright, Schnepf, & Waldmann, 2005). We already discussed the discrepancies between samples of students tested in each country and between sample design of PIRLS, TIMSS, and PISA. Surely, score dispersion is heavily affected by the way the samples were constructed, especially if there are differences between age distribution, tested grades, and the proportion of migrants. For example, it seems invalid to assume comparable distributions of scores in the Czech Republic where large part of students tested in PISA were still in primary school, in Germany where all students

[9] Regressions were also estimated with original scores to find almost identical results.

Table 5 Final DD results obtained for restricted sample and corrected for age differences

	PIRLS and PISA		TIMSS 2003 and PISA 2003			
	2000 reading	2003 reading	Mathematics	Science	Mathematics/problem solving	Science/problem solving
Tracking	–16.36	–15.73	2.18	8.81	–1.93	7.29
	(13.25)	(10.43)	(14.22)	(12.77)	(12.13)	(16.62)
4th grade achievement	0.62***	0.67***	0.59***	0.38***	0.65***	0.57***
	(0.14)	(0.18)	(0.11)	(0.10)	(0.09)	(0.13)
Difference in age	3.07***	2.47*	5.71***	2.91*	4.94***	4.47**
	(1.01)	(1.40)	(1.69)	(1.54)	(1.44)	(2.00)
Constant	–1.00	0.59	–179.70	106.63	–161.73	–92.10
	(97.97)	(154.85)	(135.84)	(122.21)	(115.90)	(159.10)
Adj. R-squared	0.579	0.394	0.696	0.510	0.786	0.584
N	23	20	15	15	15	15

*$p < 0.10$, ** $p < 0.05$, ***$p < 0.01$

were already in the tracking system and in Norway where all students were still in comprehensive schools. It also doubtful whether inclusion of migrants is reasonable if we do not know how long they were learning in a country they were tested. All these problems could be exacerbated in the difference-in-differences method where comparability of outcomes in $t = 0$ and $t = 1$ is crucial. Thus, it seems that, in the case of educational inequalities, correction of analyzed samples is even more important than for mean performance. The problems mentioned above could be crucial for the study of tracking effects where with high probability policy is affecting students at the extremes of distribution.

Hanushek and Woessmann considered several surveys, which test reading, mathematics and science. However, these surveys put different emphasis on tested subjects. In PISA the main subject (literacy domain) is different in every wave of the survey. It means that in each wave only one domain is tested on the whole sample of students and with the highest precision. Other domains are tested on subsamples and less precisely. In PISA 2000 reading was the main domain while in 2003 it was mathematics. It seems valid to compare reading literacy in PIRLS and PISA 2000 but conclusions based on comparisons of reading literacy in PIRLS and PISA 2003 should be treated with great cautions, especially when one concentrates not on the average performance but on much more difficult aspect to estimate statistics like score dispersion. Similarly, comparisons of score dispersion in mathematics in PISA 2003 and TIMSS are more valid than the same comparisons done for science, which was a minor domain in PISA 2003 and was tested less precisely. These facts seem to be overlooked in Hanushek and Woessmann study where the results for reading literacy in PIRLS and PISA 2003 were emphasized. Tracking effects on inequality were found to be positive for this survey but negative effects found in a more valid comparison of PIRLS and PISA 2000 were not discussed at length. Negative impacts of tracking found in TIMSS 4th graders and 8th graders comparisons were very close to zero and is not that convincing because of smaller and distinct set of tracking countries.[10]

Therefore, we believe that in the analysis of score dispersion one should concentrate on the most valid comparisons, which are PIRLS and PISA 2000 for reading, and TIMSS and PISA 2003 for mathematics. These studies focus on the same subjects and measure them with the highest precision available. Measurement is also more precise for high and low performing students. Tables 6 and 7 report estimates of tracking effects based on the country-level DD regression, but for standard deviation, interquartile range and performance at the 10th and 90th percentile. The first table gives results for whole original sample available in PIRLS, TIMSS and PISA, while the second table reports similar analysis on the restricted sample of students. The restricted sample was limited to native students, modal grades and students within the ± 6 months brackets around the country's average age. Mean age difference was added to the set of explanatory

[10] The number of countries, which track 8th grade students is much lower. These are mainly countries with a system similar to that in Germany and share other common characteristics, which could additionally bias the results.

Table 6 Tracking effects on score dispersion. The original sample

	PIRLS/PISA		TIMSS/PISA 2003			
	2000 reading	2003 reading	Mathematics	Science	Mathematics/problem solving	Science/problem solving
Dependent variable: SD of 15-year-olds achievement						
Tracking	–2.39	5.65*	0.58	–0.45	0.51	0.39
	(2.21)	(3.10)	(3.29)	(3.24)	(3.49)	(3.20)
SD of achievement in the 4th grade	0.23***	0.33**	–0.21	–0.06	–0.15	–0.14
	(0.07)	(0.12)	(0.13)	(0.09)	(0.14)	(0.09)
Constant	72.97***	61.46***	107.69***	98.99***	102.22***	101.30***
	(7.30)	(12.26)	(11.30)	(7.67)	(11.99)	(7.57)
Adj. R-squared	0.343	0.226	0.090	–0.120	–0.029	0.075
Dependent variable: IQR of 15-year-olds achievement						
Tracking	–1.34	9.07*	1.04	–0.85	0.09	0.40
	(3.24)	(4.67)	(4.75)	(4.69)	(4.14)	(3.65)
IQR of achievement in the 4th grade	0.25***	0.33**	–0.29**	–0.13	–0.20*	–0.16**
	(0.07)	(0.14)	(0.13)	(0.08)	(0.11)	(0.07)
Constant	96.03***	82.62***	155.97***	144.01***	145.51***	140.39***
	(9.62)	(18.33)	(15.08)	(9.73)	(13.14)	(7.58)
Adj. R-squared	0.345	0.190	0.227	0.027	0.112	0.256
Dependent variable: 15-year-olds 10th percentile's achievement						
Tracking	–30.44**	–26.33**	–15.42	–6.22	–15.76	–11.38
	(12.56)	(9.19)	(13.59)	(6.80)	(15.21)	(12.38)
4th grade 10th percentile's achievement	0.50***	0.34***	0.47***	0.37***	0.49***	0.48***
	(0.11)	(0.11)	(0.09)	(0.04)	(0.10)	(0.08)

Table 6 (continued)

	PIRLS/PISA		TIMSS/PISA 2003			
	2000 reading	2003 reading	Mathematics	Science	Mathematics/problem solving	Science/problem solving
Constant	197.23***	258.01***	202.62***	232.67***	190.75***	197.03***
	(41.27)	(39.14)	(34.87)	(16.14)	(39.02)	(29.37)
Adj. R-squared	0.494	0.376	0.643	0.848	0.616	0.734
Dependent variable: 15-year-olds 90th percentile's achievement						
Tracking	–28.75**	–8.49	–3.90	2.90	–6.07	3.72
	(12.14)	(7.50)	(19.11)	(13.75)	(17.76)	(19.83)
4th grade 90th percentile's achievement	0.65***	0.53***	0.78***	0.75***	0.87***	0.93***
	(0.20)	(0.14)	(0.19)	(0.16)	(0.18)	(0.23)
Constant	226.67*	290.53***	148.49	165.82	89.96	51.61
	(124.11)	(84.32)	(113.36)	(96.04)	(105.35)	(138.52)
Adj. R-squared	0.403	0.458	0.521	0.593	0.620	0.511
N	23	20	15	15	15	15

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

Table 7 Tracking effects on score dispersion. The restricted sample

	PIRLS/PISA		TIMSS/PISA 2003			
	2000 reading	2003 reading	Mathematics	Science	Mathematics/problem solving	Science/problem solving
Dependent variable: SD of 15-year-olds achievement						
Tracking	–4.76	3.20	–2.95	–4.71	–2.62	–3.49
	(3.22)	(4.24)	(4.88)	(5.42)	(6.08)	(5.60)
SD of achievement in the 4th grade	0.27**	0.45**	–0.10	–0.08	–0.11	–0.17
	(0.10)	(0.16)	(0.18)	(0.14)	(0.23)	(0.14)
Constant	67.61***	52.71***	101.34***	102.64***	101.27***	107.15***
	(10.16)	(16.16)	(15.83)	(12.43)	(19.72)	(12.85)
Adj. R-squared	0.317	0.271	–0.120	–0.087	–0.138	–0.034
Dependent variable: IQR of 15-year-olds achievement						
Tracking	–4.30	3.81	–4.26	–8.48	–5.37	–5.92
	(5.16)	(6.02)	(6.94)	(7.87)	(8.49)	(7.63)
IQR of achievement in the 4th grade	0.27**	0.46**	–0.14	–0.14	–0.17	–0.21
	(0.11)	(0.17)	(0.18)	(0.13)	(0.22)	(0.13)
Constant	90.88***	71.33***	142.67***	147.84***	144.91***	149.34***
	(14.92)	(23.26)	(20.81)	(16.21)	(25.43)	(15.72)
Adj. R-squared	0.203	0.229	–0.099	–0.015	–0.098	0.046
Dependent variable: 15-year-olds 10th percentile's achievement						
Tracking	–10.14	–16.87	9.51	18.27	7.34	13.76
	(16.95)	(13.74)	(11.60)	(12.48)	(10.44)	(13.52)
4th grade 10th percentile's achievement	0.51***	0.67***	0.39***	0.22**	0.44***	0.36***
	(0.13)	(0.18)	(0.07)	(0.07)	(0.07)	(0.08)

Table 7 (continued)

	PIRLS/PISA		TIMSS/PISA 2003			
	2000 reading	2003 reading	Mathematics	Science	Mathematics/problem solving	Science/problem solving
Difference in age	3.09**	3.95**	5.26***	2.63	5.12***	4.61**
	(1.27)	(1.85)	(1.35)	(1.47)	(1.22)	(1.59)
Constant	–10.83	–141.80	–131.08	105.32	–140.60	–75.32
	(98.00)	(168.21)	(100.45)	(106.65)	(90.44)	(115.50)
Adj. R-squared	0.464	0.366	0.736	0.466	0.800	0.653
Dependent variable: 15-year-olds 90th percentile's achievement						
Tracking	–15.28	–3.69	8.58	13.32	5.17	15.79
	(12.34)	(9.12)	(12.50)	(12.15)	(11.88)	(18.40)
4th grade 90th percentile's achievement	0.75***	0.54***	0.79***	0.65***	0.91***	0.90***
	(0.19)	(0.16)	(0.12)	(0.14)	(0.12)	(0.21)
Difference in age	2.75***	1.00	6.72***	3.90**	5.72***	5.36**
	(0.94)	(1.16)	(1.53)	(1.51)	(1.45)	(2.28)
Constant	–22.73	218.81	–316.12**	–38.80	–320.56**	–292.04
	(140.09)	(146.64)	(142.88)	(149.60)	(135.78)	(226.51)
Adj. R-squared	0.548	0.320	0.773	0.607	0.818	0.553
N	23	20	15	15	15	15

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

variables, but only for regressions explaining performance at the 10th and 90th percentile.[11] Again, achievement scores were re-standardized to have mean 500 and standard deviation 100 after restrictions were imposed. In this case, re-standardization is especially important because original statistics of dispersion were probably heavily affected by excluded students.

Following instructions given in PIRLS, TIMSS, and PISA documentation, we calculated all statistics separately for each of plausible values and used average of five estimates in the final regression. However, we omitted the survey weights to make results in both tables comparable. It is not possible to recalculate the weights for the restricted sample, because needed information on sampling, non-response and weight adjustment is not provided in the documentation. Analysis was also replicated with original survey weights and results were qualitatively the same.

No simple conclusion about the impact of tracking on educational inequalities could be made using the results in the first table (from the original sample). Almost all estimates for the tracking effects on score standard deviation or interquartile range are insignificant. Generally, effects for reading are negative for PIRLS and PISA 2000 and positive for PIRLS and PISA 2003. Results for PISA/ TIMSS math and science are close to zero. The estimates of tracking for the most reliable comparisons (emphasized by bold and bigger letters) – reading in PIRLS/PISA 2000 and mathematics in TIMSS/PISA 2003 are insignificant and from the practical point of view are non distinguishable from zero. Thus, the results do not support what Hanushek and Woessmann claim that DD analysis demonstrates strong negative impact of tracking on educational inequalities (dispersion of achievement). Note also, that primary school score dispersion is positively correlated with secondary school score dispersion only for reading, which makes whole approach doubtful in the case of math and science.

Unbeneficial effects of tracking on low-performing students could be supported by negative estimates of tracking effects for 10th percentile of student scores. In this case, results are more coherent, but significant estimates were obtained only for reading. What makes this finding doubtful is that negative effects were also found for 90th percentile of student scores. We cannot find reasonable explanation why tracking should negatively affect high performing students. Intuitively, it should be the other way around because these students could benefit from other more able peers choosing general track. In the most reliable comparison for reading (PIRLS and PISA 2000) the effects are nearly identical for the 10th and 90th percentiles. One could interpret the results for the most reliable comparison in mathematics (TIMSS and PISA 2003) as consistent with the claim that tracking negatively affects low performing students but have no effect on high achievers. In this case, estimate for the 10th percentile is negative and for the 90th percentile close to zero. However, both are insignificant.

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[11] We couldn't find theoretically valid expectation of how difference in mean age should affect score distribution. While in the case of mean performance or quantiles interpretation is clear (more or less time for learning), there is no theory or robust evidence that score dispersion should increase or decrease with time.

The estimates for the restricted sample, presented in the second table, are even more confusing. After restricting the samples to make them more comparable, all estimates of tracking effects on score standard deviation or interquartile range became insignificant. Estimates are negative except PIRLS/PISA 2003, but even in this case are much closer to zero. Thus, it seems that negative impact of tracking on inequalities completely disappears if one concentrates on native students of the same age and from the modal grade. The choice of statistic measuring score dispersion is not an issue here. Estimates obtained for standard deviations and interquartile range are qualitatively the same. Estimates for the 10th and 90th percentiles changed importantly. In some cases, tracking coefficient is now lower for high-achievers. Generally, effects for low and high achievers are nearly the same except PIRLS/PISA 2003 reading. Thus, contrary to Hanushek and Woessmann, we found no evidence that tracking increases inequality, at least when using their approach. Slight modifications of their method change conclusions importantly and their findings become doubtful.

Student-Level Difference-in-Differences Approach

The DD model proposed by Hanushek and Woessmann and replicated in the preceding sections assumes that country-level primary school statistics are linearly related to secondary school statistics. That assumption could be invalid. Moreover, in this approach individual student characteristics cannot be directly employed. We tried to incorporate individual characteristics by restricting the samples to subgroups of population. However, with final 15 to 23 observations, it was hard to obtain any significant results, which are robust to even minor changes in the method. Thus, one could plausibly doubt any results based on this approach. Hence, we propose another difference-in-differences method, which directly uses individual data benefiting from all information contained in the original PIRLS, TIMSS, and PISA data sets. We limit analysis only to the most reliable comparisons: PIRLS 2001/PISA 2000 for reading literacy and TIMSS 2003/PISA 2003 for mathematics. It was already mentioned that these are two pairs of surveys focused on the detailed measurement of achievement in the same subject domain. In what follows, we use whole original samples, adjusting for survey differences using student characteristics. Results were obtained with survey weights provided by organizers, which make them representative to the population of interest in each country. However, weights were recalculated to have the same sum in each country (so-called senate weights), making results from each country equally important.

Several regressions based on equation (3) were estimated. Results are presented in Table 8 for reading in PIRLS and PISA 2000, and in Table 9 for mathematics in TIMSS and PISA 2003. All regressions include the gender dummy and the dummy indicating those born in a country of test or speaking language of test at home. These dummies were also interacted with time to assure that tracking effect will not be confounded with the effect of change in covariates distribution and diverse effects

Table 8 Results for DD approach with student-level data. Reading literacy in PIRLS 2001 and PISA 2000

	PIRLS 2001 PISA 2000 Reading literacy			
	(1)	(2)	(3)	(4)
Time (PISA = 1)	–18.88***	–17.89***	–145.08***	–125.14**
	(2.52)	(2.70)	(51.46)	(51.28)
Tracking countries dummy	4.88**	9.88***	15.50***	
	(2.00)	(2.53)	(2.49)	
Time × Tracking	**–34.62*****	**–36.99*****	**–20.69*****	**–20.42*****
	(3.25)	**(3.80)**	**(3.74)**	**(3.29)**
Gender (1 = girls)	20.72***	20.72***	20.58***	20.48***
	(0.90)	(0.90)	(0.89)	(0.86)
Gender × Time	11.24***	11.25***	8.11***	9.03***
	(1.54)	(1.55)	(1.47)	(1.30)
Born outside the country	–30.31***	–30.37***	–31.10***	–31.50***
	(1.87)	(1.87)	(1.79)	(1.60)
Born outside the country × time	20.49***	20.52***	35.32***	28.00***
	(3.44)	(3.44)	(3.31)	(2.66)
Different language at home	–22.90***	–22.84***	–20.20***	–22.52***
	(3.31)	(3.31)	(3.28)	(3.16)
Different language at home × time	–15.78***	–15.65***	–18.40***	–15.28***
	(5.34)	(5.33)	(5.13)	(3.95)
Parents have maximum post/upper	–41.24***	–38.08***	–37.23***	–41.03***
secondary education	(1.26)	(1.93)	(1.86)	(1.68)
Parents have maximum	–73.19***	–69.96***	–71.23***	–77.55***
lower-secondary education	(2.17)	(2.65)	(2.58)	(2.22)
Parents have primary or no	–124.76***	–121.88***	–119.58***	–102.59***
education	(4.36)	(4.71)	(4.58)	(3.39)
Time × Parents have maximum	12.92***	12.01***	13.73***	18.63***
post/upper secondary education	(1.73)	(2.53)	(2.41)	(2.17)
Time × Parents have maximum	25.18***	24.05***	31.65***	31.23***
lower-secondary education	(3.25)	(3.84)	(3.62)	(3.00)
Time × Parents have primary or no	41.44***	40.43***	53.62***	41.53***
education	(5.56)	(6.02)	(5.63)	(4.08)
Low background × tracking		–6.77**	–7.71***	–1.58
		(2.64)	(2.58)	(2.31)
Low background × Tracking ×		**2.29**	**3.18**	**–4.19**
Time		**(3.64)**	**(3.43)**	**(3.08)**
Age and grade dummies			Yes	Yes
Country fixed effects				Yes
Constant	538.57***	536.42***	494.95***	441.53***
	(1.82)	(2.06)	(16.16)	(16.47)
Adj. R-square	0.125	0.125	0.177	0.272
N	186,396	186,396	185,324	185,324

$^{*}p<0.10$, $^{**}p<0.05$, $^{***}p<0.01$

Table 9 Results for DD approach with student-level data. Mathematics in TIMSS 2003 and PISA 2003

	TIMSS 2003 PISA 2003 Mathematics			
	(1)	(2)	(3)	(4)
Time (PISA = 1)	–0.06	–0.60	0.00	0.00
	(5.17)	(5.31)	(0.00)	(0.00)
Tracking countries dummy	27.44***	23.36***	20.40***	
	(2.39)	(2.59)	(2.46)	
Time × Tracking	–24.64***	–25.07***	–13.77***	–6.83**
	(3.72)	(3.91)	(3.89)	(3.40)
Gender (1 = girls)	–6.82***	–6.84***	–6.94***	–6.66***
	(0.92)	(0.92)	(0.90)	(0.80)
Gender × Time	–4.65***	–4.62***	–7.47***	–7.26***
	(1.56)	(1.56)	(1.54)	(1.32)
Born outside the country	–15.85***	–15.84***	–13.03***	–28.41***
	(2.43)	(2.43)	(2.48)	(1.69)
Born outside the country × Time	30.50***	30.62***	40.95***	35.69***
	(3.23)	(3.23)	(3.48)	(2.52)
Different language at home	–54.74***	–54.66***	–50.88***	–31.99***
	(4.86)	(4.85)	(4.62)	(3.83)
Different language at home × Time	35.96***	35.73***	25.34***	11.28**
	(5.79)	(5.79)	(5.58)	(4.77)
11–25 books	38.21***	38.05***	35.74***	26.36***
	(3.22)	(3.20)	(3.03)	(1.77)
26–100 books	65.63***	65.53***	62.31***	49.29***
	(3.59)	(3.57)	(3.33)	(1.87)
101–200 books	76.00***	77.79***	74.90***	65.76***
	(3.84)	(4.22)	(3.95)	(2.19)
More than 200 books	76.36***	78.14***	76.15***	67.96***
	(3.94)	(4.32)	(4.04)	(2.30)
Time × 11–25 books	–22.05***	–22.09***	–26.28***	–11.92***
	(3.72)	(3.69)	(3.42)	(2.26)
Time × 26–100 books	–14.35***	–14.51***	–27.09***	–13.95***
	(4.22)	(4.19)	(3.71)	(2.42)
Time × 101–200 books	–3.50	–2.68	–19.06***	–9.16***
	(4.59)	(5.11)	(4.49)	(2.93)
Time × More than 200 books	23.53***	24.34***	5.65	15.27***
	(4.76)	(5.25)	(4.60)	(3.06)
Low background × tracking		5.84**	7.88***	11.56***
		(2.64)	(2.56)	(2.26)
Low background × tracking × time		2.49	–4.92	–13.29***
		(3.78)	(3.58)	(3.18)
Age and grade dummies			Yes	Yes
Country fixed effects				Yes
Constant	446.19***	445.68***	480.92***	499.17***
	(4.24)	(4.33)	(5.66)	(5.96)
Adj. R-square	0.110	0.110	0.175	0.336
N	148,712	148,712	147,960	147,960

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

in the surveys. However, we did not add interaction terms of these characteristics with tracking dummy, assuming coherent definition and measurement within each survey.The most important individual covariates in the regressions control for student family background. In PIRLS/PISA parental education was included, while in TIMSS/PISA the number of books at home. These are the only family background indicators, which were similarly defined across surveys. Dummies for each category of these variables were interacted with time.

Results obtained for the regression with these individual characteristics, time, tracking, and treatment dummies, are in the column (1) of Tables 8 and 9, respectively. Negative effects of tracking (interaction term Time $\times$ Tracking) are similar to those estimated with country-level data. However, standard errors are much smaller and tracking estimates are highly significant.[12] Results obtained from regression where tracking effects were estimated separately for group of students from low-educated families ("low background") are presented in columns (2)–(4). These are called "second-order treatment effects" (see Meyer, 1995) or difference-in-differences-in-differences estimates (see Gruber, 1994). We tested here the hypothesis that lower background students are differently affected by tracking. In other words, despite the overall difference in achievement growth between tracking and non-tracking countries, we expect that student from low-educated families should be worse off because of tracking (comparing to other students). Lower background was arbitrarily defined as not having a parent with tertiary education (PIRLS/PISA) or having at most 100 books at home (TIMSS/PISA). Several different thresholds were also considered but results were very similar. We are fully aware that the group defined as "low background" could contain some students who should not be classified this way. Some students from well-educated families could end up in vocational school, but in reality this is rarely the case. More importantly, there is probably non-negligible measurement error in self-declared variables about parental education (reported by students). That could increase standard errors and lower the effects but if there is any differential impact of tracking according to family background of students we should be able to detect it. To control for systematic differences between tracking and non-tracking countries as well as between "low background" and other students, we interacted "low background" and tracking dummies. This way we controlled not only for any systematic differences in samples tested in two surveys (all levels of parental education or number of books at home were already interacted with time), but also for differences in measurement, definitions or correlation of socio-economic status of families and student achievement growth between surveys and tracking/non-tracking countries.

The coefficient of interest is now for the "Low background $\times$ Tracking $\times$ Time" interaction term. Estimates of this coefficient presented in column (2) suggest that differential impact of tracking on the lower background group of students is negligible, both in PIRLS/PISA and TIMSS/PISA comparisons. In column (3), age

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[12] Standard errors were computed analytically correcting for clustering at the school level. We tried also bootstrap and jackknife estimators of standard errors but they were only slightly different and did not change any of the conclusions.

and grade dummies were added to control for discrepancies in their distribution between surveys and countries. Impact of tracking on lower background students remained insignificant after controlling for age and grade, but overall tracking effect was almost halved. Finally, tracking dummy was replaced by full set of country dummies, or in other words, by country fixed effects. The results for fixed effect model are presented in column (4). In the case of PIRLS/PISA, overall impact of tracking didn't change but the effect for low background students became negative, although still insignificant. For TIMSS/PISA, overall effect almost disappeared but the effect for low background student became significant and negative. Nevertheless, estimated differential impact on lower background group was in all cases very close to zero. The difference in the magnitude of the impact is almost negligible from the practical point of view.

Looking separately at each country score distribution in PISA, PIRLS, and TIMSS, we found it interesting that almost all Eastern European countries experienced lower achievement growth (see figures in the Appendix). These countries scored near the average in PIRLS or TIMSS and much lower in PISA 2000 and 2003. It could be due to common transition experience, which similarly affected students in these countries and likeness of educational systems under the previous regime. Many of these countries are among tracking countries considered in this chapter: Bulgaria, Czech Republic, Hungary, Romania, Russian Federation, and Macedonia. Only Latvia doesn't have tracking system for 15-year-olds. Thus, it could be that we confound the effect of tracking policy with the ineffectiveness of the Eastern European secondary school systems. To separate these effects, we added dummy for Eastern Europe and interacted it with time to see whether there is common path of achievement growth among students from these countries and if tracking effect remains if we take that into account.

Additionally, we recognized that in the group of tracking countries some are tracking students earlier and some later. In fact, many students in tracking countries tested in PISA were tracked into different programs for less than 1 year before the study was conducted. It is doubtful that we could observe any strong effects of tracking for these students. It could be hypothesized that even existence of tracking in secondary schools affects student learning in primary schools but in this case one should observe much stronger negative effects in countries which track students earlier. Disentangling tracking effects is quite difficult because of low number of countries in our samples. Thus, we limited analysis to PIRLS and PISA in reading. However, even here, only two early tracking countries are present: Germany and Netherlands. Thus, findings are rather of exploratory nature and shouldn't be generalized without great caution.

Table 10 reports results from six regressions for reading in PIRLS and PISA. For brevity, we didn't present all coefficients. Sets of regressors in columns (1)-(3) are identical to those in column (1) in Table 8, except that we included country fixed effects instead of tracking dummy. The number of observations is higher because missing data were separately coded and interacted with time and tracking dummies. This way estimation was possible on the full sample available to the public. Nevertheless, it is again DD regression with Eastern European dummy included in

Table 10 Effects for Eastern European, early, and late tracking countries

	Reading literacy in PIRLS 2001 and PISA 2000					
	(1)	(2)	(3)	(4)	(5)	(6)
Tracking × time	–10.84***			–13.74***		
	(2.71)			(2.57)		
Low background × tracking × time				0.95		
				(2.84)		
Early tracking × time		0.43	–4.39		–2.26	–7.31**
		(4.01)	(4.03)		(3.70)	(3.71)
Late tracking × time		–24.68***	–13.73***		–27.49***	–16.32***
		(2.81)	(3.00)		(2.65)	(2.90)
Low background × early tracking × time					–3.39	–2.26
					(5.80)	(5.80)
Low background × late tracking × time					2.66	1.96
					(2.90)	(2.90)
Eastern European country	65.39***		65.99***	69.11***		67.67***
	(6.99)		(5.38)	(5.39)		(5.42)
Eastern European country × time	–29.16***		–25.75***	–28.75***		–25.79***
	(3.04)		(3.28)	(3.02)		(3.26)
Adj. R-square	0.32	0.32	0.32	0.32	0.32	0.32
N	210,404	210,404	210,404	210,404	210,404	210,404

*$p < 0.10$, **$p < 0.05$, ***$p < 0.01$

column (1), tracking effect separated into earlier and later tracking in column (2), and a combination of both in column (3). Sets of regressors in columns (4)-(6) are identical to those in column (4) in Table 8. Thus, it is again DD regression with "second-order treatment effects" and Eastern European dummy included in column (4), tracking effect separated into earlier and later tracking and interacted with low background indicator in column (5), and a combination of all in column (6).

The results are striking. They suggest that being in the early tracking country alone has negligible effect on achievement, even for the students from low-educated families. Being in the late tracking country has negative effect on achievement growth, but this affects all students despite their background. It is doubtful that tracking is the source of lower achievement growth in this case because it should affect more heavily disadvantaged students and the effect should be more visible in the early tracking countries. Interestingly, students from Eastern European countries experienced much lower achievement growth than students in other countries. This effect was probably confounded with tracking effect in the previous studies, because almost all Eastern European countries are late trackers. Thus, although one explanation was found to be doubtful (impact of tracking), the new evidence poses new attractive research questions. Why students in Eastern Europe experienced lower achievement growth? Why did they score above the average in primary schools and lose all the advantage in secondary schools? It could be because of the negative impact of social and economic changes in the transition period. It could be that the model of secondary education inherited from communist times is so unbeneficial for student achievement. We look forward for future studies, which will attempt to research this phenomenon.

Summary and Conclusions

This chapter discusses the difference-in-differences approach to estimate tracking effects based on the PIRLS, TIMSS, and PISA data. These data sets allow international comparisons of student achievement in reading, mathematics, science and problem solving. Our goal was to test the robustness of findings from the seminal work of Hanushek and Woessmann (2006) who claimed that tracking has negative impact on educational inequality and at least no positive impact on mean performance. We demonstrated that there are crucial differences between PIRLS, TIMSS, and PISA that could bias the results obtained from the difference-in-differences method. Using individual data, we adjusted the samples of students tested in these surveys to make them more comparable. With samples limited to native students, who were in modal grades and of the same age, the results changed importantly. There is no evidence of negative impact of tracking on mean performance and on educational inequality.

In the chapter, we propose another difference-in-differences approach, which relaxes the assumption of linear relation between country-level performance in primary and secondary education. Moreover, this approach opens the possibility to use individual data to control for student characteristics and discrepancies in their distribution between surveys and countries. Thus, we were able to estimate tracking effects more precisely and limit the bias coming from dissimilar survey design. The new results suggest that overall impact of tracking on student performance is negative. However, in the model, which allows for heterogeneous effects, we found that the impact is of the same magnitude for students from low-educated families and for students from well-educated families. We argue that this is hardly possible because students with privileged background could only benefit from tracking and negative impact on this group makes all approach doubtful. Moreover, additional estimates showed that tracking effects are much more negative in late tracking countries, which are mainly Eastern European countries. It was argued that tracking effects were probably confounded with secondary school policies common in Eastern Europe, which are unbeneficial for student achievement growth. The tracking effects for early tracking countries were found to be negligible.

Thus, we didn't confirm earlier evidence on negative impact of tracking on mean performance or educational inequality. However, we found new evidence on lower achievement growth in Eastern Europe, which opens interesting research area for future studies. Our study demonstrates also that combining data from international surveys of achievement is not a straightforward task. These surveys differ in several important assumptions, which have to be considered before any meaningful comparisons could be made.

Appendix

Table 11 Re-standardized mean achievement on PIRLS, TIMSS, and PISA in the analyzed sample

	PIRLS 2001	PISA 2000	PIRLS 2001	PISA 2003	TIMSS 2003	PISA 2003	TIMSS 2003	PISA 2003	PISA 2003
Country	Reading literacy		Reading literacy		Mathematics		Science		Problem solving
Argentina	362.7	427.3							
Australia					487.2	521.2	511.7	517.0	526.0
Belgium (Flemish community)					544.1	550.3	509.2	520.8	543.4
Bulgaria	529.3	439.3							
Canada	521.3	542.0	518.8	532.6					
Czech Republic	512.0	499.8	508.9	489.2					
England	532.4	531.2	530.7	508.7	522.8	503.8	532.7	510.7	504.8
France	497.1	512.8	492.9	497.6					
Germany	514.8	492.3	511.9	492.3					
Greece	495.8	482.2	491.6	471.2					
Hong Kong	500.5	533.2	496.6	512.3	570.5	547.3	535.1	531.5	544.2
Hungary	520.1	488.3	517.5	481.8	519.9	487.0	521.4	495.1	497.1
Iceland	480.9	514.9	475.6	492.7					
Israel	476.5	460.8							
Italy	516.9	495.7	514.1	474.9	491.7	462.6	506.3	478.3	465.4
Japan					559.3	531.1	536.1	539.6	543.5
Latvia	521.8	466.7	519.4	491.4	527.9	480.3	523.3	480.9	478.5
Macedonia	390.7	382.1							
Netherlands	534.1	539.6	532.5	516.3	532.9	534.8	516.4	516.3	516.3
New Zealand	501.8	536.5	497.9	525.6	481.6	520.4	510.6	512.8	529.0
Norway	464.0	513.3	457.5	501.5	435.5	492.1	453.4	476.0	485.8
Romania	480.0	436.9							
Russian Federation	500.6	470.3	496.7	437.9	523.4	465.4	517.6	481.1	474.5
Scotland	500.9	533.4	497.0	519.0	478.1	520.8	491.6	505.7	521.7
Slovak Republic			483.3	467.7					
Sweden	542.7	524.2	541.8	517.6					
Tunisia					312.9	355.7	289.8	376.2	340.2
Turkey			389.6	436.6					
United States	518.7	512.4	516.1	496.5	508.7	479.8	527.7	483.1	473.3

Note: Own calculations based on average estimate from five student plausible values in each subject accounting for survey weights. All scores were re-standardized to have mean 500 and standard deviation 100 in the sample of considered countries.

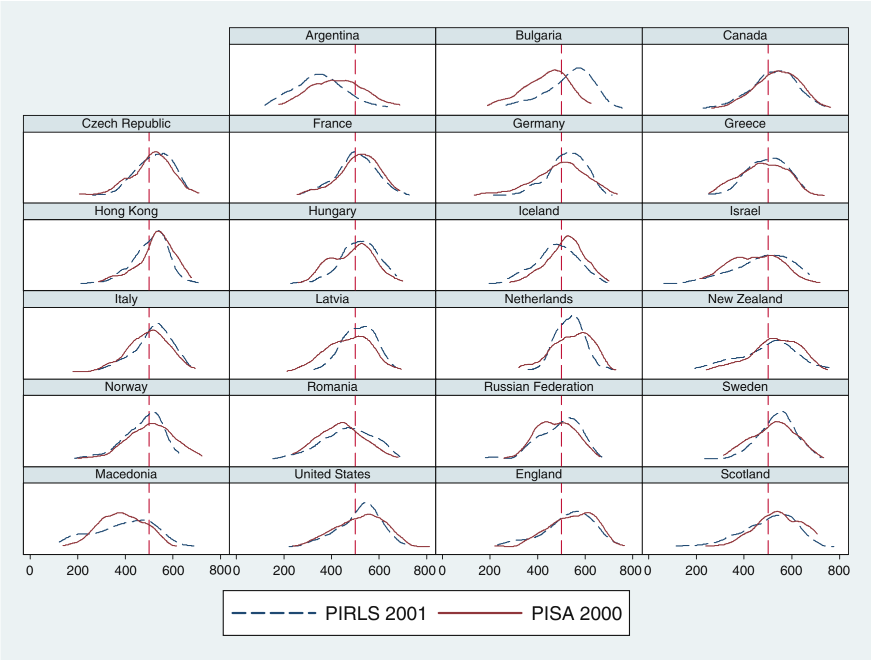

Fig. 2 Reading literacy score distribution in PIRLS 2001 and PISA 2000

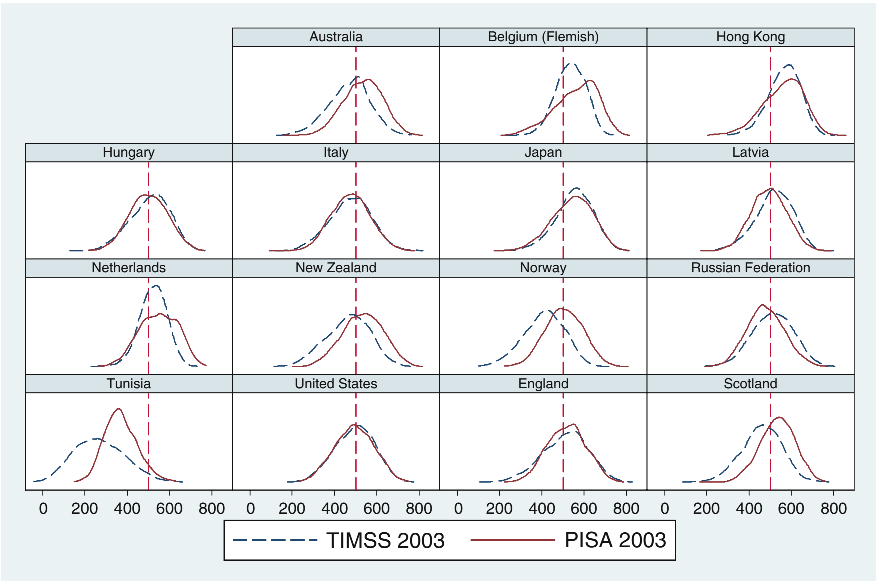

Fig. 3 Mathematics literacy distribution in TIIMMS 2003 and PISA 2003

Table 12 Description of student characteristics used in the analysis

NT – non-tracking countries T – tracking countries		PIRLS and PISA 2000				TIMSS and PISA 2003			
		PIRLS		PISA 2000		TIMSS		PISA 2003	
		NT	*T*	*NT*	*T*	*NT*	*T*	*NT*	*T*
Gender	% of girls	49.8	49.6	51.4	50.1	49.4	49.4	50.7	49.5
Born outside the country	%	19.5	8.2	10.1	4.0	12.3	7.6	8.5	5.0
Different language at home	%	5.0	3.3	6.4	7.7	2.6	1.9	4.2	3.0
Highest level of parents' education	% tertiary	21.2	17.5	43.7	33.9	No data in TIMSS			
	% post/upper secondary	33.1	46.4	33.2	46.8				
	% lower-secondary	8.7	14.5	10.3	11.6				
	% primary or none	5.1	3.8	6.4	4.4				
	% of missing	31.9	17.8	6.4	3.2				
Age	In months	122.2	125.3	188.4	187.2	122.5	123.1	189.5	189.3
Grade		4.2	3.9	10.0	9.4	4.0	4.0	9.9	9.6
How many books do you have at home?		% with 0–10 books				12.9	10.5	11.5	8.4
		% with 11–25 books				20.1	24.7	14.8	14.0
		% with 26–100 books				32.0	34.5	28.6	29.4
		% with 101–200 books				16.7	15.4	17.9	19.5
		% with more than 200 books				14.3	13.0	24.7	26.3
		% of missing				4.0	1.9	2.5	2.4

Note: Results were obtained with survey weights rescaled to have the same sum in each country (senate weights).

Table 13 PIRLS and PISA 2000. Country-level DD based on reading literacy subscales

	PIRLS and PISA 2000 reading literacy subscales PIRLS: (1) reading to acquire and use information; (2) reading for literary experience PISA 2000: (3) retrieving information; (4) interpreting texts; and (5) reflection and evaluation						PIRLS subscales and PISA 2003 overall reading literacy	
	Information[1] retrieving[3]	Experience[2] retrieving	Information interpreting[4]	Experience interpreting	Information reflection[5]	Experience reflection	Information reading	Experience reading
Track	–34.33**	–30.56**	–34.19***	–30.49**	–43.44***	–39.93***	–28.50***	–24.88***
	(12.99)	(12.84)	(11.88)	(11.60)	(11.81)	(11.49)	(8.00)	(7.97)
PIRLS	0.66***	0.65***	0.66***	0.65***	0.62***	0.62***	0.49***	0.47***
	(0.16)	(0.15)	(0.14)	(0.14)	(0.14)	(0.14)	(0.12)	(0.12)
Cons	180.35**	183.75**	184.84**	184.95**	204.19***	202.96***	261.18***	273.39***
	(77.78)	(75.88)	(71.14)	(68.56)	(70.68)	(67.93)	(61.74)	(60.53)
R^2	0.486	0.493	0.528	0.545	0.555	0.574	0.528	0.514
N	23	23	23	23	23	23	20	20

$^{**}p < 0.05$, $^{***}p < 0.01$

Table 14 TIMSS 2003 and PISA 2003: country-level DD with all mathematics subscales

TIMSS 2003 mathematics content scales and PISA 2003 mathematics subscales
TIMSS content scales: (alg) – algebra; (dap) – data reproduction, analysis, probability; (fns) – fractions + number sense; (geo) – geometry; (mea) measurement. Cognitive scales: (app) – applying; (kno) – knowing; (rea) – reasoning.
PISA: m1 – space and shape; m2 – change and relationship; m3 – uncertainty; m4 – quantity

	m1 *alg*	*m1* *dap*	*m1* *fns*	*m1* *geo*	*m1* *mea*	*m2* *alg*	*m2* *dap*	*m2* *fns*	*m2* *geo*	*m2* *mea*
Track	–18.03	–2.44	–22.02	–8.90	–18.01	–13.85	2.90	–16.96	–3.83	–13.91
	(16.12)	(12.39)	(17.40)	(13.73)	(13.41)	(18.29)	(13.11)	(20.95)	(16.09)	(15.33)
TIMSS	0.61***	0.57***	0.67***	0.66***	0.60***	0.67***	0.64***	0.70***	0.71***	0.66***
	(0.12)	(0.08)	(0.15)	(0.11)	(0.09)	(0.14)	(0.09)	(0.18)	(0.13)	(0.11)
Cons	196.14***	212.98***	167.76**	168.44***	199.87***	169.46**	180.03***	154.07	142.04**	172.46***
	(60.72)	(42.27)	(72.55)	(54.97)	(46.90)	(68.90)	(44.72)	(87.33)	(64.44)	(53.63)
R^2	0.620	0.758	0.573	0.709	0.735	0.600	0.779	0.494	0.674	0.716
N	15	15	15	15	15	15	15	15	15	15

	m3 *alg*	*m3* *dap*	*m3* *fns*	*m3* *geo*	*m3* *mea*	*m4* *alg*	*m4* *fns*	*m4* *geo*	*m4* *mea*	
Track	–28.15	–13.61	–30.80	–19.64	–28.55	–9.23	5.17	–12.16	–0.81	–9.34
	(22.56)	(17.32)	(24.57)	(20.08)	(20.23)	(16.08)	(12.28)	(18.04)	(13.82)	(13.51)
TIMSS	0.59***	0.60***	0.62**	0.65***	0.59***	0.57***	0.54***	0.60***	0.62***	0.56***
	(0.17)	(0.12)	(0.21)	(0.16)	(0.14)	(0.12)	(0.08)	(0.15)	(0.11)	(0.10)
Cons	211.56**	205.98***	199.26*	177.42**	209.61**	214.92***	227.04***	198.35**	187.85***	216.69***
	(84.97)	(59.08)	(102.46)	(80.41)	(70.77)	(60.57)	(41.88)	(75.21)	(55.32)	(47.27)
R^2	0.414	0.628	0.328	0.509	0.524	0.588	0.742	0.500	0.679	0.706
N	15	15	15	15	15	15	15	15	15	15

Table 14 (continued)

TIMSS 2003 mathematics cognitive scales and PISA 2003 mathematics subscales
TIMSS: (app) – applying; (kno) – knowing; (rea) – reasoning. PISA: see above

	m1 *app*	*m1* *kno*	*m1* *rea*	*m2* *app*	*m2* *kno*	*m2* *rea*	*m3* *app*	*m3* *kno*	*m3* *rea*	*m4* *app*	*m4* *kno*	*m4* *rea*
Track	–18.91	–16.24	–12.84	–14.12	–11.26	–8.26	–27.97	–26.72	–23.53	–9.49	–7.34	–4.44
	(16.18)	(14.26)	(13.73)	(19.28)	(17.52)	(15.71)	(23.62)	(20.86)	(20.17)	(16.86)	(14.87)	(13.92)
TIMSS	0.64***	0.65***	0.69***	0.68***	0.69***	0.76***	0.59***	0.64***	0.69***	0.58***	0.60***	0.65***
	(0.13)	(0.11)	(0.11)	(0.15)	(0.14)	(0.13)	(0.19)	(0.16)	(0.17)	(0.14)	(0.12)	(0.12)
Cons	179.7**	175.8***	153.9**	161.1*	157.5**	122.9*	209.9**	187.3**	163.1*	207.4***	199.6***	175.2**
	(64.02)	(55.22)	(56.70)	(76.29)	(67.82)	(64.89)	(93.47)	(80.77)	(83.33)	(66.75)	(57.57)	(57.52)
R^2	0.620	0.697	0.714	0.559	0.627	0.694	0.361	0.489	0.513	0.550	0.641	0.680
N	15	15	15	15	15	15	15	15	15	15	15	15

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Table 15 DD with TIMSS subscales and PISA overall score in science and problem solving

	TIMSS 2003 and PISA 2003 TIMSS: life, physical, and earth sciences. PISA: science and problem solving overall scores					
	Science earth sciences	Science life sciences	Science physics	Problem earth sciences	Problem life Sciences	Problem physics
Track	–6.27	–13.33	–2.45	–9.57	–18.69	–4.56
	(12.12)	(11.09)	(11.31)	(17.80)	(16.44)	(17.59)
TIMSS	0.59***	0.52***	0.55***	0.75***	0.67***	0.68***
	(0.11)	(0.08)	(0.09)	(0.15)	(0.12)	(0.14)
Cons	201.83***	237.94***	223.65***	125.77	168.83**	160.03**
	(52.26)	(39.77)	(44.59)	(76.73)	(58.96)	(69.37)
R^2	0.681	0.743	0.718	0.607	0.677	0.609
N	15	15	15	15	15	15

$^{**}p < 0.05$, $^{***}p < 0.01$

Table 16 DD with TIMSS subscales in mathematics and PISA score in problem solving

	TIMSS 2003 subscales in mathematics and PISA 2003 problem solving score TIMSS: all subscales in mathematics (see Table 13). PISA: problem solving overall score							
	Algebra	Data…	Fractions…	Geometry	Measurement	Applying	Knowing	Reasoning
Track	–20.21	–2.66	–23.14	–10.09	–20.18	–20.26	–17.53	–14.26
	(17.50)	(13.03)	(20.70)	(14.14)	(14.32)	(18.90)	(16.63)	(14.98)
TIMSS	0.69***	0.65***	0.72***	0.75***	0.68***	0.70***	0.72***	0.78***
	(0.13)	(0.09)	(0.18)	(0.11)	(0.10)	(0.15)	(0.13)	(0.12)
Cons	157.95**	176.23***	145.59	122.41*	162.20***	152.34*	145.32**	112.50*
	(65.92)	(44.44)	(86.32)	(56.62)	(50.09)	(74.80)	(64.37)	(61.87)
R^2	0.639	0.785	0.512	0.751	0.756	0.581	0.668	0.725
N	15	15	15	15	15	15	15	15

$^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

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Educational Expansion and Social Class Returns to Tertiary Qualifications in Post-communist Countries

Erzsébet Bukodi

Introduction

This chapter compares the impact of qualifications on social class in seven post-communist countries: Hungary, Czech Republic, Slovakia, Poland, Slovenia, Estonia and Ukraine. The aim of the study is to investigate the effects of the vertical and horizontal dimensions of education, i.e. the effects of *level* of education and *field of study* on the probabilities of individuals ending up in different classes. The main research question to be answered is as follows: To what extent do educational expansion at tertiary level lead to labour market success – in terms of social class position – differentially in the seven countries considered here, and how can we explain these differences? These countries are interesting to compare as they bring the same communist legacy in all regards, but as the crucial aspects of their educational systems, including tertiary education, differ strongly. At the same time, all countries have important similarities relating to chief economic factors that have been affecting the demand for qualifications in the post-communist era.

One of the principal changes in the labour market during the economic transition was a sizeable increase in returns to qualifications (Svenjar, 1999). For example, in Hungary, the winners of economic transformation appear to be tertiary educated young people, in both the terms of earnings (Kertesi & Köllö, 2007) and of chances of their finding rewarding jobs relatively quickly after graduation (Bukodi, 2008). In Poland, the correlation between level of qualification and earnings has also increased substantially in the post-communist period (Dabrowa-Szefler & Jablecka-Pryslopska, 2006). Likewise, Jurajda (2003) finds that in Czech Republic the college/upper secondary school wage gap is much higher than comparable gaps in Austria and Germany, both of which have relatively similar educational systems and enrolment patterns. However, in Estonia, the level of education attained appears

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to play a much less role and graduates have no significant advantages as compared to the lower educated in finding their first adequate job (Kogan & Unt, 2005). All in all, these studies demonstrate that – though there are some differences across countries – the association of levels of qualification and different labour market outcomes has become stronger in post-communist era. As regards the fields of study, however, only one article deals with societies undergoing market transitions. Gerber and Schaefer (2004) discuss this issue in Russian context and find that relative returns – in terms of earnings and risk of unemployment – to degrees in economics and law have increased during the post-Soviet era, and recently obtained diplomas in these fields are more valuable than are engineering and science degrees obtained at any time.

In this chapter, my interest is of the effects of qualifications on social class. There is no doubt that social class and income or risk of unemployment can be regarded as different conceptualisations of labour market outcomes. In many advanced Western societies it has been shown that the effects of education on social class, in fact, decreased in the last decades (Goldthorpe & Mills, 2004; Vallet, 2004; Ganzeboom & Luijkx, 2004; Whelan & Layte, 2002), often explained by an increase of the relevance of non-educational attributes (social origin, social skills, personality, etc.) (Goldthorpe, 1996). In post-communist context, however, we do not know much about how the effects of qualifications on social class have changed after the regime transformation.

Previous Research

Educational Expansion

The supply of education in all advanced societies has been expanding. Members of the successive birth cohorts have steadily increased their average levels of qualification. However, this expansion of education tends to weaken the labour market value of qualifications through the effect that it has on level of education as a signal. When a majority of the workforce had only minimal education, the possession of some qualifications gave a clearer signal to employers than when the significant proportion of the workforce has at least upper secondary education – as in many modern societies now. This means that it has become more difficult for employers to interpret a certain level of education and qualifications might become less reliable basis of their choice among applicants for particular jobs than they were before. Furthermore, if level of education declines in value as a signal in the labour market, employers tend to try to look for alternative signals. Of course, quite different signals can be taken up, for instance those derive more from “ascribed” rather than “achieved” characteristics – e.g. the family background – (Goldthorpe, 2007b) or those derive from a range of individuals’ personal attributes (Jackson, Goldthorpe, & Mills, 2005; Jackson, 2006). But, some of the signals might be still education-related. Employers may focus more on the type – in terms of fields of study – rather than on the level of education. Thus, we can expect that the greater the rate of educational expansion, especially at tertiary level, in a country, the stronger the role of fields of study in job allocation process.

Turning now to the side of employers, the last decade witnessed a growing demand for highly educated personnel displacing poorly qualified workers. It is indeed true that professional, managerial and various ancillary occupations, the so-called salariat (Goldthorpe, 2007a), have expanded and have become more diverse in its character. Since the seventies the salariat class has not only increased in size because the "old" professions (e.g. lawyers, medical doctors, teachers, high-level managers) have grown but also because many "new" occupations (e.g. consultancy and different administrative jobs) have appeared (Van de Werfhorst, 2007). And these new jobs are especially those which – besides a particular level of qualification – require other relevant competencies, e.g. "people processing" skills (Breen & Goldthorpe, 2001), and one may assume that field of study might be a better signal of these skills than level of education.

Transparency of Qualifications

The organisation of the educational and vocational system has far-reaching implications for the speed of employment entry, the matching quality between qualification and jobs and the mobility processes in the course of employment career (Shavit & Müller, 1998). Allmendinger (1989) has introduced a widely used typology for the classification of educational systems, which takes two dimensions into account: the extent of standardisation and stratification. However, this classification has been developed to capture the most important characteristics of secondary education. To analyse cross-national differences in systems of higher education and their potential effects on the labour market outcomes, some modifications are needed.

(1) A necessary consequence of educational expansion is that systems become more complex. However, the mode and the extent of differentiation in the stratification of tertiary education vary across countries (Goedegebuure, Meek, Kivinen, & Rinne, 1996). In some countries, tertiary education is offered chiefly by a single type of institution – usually, a research university. This type of system is referred to as unified. In general, these systems are regarded to be quite rigid without a firm intention to encourage expansion, neither by increasing places available in universities nor by founding new types of institutions. Other systems consist of a mix of organisations that are stratified by prestige, resources and selectivity of students, distinguishing prestigious research universities and a second tier of colleges. Goedegebuure and associates refer to this type as diversified tertiary education. In the third type, the second tier of higher education takes the form of vocational training. This system is labelled as binary because it consists of two main types of institutions: academic and vocational. In binary system the vocational colleges are designed to provide with job-oriented skills in specific subjects. Graduates with such qualifications

show clear signals to the labour market: both their level of training and their field of study are considered to be good indicators of their employability in specific jobs.

(2) The systems of higher education also vary by the extent to which expansion is promoted by market-based private financing or more exclusively by public sources. As Arum, Gamoran, and Shavit (2007) argue, where tertiary education is primarily supported through private sources, enrolment rates exceed those being found in publicly funded systems. Privately established institutions are mostly client-seekers, furthermore, these colleges and universities may engage extensively in development of specialised programmes that might be more responsive than programmes offered by publicly financed organisations to fast changes in labour market demands of qualifications. Moreover, private, tuition-charging institutions may provide better quality training, since presumably they have resources to hire superior faculty as well as to ensure a high quality infrastructure for teaching. Thus, it can be expected, that the larger the extent to which market forces operate in tertiary education, the greater the returns to degrees in general. However, plausible as this hypothesis may be, an opposite prediction is also conceivable. The face of the private sector institutions might be quite heterogeneous. If the quality of programmes offered by some private universities or colleges is not controlled to same extent as in publicly financed institutions, the signals of qualifications and competencies provided by these organisations might be less clear, making employers much more reluctant to hire graduates trained by these institutions.

(3) The third attribute of the system of higher education that may be important in assessing the labour market value of degrees is the extent of non-regular (part-time, evening, correspondence) programmes. If employers have concerns about the poor quality of training taken in non-regular forms and they view non-regular programmes as less rigorous, degrees and qualifications from such programmes may have less value in the labour market. Furthermore, it can be assumed that in countries where the proportion of non-regular programmes is high, it might be quite common that students take part in these programmes in order to obtain a second diploma, and to do two different subjects for each degree, than in countries where the share of non-regular training is low.

These characteristics of the systems of tertiary education are supposed to be strongly related to the extent of transparency of competencies. If potential employees possess one of the clear signals provided by higher education – they have occupation-specific qualifications or/and obtain their degrees in publicly financed institutions preferably in full-time programmes – employers may have less concern about the quality of their degrees and might be willing to hire them in rewarding jobs. However, in countries with a weak signalling function of the system of education, additional selection criteria – for example, fields of study – are thought to be in operation. In fact, investigating the probability of entering the salariat in terms of the EGP schema described by Erikson and Goldthorpe (1992), more variations across fields of study are found in the UK (where signalling function of educational level is relatively weak) than in Germany (where it is supposed to be fairly strong) (Kim & Kim, 2003). However, another research draws an opposite conclusion, namely in countries with a strong signalling function of tertiary education, the effects of fields of study on wages and occupational status are more pronounced than in countries with a weak signalling function of higher education (Van de Werfhorst, 2004).

The Post-communist Context

In the communist era, systems of higher education were centrally planned, and controlling demand for places in strict obedience to the rigours of command economy, the rate of increase in number of students in tertiary education was quite low from the early seventies onwards. Though majority of students attended full-time courses, the proportion of those in part-time (evening or correspondence) programmes was generally high, accounted for about 35–40% of total tertiary enrolment. However, education officials often expressed their concerns about the relatively poor quality of training taken in non-regular forms, and those who obtained their tertiary degrees in part-time programmes had significantly lower chances to get prestigious jobs than those who studied in full-time form (Kolosi & Róbert, 1985).

Higher educational systems required immediate specialisation into a field of study. This meant that students had to choose a major at the time of their application, which could not be changed afterwards, only with few exceptions. The rule was that central authorities determined the number of student slots allocated to various fields of study, chiefly on the basis of the perceived needs of the economy. Engineering, natural sciences and other technical specialities were especially emphasised, due to the general belief that these majors bring the most immediate economic and technological benefits. Another large field of study was teacher training, which was designed to provide primary and secondary schools with appropriate number of qualified professionals. Specialities such as social sciences and humanities or economics and law that were thought not directly to enhance the productivity of economy received relatively few slots.

As a defining characteristic of the communist system, educational qualifications did affect substantially individuals' access to jobs and occupations. The linkage between level of education and the occupational status was fairly clearly defined and was stronger than in Western societies (e.g. Solga & Konietzka, 1999; Titma, Tuma, & Roosma, 2003), although status much often tended to overweigh the skill match (Róbert & Bukodi, 2005; Saar, 2005). However, the earnings returns to higher education, overall, were much smaller than in Western countries (e.g. Gerber & Hout, 1998; Ivancic, 2000). Returns to different fields of study were based on how state authorities viewed the importance of the corresponding occupations for the development goals of the state. And, because communist leaders believed that engineering and technical sciences promoted to greatest extent the productive capacity of the economy, they rewarded them the most. Specialities like teacher training, humanities and social sciences yielded relatively low earnings returns in communist countries.

The introduction of market reforms has led to a growing demand for highly qualified people in all post-communist countries. However, there are substantial differences in the rate of expansion at tertiary level across nations. Three countries – Poland, Hungary and Estonia – have witnessed a huge expansion, especially since the mid-1990s (Dabrowa-Szefler & Jablecka-Pryslopska, 2006; Estonian Ministry of Education and Research, 2006; Hungarian Statistical Office, 2005). However, the rate of increase in number of students at tertiary level seems to be relatively modest in Slovenia, Slovakia and Czech Republic (Flere & Lavric, 2005; Mederly, 2006; Ministry of Education, Youth and Sports of Czech Republic, 2006) and to be particularly low in Ukraine (Kremen & Nikolajenko, 2006). In Poland, Hungary and Estonia, the major attention has been paid to raise of low enrolment rates in higher education, basically without specifying the desirable structure of education. In Poland, but especially in Estonia, the significant growth is due to the increase in the proportion of paid education in public universities, coupled with the establishment of new private institutions (Dabrowa-Szefler & Jablecka-Pryslopska, 2006; Estonian Ministry of Education and Research, 2006). But some of these newly established institutions have only limited right to award nation-wide, state-recognised diplomas, and the quality of programmes offered by them is not controlled to the same extent as in publicly financed institutions. Furthermore, many of private universities do not have the proper resources for developing the infrastructure necessary to keep the institutions sustainable in the long run. In addition, for a significant proportion of students, attending a private university or college is a “second best” option, since at the entrance examination they have not met the requirements for studying free of charge in public institutions. In Hungary, the attendance increased faster in vocational-type colleges than in traditional universities (Lannert, 2005), and the rate of expansion was especially high in the non-regular (part-time, correspondence) forms of education (Hungarian Statistical Office, 2004). The number of non-regular students increased at a higher rate than that of regular students in Poland as well (Dabrowa-Szefler & Jablecka-Pryslopska, 2006). And also in Estonia, a large emphasis is put on the lifelong learning, which takes place mainly in a non-regular form (Estonian Ministry of Education and Research, 2006). But without doubt – more or less regardless of the forms and the fields of the study – the content of tertiary programmes has changed over the last some 15 years in all post-communist countries. Now the curriculum of tertiary education is oriented towards international – in fact, Western – approaches and standards, including more up-to-date knowledge and expertise.

Also, there have been enormous changes in the composition of tertiary education by fields of study in all countries covered by this study. In light of the oversupply of engineers and technical specialists, which was the legacy of the communist regime, the sharp decline of industries and the strong growth of service sector have led to a shift from engineering and technical sciences to business, law and social sciences. However, country differences in this regard are also apparent. The proportion of graduates with the latter specialisation is far largest in Poland, where there was a general trend in the nineties towards broadening of educational profiles in order to make them more appropriate for flexible adjustment to the demand of economy (Dabrowa-Szefler & Jablecka-Pryslopska, 2006). The percentage of people recently graduated in law, business and social sciences is also fairly high in Estonia, Slovenia and Hungary, but has remained relatively low in Czech Republic and Slovakia. In these two latter countries, the proportion of graduates in engineering and natural sciences still accounts for a non-negligible minority.

Although all countries inherited the structure of tertiary education from the communist era, after the regime transformation the systems have been developed into quite different directions. Taking the classification schema developed by Goedegebuure et al. (1996) – see above – Czech Republic and Slovakia belong to the "unified" category with the structure of the traditional and "elitist" research universities (Mateju & Simonová, 2003; European Commission, 2003). Hungary and Slovenia have "binary" systems with a firm division between vocational colleges and academic universities (Lannert, 2005; Ivancic, 2000). In Poland, Estonia and Ukraine, the systems of tertiary education appear to be "diversified", distinguishing first-cycle bachelor's programmes – with a stronger or weaker emphasis on vocational character – and second-cycle master's degrees (Dabrowa-Szefler & Jablecka-Pryslopska, 2006; Estonian Ministry of Education and Research, 2006; Kremen & Nikolajenko, 2006).

What might be the labour market consequences of these substantial changes in tertiary education in post-communist countries? Since it can be assumed that recruitment process to managerial and professional positions has changed after the collapse of the communism, and employers are now more inclined to hire well-educated school-leavers with up-to-date expertise rather than to employ older, though highly educated, workers with more "obsolete" knowledge and experience, I expect that (1) in general, people whose degrees were awarded after the regime transformation are more likely than those who earned their degrees during the communist era to be found among professionals and managers. However, since there are notable differences in the rate of expansion at tertiary level across countries, I would expect that (2) the probability of tertiary graduates recently earned their degrees being found in the managerial and professional class is lower in Hungary, Poland and Estonia, where rates of expansion are especially marked and to a great extent promoted by market-based funding and non-regular programmes, than in Czech Republic, Slovakia, Slovenia and Ukraine with more modest rates of expansion. The rapid growth in labour market demands for well-trained experts in the service sector, in particular in the spheres of business, banking and public administration, may result in that (3) people who obtained their degrees in economics and law after the regime transformation are more likely than those who gained their degrees in these fields in the communist era to be found among higher-grade professionals, managers and administrators. Due to the fact that expansion at tertiary level is greatest in Hungary, Poland and Slovenia, and in these countries rise in number of students is marked in private institutions and/or in non-regular forms of study, I would expect that (4) the signalling function of fields of study is stronger in Hungary, Poland and Estonia than in Czech Republic, Slovenia and Ukraine.

Data and Analytical Strategy

I draw on data from the Round 2 of the European Social Survey, collected in 2004 and 2005 in a number of European countries, among others in Hungary, Czech Republic, Slovakia, Poland, Slovenia, Estonia and Ukraine. This data set is well suited to the purposes of this study because it contains factual information on individuals' labour market characteristics and both levels and types of their qualifications. Face-to-face interviews were carried out with a stratified probability sample of individuals living in private households. In the subsequent analyses, I restrict the sample to (1) the above-mentioned post-communist countries, (2) to individuals aged 25–64 years and (3) to economically active population, excluding students and pensioners.

The dependent variable of the analysis is respondent's social class, as it is conceptualised along the lines of the European Socio-economic Classification (ESeC) (Harrison & Rose, 2006). As the widely used EGP class schema, EseC also assumes that the class structure in modern societies is captured by social relations of economic life, more specifically, by relations in labour market. Conceptually three basic employment positions are distinguished: employers, the self-employed and employees. Among employees, further differentiation is recognised in terms of the type of contract they have and the way their work is regulated by employers. The different forms of employment relationships are conceived as a response to the weaker or stronger presence of work monitoring and qualification asset specificity problems in different work situations. On the basis of this theoretical approach, the following classes are defined: the higher salariat (large employers, higher-grade professional and administrative and managerial occupations), the lower salariat (lower grade professional, administrative and managerial occupations and higher-grade technician and supervisory occupations), higher-grade white collar workers, small employers and self-employed occupations, lower supervisory and lower technician occupations, lower services, sales and clerical occupations, skilled workers and semi- and non-skilled workers. Since my main interest here is to investigate the effects of qualifications on social class, the largest group of the economically actives, i.e. employees, employers and self-employed workers are excluded from this analysis. And, since I focus on the effects of educational expansion at tertiary level on individuals' class outcomes, I use a collapsed version of the ESeC distinguishing the following categories: (1) the higher salariat, (2) the lower salariat, (3) higher-grade white collar workers and lower supervisory and lower technician occupations (routine non-manuals) and (4) skilled, semi-skilled and non-skilled workers, lower services, sales and clerical occupations (working class). Table 1 shows the distribution of individuals in different countries using this class classification. In each

Table 1 Class distribution in different countries (employees aged 25–64 years)

	Higher salariat	Lower salariat	Higher-grade white collar workers/lower supervisory and technician occupations (routine non-manuals)	Skilled, semi-skilled and non-skilled workers, lower services, sales and clerical occupations (working class)	Total
Hungary	12.0	21.5	17.0	49.5	100.0
Czech Republic	6.7	22.7	20.1	50.5	100.0
Slovakia	9.5	26.9	18.8	44.7	100.0
Poland	7.7	20.7	20.1	51.5	100.0
Slovenia	13.5	23.5	26.2	36.8	100.0
Estonia	12.0	20.1	13.6	54.3	100.0
Ukraine	7.6	29.4	15.3	47.7	100.0

country, working class is clearly the numerically predominant class – although there are some notable differences: the proportion of employees in this class category is especially high in Estonia, but is relatively low in Slovenia.[1] The higher salariat is relatively numerous not only in Slovenia and Hungary but also in Estonia, and the proportion of the lower salariat is highest in Ukraine, amounting to almost 30%.

Measuring individuals' educational attainment, a collapsed version of the ISCED categorisation is used, distinguishing the following categories: (1) basic and lower secondary education, (2) upper secondary and post-secondary education and (3) tertiary education including first- and second-tier programmes. Due to institutional differences in higher education across countries, I cannot apply any further distinction at tertiary level. Field of study at tertiary level is measured in five categories.[2] Degrees in the "engineering/natural science" field comprise all kinds of engineering, technical and science qualifications. "Teacher training" covers all programmes preparing for the teaching professions. The "arts/humanities and social science" are characterised by the strong focus on skills and knowledge that enhance cultural capital. The "economics/business/law" is thought to comprise all qualifications in the area of business training, law studies and public administration. "Healthcare" includes study programmes focusing on all kinds of medical care, nursing and therapy.

The other covariates in the statistical analyses are the following: Gender is operationalised with a dummy variable representing women (women = 1, men = 0). Age

[1] In comparison with advanced Western societies, the size of working class is still higher in the post-communist countries (Bukodi & Róbert, 2007). A possible explanation can be found in the communist ideology, which put a large emphasis on the glorification of manual labour. As Szelényi (1998) pointed out for Hungary, a hybrid occupational structure had developed under the communism, with an increasing managerial and professional class on the one hand, and an expanding skilled and unskilled industrial labour class on the other.

[2] In the analyses on the effects of fields of study on class, Slovakia is excluded, since the data set does not include information on educational specialisation in this country.

is measured in years, and the quadratic term of age is also included to account for the curvilinear relation between age and class destinations. Furthermore, a dummy indicating labour market entry after 1990, in the post-communist era, is also included.[3] Parental education is also incorporated in the analyses, measured by the highest level of education attained by either parent where each level being scored by the modal number of years of full-time education involved.

After deleting cases with missing values on all explanatory variables, the size of the analytical sample is 5,297.[4]

Results

Levels of Qualification and Social Class

The first question is whether or not there are differences in the association between levels of education and individuals' occupational class positions across countries. As can be seen in Table 2, clear qualification gradients show up for the salariat and the working class in each country. The proportion of people being employed in either level of the salariat increases across qualifications, i.e. is much higher among the tertiary educated than among those with upper secondary and especially primary or lower secondary education, although in some countries, e.g. Slovenia and Ukraine, even at some lower levels of qualification, the lower salariat represents far from negligible minorities. The proportion of working class decreases steadily across educational levels. But, again, there are notable country differences: while in Slovenia and Czech Republic only 2% of the tertiary educated can be found in the working class, in Estonia more than 20% can be found. The size of the class of routine non-manuals is largest for individuals with upper or post-secondary qualifications in most countries but the two post-Soviet countries, Estonia and Ukraine. In Estonia, the proportion increases with education fairly steeply, but in Ukraine, the percentage of routine non-manuals declines with qualification in a more or less linear fashion.

In proceeding now to a multivariate analysis, I take the class as forming the dependent variable in regression models, and focus on the effects of the level of education (Model 1), supplemented by those of the education-by-timing of labour market entry interaction terms (Model 2). Country dummies and socio-demographic variables (sex, age and parental education) are also included in the models. In

[3] Unfortunately, the data set does not contain information on the year when respondents obtained their educational qualifications. This variable therefore serves as a proxy for it, assuming a fairly high correlation between timing of school completion and labour market entry.

[4] The documentation of the survey recommends the use of the design weights (i.e. re-weighting for selection probability), and all results reported here are weighted by them. In addition, since the sample sizes in the various countries differ from each other, I used an additional weight to equalise the sample size for each country (N=800).

Table 2 Class distribution by educational level in different countries (employees aged 25–64 years)

	Higher salariat	Lower salariat	Routine non-manuals	Working class	Total
Hungary					
Basic/lower secondary	-	6.4	7.5	86.1	100.0
Upper/post-secondary	7.7	16.7	31.7	43.9	100.0
Tertiary	34.8	49.0	10.5	5.7	100.0
Czech Republic					
Basic/lower secondary	0.8	5.3	12.2	82.6	100.0
Upper/post-secondary	4.0	33.6	32.5	29.9	100.0
Tertiary	42.4	50.6	5.1	2.0	100.0
Slovakia					
Basic/lower secondary	1.0	7.2	15.3	76.5	100.0
Upper/post-secondary	8.6	35.5	24.6	31.2	100.0
Tertiary	46.0	38.7	11.3	4.0	100.0
Poland					
Basic/lower secondary	1.2	3.6	15.8	79.5	100.0
Upper/post-secondary	4.4	25.8	27.5	42.4	100.0
Tertiary	28.0	47.8	15.3	8.9	100.0
Slovenia					
Basic/lower secondary	0.6	6.3	26.5	66.7	100.0
Upper/post-secondary	10.3	40.1	31.9	17.7	100.0
Tertiary	56.2	37.1	4.6	1.5	100.0
Estonia					
Basic/lower secondary	-	7.5	7.5	84.9	100.0
Upper/post-secondary	4.2	11.7	10.5	73.7	100.0
Tertiary	25.1	34.3	19.1	21.5	100.0
Ukraine					
Basic/lower secondary	-	25.0	20.8	54.2	100.0
Upper/post-secondary	2.0	23.1	17.6	57.3	100.0
Tertiary	31.8	55.6	5.3	7.3	100.0

Table 3, results from a multinomial logistic regression analysis are reported in which the contrast is that of being employed in one of the three “white collar” classes rather than being a member of the working class. Table 4 shows, in the first and the second columns of each model, results from the same regression analysis with routine non-manuals as reference; and then in the third column of each model, I contrast the higher salariat with the lower salariat.

From these tables, it may first of all be noted that some of the socio-demographic variables do have significant effects on class position (Table 3, Model 1). Gender affects the probability of being a member of one of the “white collar” classes rather than being employed as a skilled- or unskilled worker, but the signs of the coefficients are different for differing classes. Males are more likely than females to be found in the higher salariat rather than in the working class, but they are less likely to show up either in the lower salariat or among routine non-manuals. Age is significant in regard to the probability of being found in the “white collar” classes rather than in the working class in that older people are more likely than younger people to

Table 3 Multinomial logistic regression estimates for class positions; contrast: skilled, semi-skilled and non-skilled workers

	Model 1									Model 2								
	Higher salariat			Lower salariat			Routine non-manuals			Higher salariat			Lower salariat			Routine non-manuals		
	vs. working class									vs. working class								
	B	S.e.	Sig.	*B*	S.e.	Sig.	*B*	S.e.	Sig.	*B*	S.e.	Sig.	*B*	S.e.	Sig.	*B*	S.e.	Sig.
Female	−0.372	0.138	**	0.311	0.098	**	0.325	0.095	**	−0.372	0.138	**	0.311	0.098	**	0.326	0.095	**
Age	0.029	0.011	*	0.035	0.008	**	0.016	0.008	*	0.029	0.012	*	0.035	0.008	**	0.016	0.008	*
Age^2	−0.001	0.001		−0.001	0.000	+	−0.000	0.000		−0.001	0.001		−0.001	0.000	+	−0.000	0.000	
Entry the LM after 1990	0.276	0.277		0.241	0.204		0.184	0.196		0.528	0.358		0.193	0.220		0.295	0.217	
Parental education	0.123	0.029	**	0.088	0.024	**	0.055	0.023	*	0.124	0.029	**	0.087	0.024	**	0.055	0.023	*
Country																		
Hungary (ref.)	0			0			0			0			0			0		
Czech Republic	0.216	0.304		0.489	0.314		0.248	0.195		0.222	0.303		0.493	0.314		0.250	0.195	
Slovakia	0.762	0.304	*	0.701	0.220	**	0.331	0.204		0.753	0.304	*	0.704	0.221	**	0.338	0.213	
Poland	−0.163	0.308		0.228	0.217		0.263	0.199		−0.153	0.308		0.230	0.218		0.262	0.199	
Slovenia	1.624	0.307	**	1.244	0.230	**	1.141	0.206	**	1.628	0.306	**	1.246	0.230	**	1.143	0.207	**
Estonia	−1.545	0.281	**	−1.382	0.213	**	−1.109	0.198	**	−1.556	0.281	**	−1.376	0.213	**	−1.094	0.198	**
Ukraine	−0.751	0.296	*	−0.187	0.214		−0.632	0.223	**	−0.754	0.296	*	−0.186	0.214		−0.630	0.223	**
Education																		
Basic/lower vocational	−3.321	0.369	**	−2.408	0.162	**	−1.438	0.116	**	−3.418	0.449	**	−2.399	0.180	**	−1.456	0.133	**

Table 3 (continued)

	Model 1									Model 2								
	Higher salariat			Lower salariat			Routine non-manuals			Higher salariat			Lower salariat			Routine non-manuals		
	vs. working class									vs. working class								
Upper/post-secondary (ref.)	0			0			0			0			0			0		
Tertiary	3.771	0.192	**	2.390	0.149	**	1.064	0.162	**	3.810	0.222	**	2.284	0.167	**	0.825	0.195	**
Education × entry the LM after 1990	–			–			–											
Basic/lower vocational										−0.442	0.768		−0.086	0.365		0.052	0.237	
Upper/post-secondary (ref.)										0			0			0		
Tertiary										0.111	0.361		0.331	0.285		0.627	0.302	*
Constant	−0.450	0.750	**	−0.189	0.525	**	−2.026	0.495	**	−4.526	0.759	**	−3.170	0.525	**	−1.998	0.495	**
Log-likelihood				−5,232.73									−5,228.066					
Pseudo R^2				0.201									0.204					
Number of observations				5,297									5,297					

** Effect significant at $p < 0.01$; * effect significant at $p < 0.05$; + effect significant at $p < 0.10$.

Table 4 Multinomial logistic regression estimates for class positions; contrasts: routine non-manuals, the lower salariat

	Model 1									Model 2								
	Higher salariat			Lower salariat			Higher salariat			Higher salariat			Lower salariat			Higher salariat		
	vs. routine non-manuals						vs. lower salariat			vs. routine non-manuals						vs. lower salariat		
	B	S.e.	Sig.	*B*	S.e.	Sig.	*B*	S.e.	Sig.	*B*	S.e.	Sig.	*B*	S.e.	Sig.	*B*	S.e.	Sig.
Female	−0.698	0.141	**	−0.014	0.107		−0.683	0.128	**	−0.698	0.141	**	−0.014	0.106		−0.684	0.128	**
Age	0.012	0.0123		0.019	0.009	*	−0.006	0.011		0.012	0.012		0.018	0.009	*	−0.006	0.011	
Age^2	−0.0009	0.0008		−0.001	0.0007		0.0001	0.0007		−0.001	0.0008		−0.001	0.0007		0.000	0.0007	
Entry the LM after 1990	0.092	0.278		0.057	0.215		0.035	0.257		0.433	0.345		0.097	0.239		0.335	0.231	
Parental education	0.067	0.028	*	0.031	0.023		0.045	0.026	+	0.068	0.028	*	0.032	0.023		0.036	0.026	
Country																		
Hungary (ref.)	0			0			0			0			0			0		
Czech Republic	−0.031	0.303		0.242	0.222		−0.273	0.276		−0.028	0.302		0.242	0.222		−0.271	0.276	
Slovakia	0.430	0.304		0.369	0.229		0.061	0.267		0.414	0.304		0.365	0.229		0.048	0.267	
Poland	−0.427	0.302		−0.035	0.222		−0.391	0.272		−0.415	0.302		−0.031	0.222		−0.383	0.273	
Slovenia	0.482	0.298		0.102	0.229		0.380	0.276		0.485	0.298		0.103	0.229		0.382	0.276	
Estonia	−0.436	0.279		−0.272	0.222		−0.163	0.244		−0.441	0.280		−0.282	0.223		−0.179	0.244	
Ukraine	−0.119	0.306		0.444	0.337		−0.563	0.267	*	−0.123	0.306		0.444	0.3 37		−0.568	0.267	*
Education																		
Basic/lower vocational	−1.882	0.374	**	−0.969	0.172	**	−0.913	0.386	*	−1.962	0.455	**	−0.943	0.192	**	−1.018	0.467	*

Table 4 (continued)

	Model 1									Model 2								
	Higher salariat			Lower salariat			Higher salariat			Higher salariat			Lower salariat			Higher salariat		
	vs. routine non-manuals						vs. lower salariat			vs. routine non-manuals						vs. lower salariat		
Upper/post-secondary (ref.)	0			0			0			0			0			0		
Tertiary	2.706	0.176	**	1.326	0.133	**	1.380	0.156	**	2.984	0.219	**	1.459	0.168	**	1.525	0.187	**
Education × entry the LM after 1990	–			–			–											
Basic/lower vocational										0.390	0.783		−0.138	0.400		0.528	0.830	
Upper/post-secondary (ref.)										0			0			0		
Tertiary										−0.738	0.324	*	−0.296	0.262		−0.442	0.252	+
Constant	−2.424	0.760	**	−1.163	0.556	*	−1.261	0.516	*	−2.528	0.769	**	−1.171	0.555	*	−1.356	0.526	*
Log-likelihood				−5,232.73									−5,228.06					
Pseudo R^2				0.201									0.204					
Number of observations				5,297									5,297					

** Effect significant at $p < 0.01$; * effect significant at $p < 0.05$; + effect significant at $p < 0.10$.

belong to one of the "white collar" classes. But age is less important in the contrast between the salariat and the routine non-manual class; in this case, only one coefficient is significant, indicating that the lower salariat is somewhat older than the class of routine non-manuals. One would expect that due to the skilled-biased technological change, the probability of being found in the salariat has been increasing for recent labour market entry cohorts. However, after controlling for age, people who entered the labour market after 1990 are not more likely than are those who found their first significant job under communism to be found in the salariat or among routine non-manuals rather than in the working class. It can further be seen that parental education also has significant effects. Not only do the chances of individuals being found in the salariat or in the routine non-manual class rather than in the working class rise with parents' education, but so too do the chances of their being members of the higher salariat rather than that of the class of routine non-manuals and their chances of being found in the higher salariat rather than in the lower salariat.

So far as the effects of the country dummies are concerned, taking Hungary as reference, the probability of being found in "white collar" classes rather than in the working class appears to be highest in Slovenia and lowest in the two post-Soviet countries, Estonia and Ukraine. The likelihood of belonging to the salariat rather than to the working class is also higher in Slovakia than Hungary. In the contrast of the higher salariat with the lower salariat, the coefficient for Ukraine is negative, implying that the likelihood of individuals being found in the class of higher-grade managers and professionals is significantly lower in this country than Hungary.

Turning now to the variables of my main interest, the levels of qualification, it is apparent first of all, from Tables 3 and 4, that qualification has a systematic effect on social class. The higher the educational level he or she has attained, the more likely an individual is to be found in the salariat or in the class of routine non-manuals rather than in the working class. It is also apparent from Table 5 that the probability of individuals being higher or lower salariat rather than routine non-manual workers increases with educational level. In this respect, the effects of having a tertiary qualification are especially marked. Individuals with university or college degrees are around 15 times ($e^{2.706}$) more likely than are people with upper or post-secondary education to be found among higher-grade managers or professionals rather than among routine non-manuals. In the contrast between the higher and lower salariat, again, tertiary degrees would appear to increase the probability of individuals belonging to the former rather than the latter class: persons with degrees are about 4 times ($e^{1.380}$) more likely than are employees with upper secondary qualifications to fall into the higher salariat rather than into the lower salariat.

Coming now to the effects of interaction terms between education and timing of labour market entry, it is apparent from the Model 2 of Table 3 that, in "white collar"–"blue collar" contrast and in comparison with individuals with upper secondary qualifications, tertiary educated people who entered the labour market after 1990 are more likely than are their counterparts who found their first job before

1990 to be found in the class of routine non-manuals rather than in the working class. This implies that after the regime transformation, in times of the expansion in tertiary education and of substantial structural changes in the labour markets, fresh graduates have had especially high chances to enter into some intermediate non-manual occupations. Furthermore, when the two levels of the salariat are contrasted with routine non-manuals, the coefficient for the interaction of having a degree and the entry into the labour market after 1990 is negative, though only for the higher salariat, indicating that the chance of finding a higher-grade managerial or professional job rather than a routine non-manual occupation is lower for the tertiary educated who entered the labour market under capitalism than for those who found their first employment in the communist era (Table 4, Model 2). Moreover, in the contrast of the higher salariat with the lower salariat, the coefficient for the interaction is again negative, implying that individuals with tertiary qualifications are more likely to be found in the higher salariat if they entered the labour market before 1990. All in all, these results suggest that, on the one hand, degree-holders who found their first employment under capitalism do have more chances of being employed in "white collar" rather than "blue collar" classes – as compared with their counterparts who entered the labour market under communism. But, on the other hand, within the "white collar" classes, the likelihood of the tertiary educated having some higher-grade managerial or professional jobs is lower for those who started their employment careers under capitalism than for those who entered the labour market under communism.

The next straightforward question is whether or not these patterns of relationship between levels of qualification, timing of labour market entry and class position are alike in all countries. In order to investigate this problem in a more detailed manner, let me take a hypothetical person and, under an appropriate version of the regression models, compute the probability of being found in the salariat (Fig. 1). More precisely, let me examine the strength of the effects of having a tertiary degree

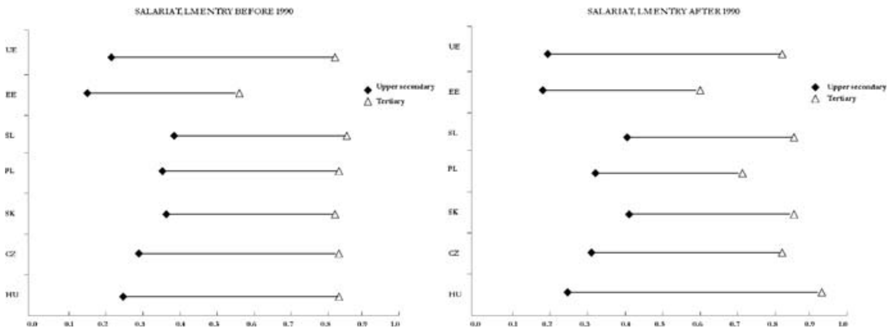

Fig. 1 *Predicted probabilities of being employed in the salariat class by level of education* Note: The predicted probabilities are calculated under a binomial logit model in which the contrast is that of being a salariat as against being a non-salariat. Other covariates in the model fixed as follows: a 30–44 years old woman with upper secondary educated parents

versus an upper secondary qualification on the likelihood of belonging to either level of the salariats for those who entered the labour market under and after communism in the seven countries separately in the case of a hypothetical woman who is 30–44 years old and whose father is upper secondary educated.

It is apparent that the country differences in the chances of my tertiary educated hypothetical person being found in the salariat are more visible if she entered the labour market under capitalism than under communism. In the latter case, the probability of being a manager or professional is about 80% in all countries, but in Estonia, this accounts for about 55%.[5] However, if my hypothetical person started the employment career after the regime transformation, the probability of belonging to the salariat has risen to around 95%, if she is a Hungarian, and has declined to some 70%, if she is a Pole; in other cases, only slight changes have been detected.[6] In sum, these results indicate that under capitalism the association between having tertiary education and class outcomes appears to be weakening or not to change significantly. Though Hungary is an obvious exception; in this country, despite of the steadily expanding tertiary education, class returns – as earning returns – of degrees seem to have been somewhat increasing.

Field of Study at Tertiary Level and Social Class

In this section, I concentrate on individuals with degrees and investigate the effects of fields of study on their class outcomes. First, in Table 5, I show the class distribution of people with different specialisation.

In four of the six countries, the proportion of the higher salariat is highest among degree-holders who gained their diploma in the field of health care. However, in Hungary, the percentage is highest for people who obtained their degrees in economics/business and law, and in Estonia, the proportion of the higher salariat is greatest in the field of engineering and natural sciences. The higher salariat is in fact quite numerous among graduates in this latter field in Slovenia and Czech Republic as well. It is apparent that the tertiary educated with teacher training are quite rare among the higher salariat in every country, the only exception is perhaps Slovenia. It is also to be noted that in Estonia and Poland, the proportion of the class of routine non-manuals and labourers is relatively high among those who earned their degrees in the field of economics/business and law.

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[5] In Estonian case, one can speculate that behind the relatively low class returns of higher education might be the fact that the proportion of people with tertiary degrees was fairly high in the communist era, indicating a weak association between education and social class.

[6] In order to examine this question in a formal way, I included education*timing of labour market entry interaction terms in the regression model for each country. The coefficient for the interaction term of having a degree and the labour market entry after 1990 was significant (at level of $p < 0.05$) only for Hungary and Poland, indicating that in comparison with upper secondary educated, the probability of individuals with tertiary diploma being found in the salariat differs by the timing of employment entry, but differently so in the two countries (details are available upon request).

Table 5 Class distribution of people with degrees by field of study

	Engineering/ science	Arts/humanities/ social sciences	Health	Teacher training	Economics/ business/law
Hungary					
Higher salariats	39.6	25.6	23.5	12.1	75.0
Lower salariats	29.2	64.1	64.7	87.9	6.3
Routine non-manuals/working class	31.3	10.3	11.8	–	18.8
Czech Republic					
Higher salariats	52.0	35.0	81.0	7.1	59.5
Lower salariats	38.0	65.0	14.3	92.9	21.6
Routine non-manuals/working class	10.0	–	4.8	–	18.9
Poland					
Higher salariats	39.1	9.7	71.4	9.7	34.0
Lower salariats	38.3	71.0	28.6	74.2	28.3
Routine non-manuals/working class	23.4	19.4	–	16.1	37.7
Slovenia					
Higher salariats	65.9	20.7	84.0	28.6	60.3
Lower salariats	34.1	65.5	16.0	71.4	29.3
Routine non-manuals/working class	–	13.8	–	–	10.3
Estonia					
Higher salariats	31.7	16.7	23.1	7.1	25.6
Lower salariats	20.6	54.2	39.0	78.6	25.6
Routine non-manuals/working class	47.6	29.2	38.0	14.3	48.8
Ukraine					
Higher salariats	27.0	28.6	69.2	23.9	46.4
Lower salariats	60.3	71.4	23.1	65.2	32.1
Routine non-manuals/working class	12.7	–	7.7	10.9	21.4

As in the previous section, a multivariate framework is required in order to gain more insight into the relationship between fields of study and the likelihood of being found in different classes. In the first two columns of the Table 6, results from a binomial logistic regression analysis are reported in which all employees in the salariat taken together form the dependent variable with those in non-salariat classes as reference. In the third and the fourth columns of the table, results from a further binomial regression exercise are displayed where the higher salariat constitute the dependent category with the lower salariat as reference.

Table 6 Logistic regression estimates for being found in the salariat

	Salariat vs. non-salariat						Higher salariat vs. lower salariat					
	M1			M2			M1			M2		
	B	S.e.	Sig	B	S.e.	Sig	B	S.e.	Sig	B	S.e.	Sig
Field of study												
Engineering/science(ref.)	0			0			0			0		
Arts/humanities/social sciences	1.057	0.311	**	0.927	0.392	*	-1.024	0.323	**	-0.563	0.382	
Health	0.842	0.310	**	0.854	0.355	*	0.339	0.311		0.490	0.341	
Teacher training	1.649	0.391	**	1.671	0.481	**	-1.477	0.342	**	-1.463	0.398	**
Economics/business/law	0.103	0.247		0.216	0.302		0.772	0.267	**	1.040	0.329	**
Field of study × entry the LM after 1990	-						-					
Engineering/science(ref.)				0						0		
Arts/humanities/social sciences				0.208	0.600					-1.097	0.441	*
Health				-0.027	0.643					-0.467	0.710	
Teacher training				-0.062	0.769					-0.113	0.663	
Economics/business/law				-0.249	0.492					-0.740	0.517	
Constant	1.166	0.500	*	1.148	0.696	*	1.373	0.602	*	1.349	0.603	*
Log-likelihood	-468.467			-468.05			-472.569			-467.484		
Pseudo R^2	0.151			0.152			0.128	0.144				
Number of observation	1,044						796					

Note: The models also include the following covariates: gender, age, labour market entry after 1990, country dummies
** Effect significant at $p < 0.01$; * effect significant at $p < 0.05$.

Focusing on the major interest of this section, it is apparent from the Model 1 of Table 6 that fields of study have systematic effects on class destinations. In the salariat–non-salariat contrast, degree-holders in fields of teacher training, arts, humanities and social sciences as well as those in health care are more likely than are their counterparts trained in the field of engineering and natural sciences to be found in the salariat. In this respect, the returns to economics/business/law do not differ significantly from those to engineering degrees. However, restricting the analysis to the salariat and regarding the probability of being found in the class of higher-grade managers and professionals, the most rewarded speciality appears to be economics, business and law. Furthermore, having tertiary qualifications in fields of teacher training and arts/humanities and social sciences does reduce the probability of belonging to the higher salariat. People with degrees in health and engineering appear to have similar chances of being found among higher-grade managers or professionals.

Proceeding further with the effects of interactions between fields of study and timing of labour market entry, Model 2 of Table 6 suggests that in the salariat–non-salariat contrast and in comparison with graduates trained in engineering and natural sciences, other fields of study neither increase nor decrease the probability of people entered the labour market under capitalism being found in the salariat. However, restricting the analysis to the salariat and regarding the likelihood of belonging to higher grades of it, it is apparent that, comparing with diplomas in engineering and sciences, arts/humanities and social science qualifications have less returns if degree-holders started their careers under capitalism. However, in contrast with my expectation, degrees in economics/business and law do not appear to yield higher returns, at least in terms of social class, than those in engineering and sciences in the post-communist era.

As in the previous section, a further question arises whether or not these patterns of relationship between fields of study, timing of labour market entry and class outcomes are alike in countries covered by this chapter. In order to respond to this question, let me take again a hypothetical person and calculate the probability of being found in the higher salariat rather than in other classes. More specifically, let me examine the strength of the effects of fields of study for those who entered the labour market under and after communism in these six countries in the case of a hypothetical woman who is 30–44 years old (Fig. 2).

There are substantial country differences in the effects of specialisation on the probability of my hypothetical person being found in the higher salariat. It is visible that Hungary and Estonia, the two countries that witnessed great expansion at tertiary level in the last decade, are fairly close to each other. First, the field-of-study differences appear to be fairly modest in both countries, with one notable exception in case of Hungary. Namely, in that country the probability of my hypothetical person being employed as a higher-grade manager or professional is more than 90% if she obtained her degree in the field of economics and law and found her first job under capitalism. Second, the timing of labour market entry does not seem to make much field-of-study differences in the likelihood of ending up in the higher salariat in either country. But, again, one exception emerges for Hungary: if the hypothetical person gained degree in economics and law, the probability of a being found in the higher salariat is substantially higher if she entered the labour market under capitalism rather than in the communist era. In other words, in Hungary, degrees in economics/business and law do appear to yield higher class returns after the regime transformation than before.[7] The third country that experienced a huge rate of expansion in higher education is Poland. Although, in this case, the strength of the effects of fields of study appears to be somewhat more marked than in Hungary and Estonia, one similarity also emerges: the timing of labour market entry scarcely makes any difference in the probability of the hypothetical person being found in the higher salariat, irrespective of fields of study.

It is apparent that the effects of fields of study on the probability of the tertiary educated hypothetical person ending up in the higher salariat are most pronounced in Slovenia and Czech Republic. Moreover, in both countries, irrespective of the

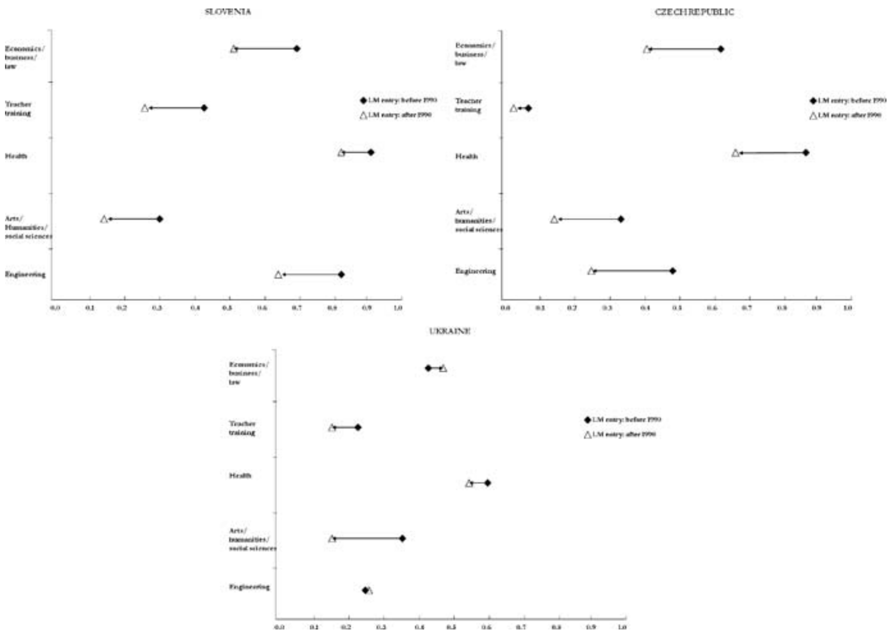

Fig. 2 (continued)

[7] In order to examine this question in a more rigorous way, I included field of study*timing of labour market entry interactions in the regression model for Hungary. The coefficient for the interaction term for economics/business/law and the labour market entry after 1990 was significant (at level of $p < 0.01$) and positive in sign, indicating that in comparison with engineering, the probability of individuals gained their diploma in economics/law being found in the higher salariat is higher for those who entered the labour market in the post-communist period (details are available upon request).

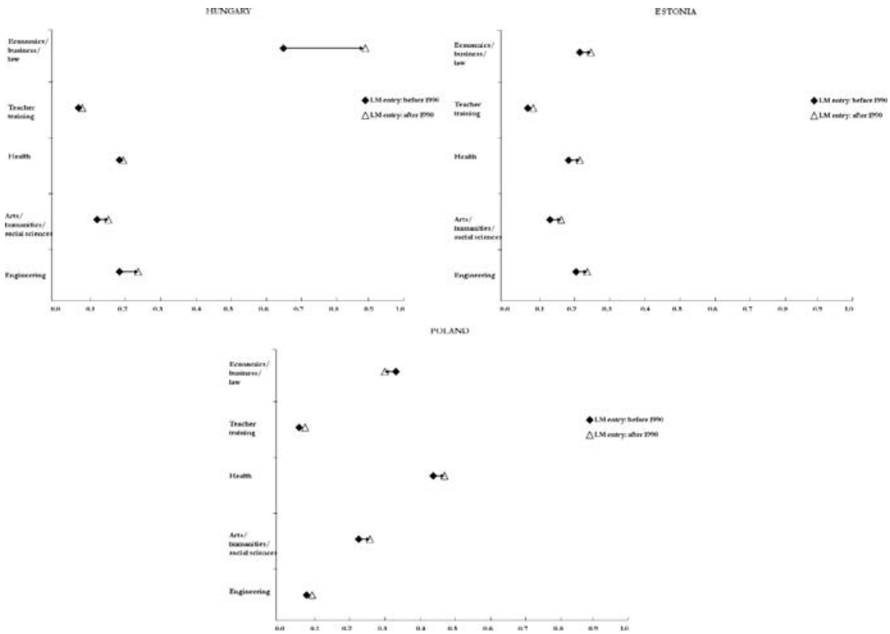

Fig. 2 *Predicted probabilities of being found in the higher salariat by fields of study in tertiary education* Note: The predicted probabilities are calculated under a binomial logit model in which the contrast is that of being a higher salariat as against being a member of other classes. Other covariates in the model fixed as follows: a 30- to 44-year-old woman

specialisation, the likelihood of the hypothetical person being found in the higher salariat is lower if she entered the labour market under capitalism.[8] Although the rate of expansion of tertiary education is smallest in Ukraine, fields of study seem to make important distinctions in the probability of belonging to the higher salariat: the class returns of arts/humanities and social sciences are substantially lower for those who started their careers after the regime transformation than for those who started to work in the Soviet era.[9]

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[8] For Czech Republic, other researches also report that certain groups of young tertiary graduates have more and more difficulties to find an adequate employment (e.g. a professional position) (Ministry of Education, Youth and Sports, 2006). In many high-ranked professions people with secondary education still prevail, and because employers are reluctant to hire candidates without employment experience, young degree-holders often enter the workforce in positions that do not correspond to their level of education.

[9] Following the same strategy as described in the previous note, I included field of study*timing of labour market entry interaction terms in the regression for Ukraine. The coefficient for the interaction for arts/humanities/social sciences and the labour market entry in the post-communist era was significant (at level of $p < 0.05$) and negative in sign – again, in comparison with engineering/natural sciences (details are available upon request).

Discussion

In this chapter, I have investigated, on the one hand, the impact of level of education, on the other hand, in case of tertiary education, the effects of fields of study on social class positions in several post-communist countries. An obvious focus of interest is on the extent of continuity or change in the emergent patterns of these associations as between the present day and the former communist period.

Level of qualification, as expected, continues to exert a huge influence on class outcomes, just as it did under communism. In general, the higher the educational level that individuals have attained, the higher the probability of their being members of non-manual classes. Moreover, in comparison with the upper secondary educated, those who possess degrees are much more likely to end up in the salariat, especially, in the higher salariat, rather than in routine non-manual positions. However, in contrast of my expectation, the findings suggest that, though degree-holders who entered the labour market under capitalism are more likely than their counterparts who started their employment career under communism to be routine non-manuals rather than being skilled or unskilled workers, they are less likely to be found in the higher salariat. One possible explanation might be that today when most rapid growth in employment is often found in the service sector, employers' requirements for high-level formal qualifications, even for higher-grade managerial or professional positions, would appear to be less important than were before. They may prefer attributes that are more ascribed than achieved and are particularly relevant to certain kinds of service job (e.g. self-presentation, cultural capital) (Goldthorpe, 2007b). Another explanation might be that after the first shock of the regime transformation, recruitment to high-grade managerial and professional positions was made directly from among young people who completed their university or college studies, but now for the key managerial and professional positions, employers rather favour employees with more labour market experience and probably with a "proper network" accumulated over the employment career. Also, as Bukodi and Goldthorpe (farthcoming) show for the case of Hungary, under capitalism, entry into better paid employment has become increasingly dependent on class origins, and higher educational qualifications do not have the same class returns for individuals of all class origins alike as they did under communism. Further, a growing number of intermediate non-manual positions also require some post-secondary or tertiary qualifications, strengthening the probability of young graduates ending up in these jobs.

However, as expected, there are differences across countries in the probabilities of individuals being found in the salariat, and these differences are especially apparent for those who entered the labour market in the post-communist era. My expectation was that in countries that witnessed a notable rate of expansion at tertiary level and where this expansion has been a great deal promoted by market-based funding or/and by extension of non-regular programmes, the signalling function of the level of education has become weaker than in countries with more modest rate of expansion. The results reported here support this hypothesis, but only partly. In fact, the probability of the tertiary educated being found in the salariat is lowest in Estonia and Poland, in nations with the sharpest increase in expansion of higher education and with a relatively large portion of graduates of private institutions. However, in Hungary – in line with findings of other studies (e.g. Kertesi & Köllö, 2007) – returns to degrees appear to have somewhat increased over the last 15 years, despite the notable pace of expansion and the introduction of market forces to higher education.

The next set of questions is concerned with the role of fields of study of tertiary graduates in securing different class positions. There is no doubt that the higher education is horizontally stratified in contemporary post-communist countries: the class returns to tertiary degrees do vary by specialisation. As in the majority of Western European countries and in the United States, economics/business and law are the most lucrative fields of study, while teacher training, the humanities and the social sciences are poorly rewarded. Healthcare and engineering/science appear to bear very similar class rewards. My expectation was that class returns to engineering and natural sciences were much higher under communism – reflecting the preferences of state officers and planners rather than to market mechanisms – than in the post-communist era, when the growing demand for well-trained experts in the sphere of business, banking and public administration might have increased the relative returns to economics and law degrees. The findings presented here, however, do not support this hypothesis. Hungary is the only country where degrees in economics/business and law appear to lead to higher returns than those of engineering and sciences under communism. In other countries, people who entered the labour market, and probably obtained their degrees in economics and law after the regime transformation, are not more likely than those who gained their degrees in engineering and sciences in the communist era to be employed as higher-grade professionals, managers or administrators. One can speculate that, though the labour market demand for engineers had fallen in the first half of the economic transition, and the rapid decline in enrolments in these specialities shows that student themselves recognised this fact, since the end of nineties demands for graduates in some engineering fields have been growing again, probably leading to rising class rewards of these fields of study. These trends, overall, might have resulted in fairly stable class returns to engineering and sciences under capitalism. Furthermore, because the vast majority of the tertiary educated with degrees in healthcare and teacher training work in the state sector, and, their positions therefore are less responsive to the market demands, class returns to qualifications in these fields have not changed significantly over the last decades.

Finally, I expected that the signalling function of educational specialisation is particularly strong in countries that witnessed great expansion at tertiary level. However, there seem to be rather modest field-of-study differences in the probabilities of individuals being found in the higher salariat in countries having experienced a huge rate of expansion – Estonia, Hungary and Poland. But the signalling function of specialisation would appear to be fairly strong in Slovenia, where of late large emphasis is put on vocational character of the higher education and in

Czech Republic, where higher educational expansion has not kept pace with rising aspirations and where tertiary education remains a unified system with essentially no lower, vocational oriented tier.

In sum, this study clearly demonstrates that the main stratifying role of education in post-communist countries is still its vertical effects, and differences across levels are more significant than are differences within levels. However, this study proved that analysing horizontal variations within levels – in this case at tertiary level –, some important insight can be gained into the mechanisms how educational credentials influence individuals' social positions. Not all of my hypotheses received unambiguous and clear confirmation, and examining associations between different attributes of qualifications and labour market outcomes in the post-communist countries calls for further research.

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Part II
Migration and Educational Inequality

Educational Gaps Between Immigrant and Native Students in Europe: The Role of Grade

Hyunjoon Park and Gary Sandefur

Background

In many European and North American countries, the immigrant population has substantially increased during the last few decades. For example, during the 1970s about 430,000 immigrants entered the United States each year, while nearly 1 million immigrants were admitted in 2001 (Martin & Midgley, 2003). In Austria, there were 282,700 foreigners in 1980 and two decades later the number increased to 757,900 (Haug, Compton, & Courbage, 2002). Between 1991 and 2001, foreign-born population in Germany increased from 5.8 million accounting for 7.3% of the total population to 7.3 million accounting for 8.9% of the total population (Bundesamt für Migration und Flüchtlinge, 2005). The rising inflow of immigrants has also increased the number of children who are either foreign-born or the children of immigrant parents: in the United States, the proportion of immigrant children or children of immigrants among all children increased from 15% in 1990 to 20% in 1997, resulting in about 14 million first- and second-generation immigrant children (Zhou, 1997; Pong, 2003).

Given the pivotal role of educational attainment for social mobility, researchers and policymakers have been concerned about educational progress of immigrant children compared to their native counterparts. Children of immigrant families often encounter difficulties in a new environment of schooling in which the educational systems, culture, and language of instruction differ from those in their origin countries. In the United States, educational experiences of immigrant children compared to their native counterparts have been extensively examined (e.g., Portes & MacLeod, 1999; Zhou, 1997). The extensive literature on immigrant children's educational progress within a specific country is also available for several European countries (e.g., Herzog-Punzenburger, 2003 for Austria; Timmerman, Vanderwaeren, & Crul, 2003 for Belgium; Rangvid, 2006 for Denmark; Riphahn, 2003 for Germany; Westin, 2003 for Sweden; Eldering & Kloprogge, 1989 for some European countries). These studies have documented significant educational

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disadvantages of immigrant children in a society and they have explored various factors, including socioeconomic conditions of immigrant families, cultural differences, school systems, and language acquisition which influence the educational performance of immigrant children within the specific society.

Although detailed analyses of educational differences between native and immigrant children in specific countries have contributed to our understanding of educational inequality associated with immigrant status in the corresponding country, there still remains an important research gap. Focusing on a single country, most previous research paid little attention to the following questions: To what extent do countries vary in terms of how immigrant children fare in schools? Which countries are more successful in facilitating immigrant children's educational integration? What accounts for such cross-country differences? These questions can be better addressed, rather than by within-country studies, by comparative research across many countries with different educational, economic, and cultural environments surrounding immigration.

Furthermore, cross-national research can facilitate comparisons of educational policies and practices and help assess how national contexts of educational environments mediate the way in which immigrant status is associated with educational disadvantage. This kind of information can be useful for policymakers and researchers in a specific country to evaluate their policies in comparative perspective and to formulate more effective policies for helping immigrant children's educational integration. Comparative research will enhance our understanding of how larger social contexts in which schooling occurs influence educational opportunities of immigrant children.

Recently there has been a growing interest in comparative research on immigrant children's education, along with the availability of large-scale international data of student's educational achievement. The report of the findings from the Program for International Student Assessment (PISA) compares mathematics performance between immigrant and native 15-year-old students among 17 countries (OECD, 2006). The analysis shows how differences in socioeconomic background are related to the educational gap between immigrant and native students within each country. Despite its detailed information, however, separate analyses for each country make it difficult to assess how countries differ in the overall strength of the effect of immigrant status and which factors are related to such between-country difference in the effect.

Research Questions

In this paper, we compare performance differences in reading literacy between immigrant and native students in 10 European countries participating in the Program for International Student Assessment (PISA) 2000: Austria, Belgium, Denmark, France, Germany, Luxembourg, Norway, Sweden, Switzerland, and the United Kingdom. Because a substantial number of immigrant students are required for statistical analysis, we selected countries where immigrant students account for at least 5% of total 15-year olds in schools.[1]

Although we could include traditional immigration countries such as Australia, Canada, and New Zealand, we decided to focus on European countries in this analysis. Those traditional immigration countries differ vastly from our 10 countries in Europe in term of history and policy of immigration (Bauer, Lofstrom, & Zimmermann, 2000; Castles & Miller, 1993). Most of all, the three traditional immigration countries have selected immigrants on the basis of human capital characteristics such as skills and education to meet their labor market needs. Therefore, immigrants in those countries tend to consist of selective population usually with high levels of skills and educational attainment. In fact, our data from PISA show that parents of foreign-born students in Australia, Canada, and New Zealand have similar (or even higher) levels of educational attainment compared to parents of native students. In other words, significant differences in socioeconomic and demographic characteristics of immigrant population affected by varying immigration policies make it less meaningful to compare the group of traditional immigrant countries to European countries. Rather, we focus on similarities and differences within European countries. But for comparison, we include the United States. Although the United States is considered a traditional immigrant country, it shows important differences from the other three traditional immigrant countries in terms of immigration policies, which place more emphasis on family re-unification than on human capital characteristics of immigrants (Bauer et al., 2000).

The main aim of this study is to provide more systematic assessment of how the 10 European countries vary in the academic achievement gap between immigrant and native children. As numerous studies in the United States and other Western countries show, poor socioeconomic conditions of immigrant families are the most eminent factor to explain educational disadvantages of immigrant children (Schmid, 2001; Parsons & Smeeding, 2006). Therefore, the degree of socioeconomic differences between immigrant and native families within countries is more likely to be correlated with the educational gap between immigrant and native children. For instance, countries, which show smaller socioeconomic differences between immigrant and native families, are expected to show narrower gaps in education between immigrant and native children, *Ceteris Paribus*, if socioeconomic factors are indeed major sources of educational disadvantages of immigrant children.

Although socioeconomic factors explain a large part of the educational gap between immigrant and native students, studies have also found that differences in educational outcomes often remain significant even after socioeconomic factors are taken into account (Schmid, 2001). In addition, socioeconomic conditions of immigrant families reflect, to some extent, the effects of origin countries, which are difficult to manipulate by policy efforts in destination countries. Therefore,

[1] Although the Netherlands has a substantial proportion of immigrant children in the total sample, OECD suggests that the result of the Netherlands should be read with caution because of its too low response rate (the initial student response rate was only 27%). With this reason, we excluded the Netherlands from the analysis.

it is important to assess the extent to which the cross-national variation in educational gaps between immigrant and native children remains significant after between-country differences in socioeconomic conditions of immigrant families are controlled. The remaining cross-national variation encourages further research to explore country-level factors that may account for the cross-national variation in educational gaps between immigrant and native children.

However, difficulties of examining country-level variables as sources of cross-national variation in immigrant–native gaps should be recognized. Countries differ in so many aspects of society including immigration policies, cultural environments for immigrants, educational systems, and welfare policies for immigrants. Moreover, between-country difference in an aspect of society is often overlapped with between-country difference in another aspect, which makes it difficult to separate the effect of a factor from the effect of another especially with a limited number of countries analyzed.

After assessing the extent to which countries vary in the degree of educational gaps between immigrant and native children, we move on to discuss potential country-level factors that may contribute to such cross-national variation. In this study, we are particularly interested in how countries differ in the practice of grade retention in schools and whether the difference is related to cross-national variation in educational gaps by immigrant status. While we are aware that a broader context of immigration or welfare policies is a fundamental factor in affecting how immigrant children fare, we also consider it important to focus on education-specific factors, which may help formulate relevant education policies or programs. Our interest in educational factors is distinguished from recent research that primarily focuses on political (such as existence of left-wing parties, and political stability) or demographic factors (such as religion of origin countries) to account for cross-national variation in the effect of immigrant status on children's education (e.g., Levels, Dronkers, & Kraaykamp 2008).

Grade Retention

Note that the target population of our dataset, PISA, is 15-year-old students. However, depending on educational systems students at age 15 can be in different grades within schools. We are interested in the extent to which distributions of students across grades are different between immigrant and native students. In principle, the same distribution across grades is expected for immigrant and native students of the same age. But as will be seen below, in some European countries immigrant students than their native peers of the same age are more likely to be in lower grades.

Although the PISA dataset does not contain information on the reasons why students were held back in school, the different grade pattern between immigrant and native students is likely related to the extent to which grade retention is practiced in educational systems. In educational systems with grade retention practiced, a child who has spent a full year of school in a specific grade has to repeat the same grade if the child is determined not to reach the level of academic performance expected for a student in the specific grade. In another school system where grade retention is not practiced, nearly all students are promoted to the next grade regardless of their academic performance, keeping students together by age. European countries vary in their practice of grade retention. Among 10 European countries analyzed in this study, Austria, Belgium, France, Germany, Luxembourg, and Switzerland practice grade retention, whereas in Denmark, Norway, Sweden, and the United Kingdom students are automatically promoted to the next grade (European Commission, 2005).

Despite the argument of advocates that repeating the same grade should give opportunities for low-achieving students to catch up necessary knowledge ready for the next grade, the empirical evidence about the effects of grade retention on subsequent educational achievement and attainment is consistently negative (Holmes, 1989; Hauser, 1999). Scant is evidence that retention improves academic achievement of students with learning deficit; on the contrary, retained students gain less in academic achievement than expected. Moreover, research has shown that retention increases the likelihood of school dropout (Rumberger & Larson, 1998).

Given the negative effects of grade retention on educational outcomes, researchers have also explored individual and family characteristics that influence the likelihood of grade retention. Socioeconomic background of students and their race/ethnicity have been found to be particularly salient factors affecting the likelihood of retention: minority students who tend to come from poorer socioeconomic families are more likely to be retained (Hauser, Pager, & Simmons, 2001).

The potential negative effect of grade retention on educational outcomes and the significant association between the likelihood of retention and student's socioeconomic background imply that grade should be an important factor in explaining educational differences between immigrant and native students. In most countries except for traditional immigrant countries mentioned earlier, immigrant students are more likely to have poorer socioeconomic background and also may suffer from learning deficit related to language skills and other cultural issues. Therefore, in countries where grade retention is widely practiced, immigrant students are more likely to be retained than native students. Retained immigrant students likely gain less in academic achievement than their promoted native peers of the same age, resulting in the achievement gap. In countries, on the contrary, where all students are automatically promoted to the next grade, we do not expect a substantial degree of difference in grade distributions between immigrant and native students.

Data and Measures

Data

The data of educational performance for each student come from the PISA dataset. PISA was initially conducted in 2000 in 32 countries (28 OECD and 4 non-OECD countries). The primary focus of PISA in 2000 was to assess reading literacy skills of young people at age 15 (OECD, 2001). The target population in PISA was defined as 15-year olds enrolled in schools regardless of the grade level, the type of institution (i.e., vocational or academic schools) in which they were enrolled, or whether they were full-time or part-time students. The two-stage stratified sampling design was used to select PISA samples. At the first stage, individual schools in which 15-year-old students were enrolled were selected systematically with probabilities proportionate to size, the size being a function of the estimated number of eligible (15-year-old) students enrolled. At the next step, students within sampled schools were selected with equal probability from a list of 15-year-old students in each selected school. PISA achieved overall high quality of the coverage of the national desired target population.[2]

In addition to literacy assessment, PISA asked students a series of questions to collect information on student's individual characteristics and family's socioeconomic and cultural environments. An important advantage of PISA over previous international surveys of student achievement especially relevant for the current study is that PISA collected detailed information on various aspects of family background including parental occupation and education, educational resources at home, and family's possession of classical culture. For comparison, TIMSS (Third International Mathematics and Science Study), another international survey of student's achievement widely used by educational researchers, did not include the other three measures above except for parental education (Buchmann, 2002). A variety of family background measures available in PISA is essential for our study that aims to assess the extent to which cross-national variation in the effect of immigrant status remains after controlling for individual and family characteristics of students.

Dependent Variable

The main outcome variable in this study is students' performance on reading literacy. *Reading literacy* is defined in PISA as "the ability to understand, use, and reflect on written texts in order to achieve one' goals, to develop one's knowledge and potential, and to participate effectively in society" (OECD, 2001: 21). By applying the Item Response Theory scaling technique, PISA measured each student's reading literacy skill in a single composite scale that has an average score of 500 and a standard deviation of 100 across all students of the OECD countries participating in PISA. Instead of a fixed value for the reading literacy scale, five plausible values are provided for each student, which should be used simultaneously to obtain the estimates of population parameters.[3]

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[2] See OECD (2001) Annex A3 for detailed introduction to PISA sampling procedures as well as the target population coverage.

[3] Randomly drawn from the posterior distribution for a student's ability, plausible values are appropriate especially to estimate population parameters, taking into account the uncertainty associated with the estimates. For details on plausible values, refer to PISA 2000 technical report (OECD, 2002).

Reading literacy skills have been found to be positively associated with a range of educational and occupational outcomes. The results from the International Adult Literacy Survey (IALS) showed that adults with higher levels of reading literacy were more likely to be employed and to have higher incomes than those with lower levels, even after educational qualifications were held constant (OECD and Statistics Canada, 2000). A study of adult literacy in the United States also found that both educational attainment and literacy skills independently affected occupational status and earnings (Kerckhoff, Raudenbush, & Glennie, 2001).

Immigrant Status

In PISA, students were asked if they, their mother, and their father, respectively, were born in the country where they were tested or in another country. Following PISA's instruction (see OECD, 2001, pp. 220–221), we distinguished three groups of students from the three items of country of birth: native, second-generation, and first-generation students. *Native* students refer to those who were born in the country of the test with at least one parent born in that country.[4] *Second-generation* students are those born in the country of test with both parents born in another country. Finally, students are classified as *first generation* students when they were born in another country and at least one parent was born in another country. We report the proportion of each type of students separately, but for the multivariate analysis we combine first-generation and second-generation students into one category of *immigrant* children. We do not deny the potential differences between students of first-generation and second-generation. But, the modest size of samples in PISA data makes it practically difficult to analyze the two groups of students separately.

Socioeconomic Background

In order to cover various aspects of student's socioeconomic background, we include four indicators. *Parental education* is the higher level of educational attainment of the parents and it has three categories: lower secondary education completed or less (the reference category), upper secondary education completed, and tertiary education completed. *Parental occupation* indicates parents' current or last main job and is measured by the International Socio-Economic Index of Occupational Status developed by Ganzeboom, De Graaf, and Treiman (1992). Higher values of the index indicate higher socioeconomic status of the occupation. The higher status occupation between mother's and father's occupation is used.

Tracking educational trajectories of American high school seniors, Teachman (1987) provided evidence that educational resources available at home enhanced

[4] The category of native students includes the very small numbers of students who were born in another country but whose parents were both born in the country of test.

children's educational attainment, even net of other aspects of parental education, occupation, and family income. Therefore, we consider the possibility that the relative lack of educational resources at home is an important source of educational disadvantages of immigrant children. The third variable measuring socioeconomic conditions of families is the index of *home educational resources*, which was constructed by summarizing students' reports on the availability and number of education-related items at home such as a dictionary, a quite place to study, a desk for study, textbooks, and calculators. The index was scaled to have a mean of 0 and a standard deviation of 1 across students in the OECD countries. Therefore, a positive value of the index indicates that the student has home educational resources above the OECD average.

Finally, we include the index of *home possessions of "classical" culture* (classical literature, books of poetry and works of art) as another indicator of family socioeconomic status. Studies in the line of cultural capital perspective provide ample evidence that a wide range of parental cultural resources including parents' beaux arts participation and parental reading behaviors significantly enhance children's success in schools (DiMaggio, 1982; De Graaf, De Graaf, & Kraaykamp, 2000). The findings suggest that the differential access to cultural resources essential for children's school success may be another source of educational differences between immigrant and native students, if immigrant parents have substantially low levels of cultural capital compared to their native counterparts. The index of home possessions of classical culture was standardized to have a mean of 0 and a standard deviation of 1 across students in OECD countries. A student with a positive value of the index has more home possessions of classical culture than does the OECD average student.

Grade, Language Spoken at Home, and Other Individual Characteristics

Students were asked to report the *grade* they were in. We present percentage distributions of grade for each country in a descriptive purpose, while we use the grade as a continuous variable (a deviation from 10th grade) for the multivariate analysis. Students also indicated whether the *language they speak at home most of the time* was the language of instruction, another official national language, another national dialect, or another (foreign) language. Consistent with the classification used in the PISA report (OECD, 2001), we distinguish students who speak a foreign language at home most of the time from other students who speak a language of instruction, official national language, or another national dialect.

We include a few control variables that have been found to affect student's educational achievement in previous literature. The results from various international or local assessments of reading literacy consistently show *gender* differences in reading performance often favoring female students (Mullis, Martin, Gonzalez, & Kennedy, 2003). Literature has consistently shown the negative relationship between sibship size and educational outcomes in various societies (Blake, 1989; Wolter, 2003). We include the total number of siblings students have as a control variable. Finally, a great deal of research on family structure has found significant educational advantages of children in intact families compared to their counterparts in single-parent families or stepfamilies (Dronkers, 1994; McLanahan & Sandefur, 1994). We distinguish between students who live with a mother and a father (*intact family*) and others who do not.[5]

Country-Level Variable: Degree of Grade Retention

As emphasized earlier, a major goal of this study is to link cross-national variation in the degree of educational gaps between immigrant and native students to the extent to which immigrant students are more likely to repeat a grade and thus are in lower grades than their native peers of the same age. To measure the extent of grade retention among immigrant students relative to their native peers within a specific country, we calculate the percentage difference between immigrant and native students whose grades are below modal grade of native students in the country.

Analytic Strategy

OLS Regression with Country Dummy Variables

We use three different analytic techniques to address our research question. First, we combine all 11 countries and apply a series of regression models to the combined data to compare the reading performance gap between immigrant and native students across countries. The baseline model predicts students' reading scores by three components of independent variables: (a) a set of 10 dummy variables representing each country (the United Kingdom as a reference); (b) a dummy variable indicating immigrant students (when the United Kingdom is a reference category, the coefficient of this dummy variable indicates the reading score gap between immigrant and native students in the United Kingdom); and (c) 10 interaction terms between the dummy variable of immigrant status and the dummy variable of country. Each interaction term indicates the difference between the immigrant–native gap in reading performance in the United Kingdom and the corresponding gap in a specific country. Hence, the main purpose of this regression analysis is to statistically assess whether the immigrant–native gap in a specific country is statistically larger or smaller than the corresponding gap in the United Kingdom as a reference country.

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[5] The wording of living arrangement items did not specify whether a mother or a father is a biological parent. However, a stepparent was specifically provided as an example of a guardian. Therefore, it seems to be reasonable to assume that a mother or a father indicates a biological parent.

Two-Level Hierarchical Linear Models

The regression analysis with country dummy variables will reveal a rank of countries in terms of the degree of reading gap between immigrant and native students and thus offer insight into potential country-level factors that may account for the difference. However, this approach does not formally test whether such rank among countries is associated with grade retention practice of countries. For the purpose, we rely on two-level hierarchical linear model (Bryk & Raudenbush, 1992). The two-level HLM is estimated with student as the first-level unit and country as the second-level unit. In the student-level equation, the reading literacy score for student i in country j is predicted as follows:

$$(\text{Reading literacy})_{ij} = \beta_{0j} + \beta_{1j}(\text{Immigrant})_{ij} + \sum_{2}^{k} \beta_{kj}\text{X}_{kij} + r_{ij}.$$

The intercept, β_{0j}, represents mean reading literacy of native students in country j adjusted for differences among countries in student characteristics included in the model (student-level variable are centered around grand means). β_{1j} is the average achievement gap in country j between native and immigrant children (a dummy variable of immigrant children contrasted to native children) and r_{ij} is the student-specific error. The effects of other control variables including family socioeconomic status and student's demographic characteristics are represented through β_{2j} to β_{kj}, which are fixed.

In HLM, the coefficients in the first-level equation serve as dependent variables in the second-level equation. Each country's mean reading literacy (β_{0j}) and the effect of being an immigrant child (β_{1j}) within a country derived from the student-level equation are modeled to vary according to the country-level variable of grade retention (i.e., the percentage difference between immigrant and native students whose grades are below modal grade)

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Grade retention})_j + u_{0j},$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{Grade retention})_j + u_{1j}.$$

Given that the effect of immigrant status is negative (i.e., disadvantage of immigrant students), the negative coefficient of γ_{11} means that the disadvantage of immigrant students increases along with the greater percentage of immigrant students whose grades are below modal grade relative to their native peers.

OLS Regression for Each Country, Separately

Note that the two previous analyses for cross-national comparison do not include a student's grade in the student-level equation. It is because the analyses intend to assess how the reading gap between immigrant and native students varies across countries according to a country-level factor, which indicates the extent to which immigrant students are more likely to be retained than their native peers. But, because a student's own grade is available in the PISA dataset, we can specifically examine how grade and other individual characteristics play roles in accounting for the immigrant–native gap *within* countries. We conduct OLS regression analyses for each of five countries where grade retention has been widely practiced and thus immigrant students are more likely to be in lower grades than their native peers of the same age. The finding that grade substantially mediates the reading gap between immigrant and native students in these countries will corroborate the hypothesis that countries with wide practice of grade retention should have larger gaps in educational performance between immigrant and native students.

Results

Percentages of Immigrant Children

Figure 1 shows the percentages of first-generation and second-generation immigration students among all 15-year-old students in 10 European countries as well as the United States. The share of immigrant children (both first-generation and second-generation students) is considerably large in Luxembourg (35%), Switzerland (22%), and Germany (16%), which is larger than the share in the United States (14%). Norway (6%) and Denmark (7%) show a relatively small share of immigrant students. In the remaining countries, the share of immigrant students is 10–13%.

In terms of the relative proportion between first-generation and second-generation immigrant students, some countries are distinctive. For instance, in

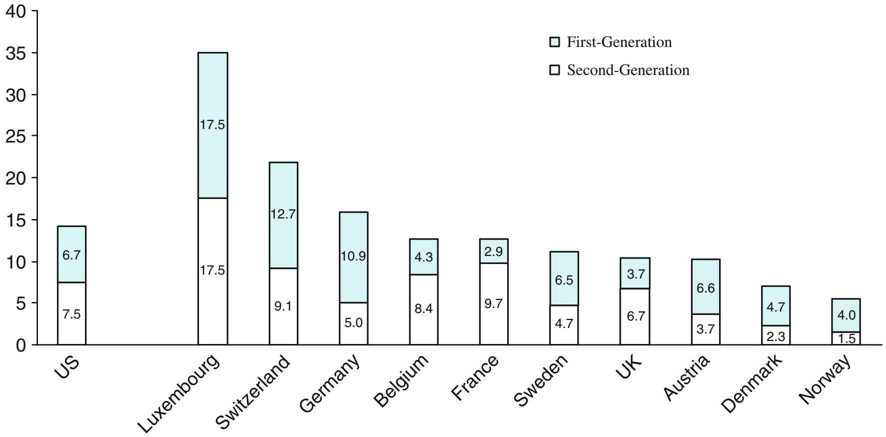

Fig. 1 Percentages of first-generation and second-generation immigrant students

Belgium, France, and the United Kingdom there are relatively more second-generation students than first-generation students, while opposite is the case for the other European countries except for Luxembourg where the proportion of second-generation students is similar to the proportion of first-generation students.

Immigrant–Native Difference in Student Characteristics

Table 1 presents descriptive statistics of students' individual and family characteristics separately for immigrant and native students in each country. Because our main focus is on grade distribution, we concentrate our discussion on this variable. To highlight differences in the distributions of grade by immigrant status between two groups of countries, we graphically present the distributions in Fig. 2a, b. Figure 2a presents the distributions of grade among native (NAT) and immigrant (IMM) students in six European countries: Austria, Belgium, France, Germany, Luxembourg, and Switzerland. As described earlier, this group of European countries has practiced grade retention. Evident from the figure is that in all six countries, *immigrant* students than native students are more likely to be in *lower* grades, while *native* students than immigrant students are more likely to be in *higher* grades. In Austria, for instance, 3% of native students are in 8th or lower grades and half of native students are in 10th or higher grades, while the corresponding percentages among immigrant students are 24 and 29%. Because information on the reason of being held back in school was not collected in PISA, it is difficult to entirely attribute to grade retention the significant difference in grade distribution between immigrant and native students. However, it is reasonable to assume that grade retention should be a major cause of being in lower grades. Also note that among those six countries, France and Switzerland show a relatively small difference in grade distribution between immigrant and native students.

In contrast to the pattern shown in Fig. 2a, Fig. 2b shows no significant differences in the distributions of grade between immigrant and native students in the other four European countries (Denmark, Norway, Sweden, and the United Kingdom) as well as in the United States. In the United Kingdom, for instance, 34% of native students are in 10th grade and the remaining 66% of native students are in 11th or higher grades. The distribution of grade is almost identical among immigrant students. Note that grade retention is not practiced in these four European countries.

The discrepancy between grade distributions of immigrant and native students is well summarized as the percentage difference between immigrant and native students whose grades are below modal grade. Table 1 shows that, for instance, 48.8% of native students in Austria are in grades below modal grade (which is 10th grade), while 71.2% of immigrant students are in grades below 10th. Thus, the percentage difference is 22.4%. In addition to Austria, Belgium, Germany, Luxembourg, Switzerland, and France show a relatively greater discrepancy than do the other group of countries. Again, this reflects that the former have widely practiced grade retention, while the latter have not.

Table 1 Descriptive statistics on student's individual and family characteristics by immigrant status

		Austria		Belgium		Denmark		France		Germany		Luxembourg
	NAT	IMM	NAT	IMM	NAT	IMM	NAT	IMM	NAT	IMM	NAT	IMM
Grade (%)												
6	0.0	0.3										
7	0.1	2.5	0.3	0.4			0.2	1.2	0.6	3.9	0.9	3.2
8	2.7	20.8	3.0	16.4	5.4	12.0	6.2	11.5	10.8	26.2	12.2	26.0
9	46.0	47.6	24.8	47.3	91.9	84.4	35.6	40.1	62.2	56.2	55.6	56.1
10	51.2	28.9	71.0	35.6	2.7	3.6	55.0	45.8	26.2	13.7	31.4	14.7
11	0.1	0.0	1.0	0.2			3.0	1.4	0.1	0.0		
12			0.0[a]	0.0								
% below modal grade	48.8	71.2	28.1	64.1	5.4	12.0	42.0	52.8	11.4	30.1	13.1	29.2
Difference	22.4		36.0		6.6		10.8		18.7		16.1	
Parental education (%)												
Low secondary or less	14.6	36.7	9.4	40.1	11.9	30.8	14.0	47.9	7.2	22.3	14.5	12.1
Upper secondary	53.2	31.6	41.7	20.8	35.1	27.5	37.6	18.2	49.9	26.4	15.2	55.8
Tertiary	27.8	25.9	45.5	33.0	50.6	35.3	44.6	30.4	38.6	24.0	37.8	16.1
Missing	4.4	5.8	3.4	6.0	2.5	6.3	3.8	3.5	4.4	27.3	32.5	16.1
Parental occupation	50.8	41.2	50.1	41.1	50.1	44.4	49.3	41.8	50.8	41.3	49.2	36.6
	(13.6)	(14.8)	(16.4)	(16.1)	(15.9)	(18.1)	(16.6)	(17.2)	(15.0)	(15.5)	(15.3)	(14.9)
Home educational	0.30	0.05	0.22	0.00	–0.20	–0.34	0.18	0.11	0.40	0.15	0.47	0.01
resources	(0.76)	(0.97)	(0.88)	(1.01)	(0.93)	(0.96)	(0.86)	(0.92)	(0.67)	(0.95)	(0.71)	(1.12)
Home cultural possession	0.03	–0.18	–0.37	–0.63	–0.09	–0.34	–0.28	–0.35	0.03	–0.15	0.10	–0.49
	(0.96)	(0.96)	(0.99)	(0.94)	(0.97)	(0.97)	(1.00)	(0.96)	(0.98)	(0.94)	(0.99)	(1.00)
Foreign language (%)	0.8	69.1	0.7	36.2	1.8	67.8	0.4	31.7	0.4	63.1	1.2	49.1
Female (%)	52.3	50.2	48.1	46.7	49.8	49.8	51.5	50.4	50.4	50.5	50.1	51.4
Intact family (%)	77.9	79.4	76.8	76.2	68.9	64.0	75.0	77.7	74.3	80.5	76.8	79.0
Number of siblings	1.54	1.80	1.63	2.88	1.88	2.41	1.71	2.71	1.48	2.04	1.52	1.84
	(1.12)	(1.34)	(1.16)	(1.85)	(1.26)	(1.55)	(1.15)	(1.55)	(1.13)	(1.60)	(1.13)	(1.43)
Unweighted *N*	4,150	478	5,707	809	3,872	283	3,978	570	4,148	740	2,245	1,157

Table 1 (continued)

	Norway		Sweden		Switzerland		UK		US	
	NAT	IMM	NAT	IMM	NAT	IMM	NAT	IMM	NAT	IMM
Grade (%)										
6										
7					0.5	2.2			0.3	0.8
8	0.0	0.5	0.0	0.2	16.4	30.5			3.0	5.8
9	0.6	4.2	1.5	6.5	69.6	51.4	0.0	0.2	39.6	41.1
10	98.6	95.3	98.1	92.5	13.4	15.7	33.8	33.4	56.7	51.3
11	0.8	0.0	0.4	0.7	0.1	0.3	64.7	66.0	0.3	1.0
12					0.0[b]	0.0	1.5	0.4		
% below modal grade	0.6	4.7	1.5	6.7	16.9	32.7	33.8	33.6	42.9	47.7
Difference	4.1		5.2		15.8		–0.2		4.8	
Parental education (%)										
Low secondary or less	9.1	19.8	7.4	18.4	22.9	45.6	8.1	25.0	4.9	27.3
Upper secondary	35.5	23.3	31.7	26.3	34.3	21.9	38.3	22.6	45.9	28.1
Tertiary	51.3	48.8	58.1	52.0	39.6	29.4	48.7	48.0	46.3	33.0
Missing	4.0	8.1	2.8	3.3	3.3	3.1	4.9	4.3	2.8	11.7
Parental occupation	54.3	49.3	51.1	46.6	51.2	42.2	51.8	50.2	53.2	47.1
	(15.2)	(17.8)	(16.0)	(17.0)	(15.7)	(16.3)	(15.6)	(17.1)	(16.0)	(18.1)
Home educational	0.12	–0.19	0.04	0.01	0.34	0.14	0.01	0.10	–0.22	–0.60
resources	(0.92)	(1.09)	(0.96)	(1.03)	(0.76)	(0.90)	(0.98)	(0.98)	(1.16)	(1.38)
Home cultural possession	0.16	–0.23	0.08	–0.22	–0.05	–0.20	–0.08	–0.03	–0.09	–0.31
	(1.01)	(1.03)	(0.97)	(0.95)	(0.98)	(0.96)	(1.06)	(1.03)	(1.03)	(1.00)
Foreign language (%)	1.2	70.6	0.4	63.9	2.2	53.9	0.4	37.1	2.4	61.5
Female (%)	48.9	51.3	49.8	44.6	50.2	50.1	50.5	50.3	52.6	45.6
Intact family (%)	71.5	65.9	70.9	69.0	77.5	78.6	68.7	72.5	52.9	54.7
Number of siblings	2.02	2.53	2.13	2.50	1.61	1.77	1.89	2.70	2.36	2.69
	(1.28)	(1.98)	(1.30)	(1.76)	(1.01)	(1.25)	(1.27)	(1.70)	(1.61)	(1.82)
Unweighted *N*	3,767	259	3,878	473	4,687	1,226	8,254	600	3,032	583

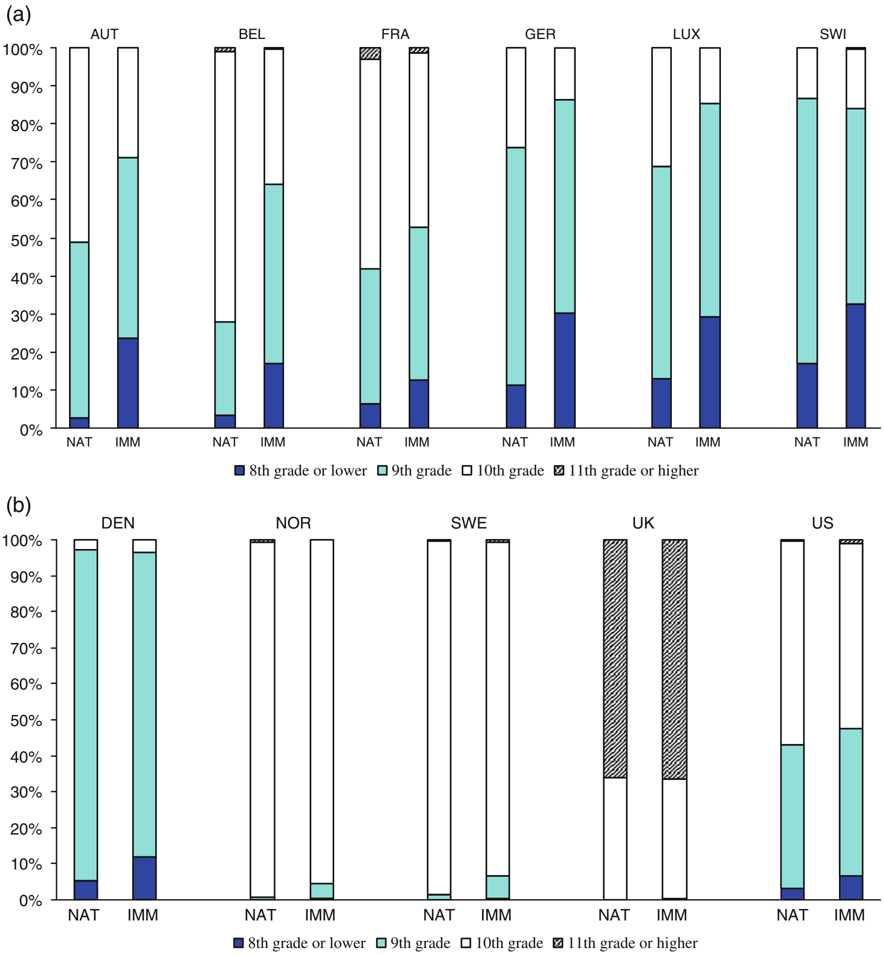

Fig. 2 **a**, **b** Distributions of grade by student's immigrant status. Note: NAT – Native students, IMM – Immigrant students, AUT – Austria, BEL – Belgium, FRA – France, GER – Germany, LUX – Luxembourg, SWI – Switzerland, DEN – Denmark, NOR – Norway, SWE – Sweden, UK – the United Kingdom, US – the United States

Table 1 also presents differences between immigrant and native students in family socioeconomic conditions measured by parental education, occupation, the index of home educational resources, and the index of home possessions of classical culture. Although the specific degree of differences varies across countries, the pattern commonly found is that immigrant students than native students are more likely to come from families with poorer socioeconomic conditions. The only exception is found in the United Kingdom where immigrant and native families do not show significant differences in socioeconomic conditions. For instance, the status level of parental occupation and the levels of home educational resources and cultural possessions are similar between immigrant and native students.

Moving to the percentage of immigrant students who speak a foreign language at home, countries vary from 32% in France to 71% in Norway. In five countries (Austria, Denmark, Germany, Norway, and Sweden), more than 60% of immigrant students speak a foreign language at home and in two countries (Luxembourg and Switzerland) half of immigrant students do so. Les than 40% of immigrants speak a foreign language at home in Belgium, France, and the United Kingdom. Overall, the result shows that a substantial proportion of immigrant students speak a foreign language at home in all 10 European countries, which implies that language proficiency should be an important factor for accounting for the immigrant–native performance gap.

Results of OLS Regression with Country Dummy Variables

Table 2 presents the results of regression analysis with country dummy variables using the pooled dataset of 11 countries. As a baseline model, Model 1 shows the gross differences between the immigrant–native performance gap in the United Kingdom (reference) and the corresponding gap in another country. The coefficient of the dummy variable representing immigrant status indicates that immigrant students in the United Kingdom score lower by 31 points than their native peers. The underachievement of immigrant students compared to their native peers is more substantial in other European countries as interaction terms between the dummy variable of immigrant status and the country dummy variable show the negative sign. For instance, the interaction term for Austria indicates that the immigrant–native gap in Austria is 47 points larger than the gap in the United Kingdom, resulting in –79 points (–47.491 + –31.436): the average score of immigrant students in Austria is 79 points lower than the average score of native students. The statistical comparison, furthermore, shows that the difference in the immigrant–native gap between the United Kingdom and Austria is statistically significant.

In addition to Austria, Belgium (–100 points = –68.121 + –31.436), Germany (–80 points), Luxembourg (–88 points), and Switzerland (–81 points) show particularly significant underachievement of immigrant students compared to their native students. The differences in the immigrant–native gap between the United Kingdom and each of France, Norway, and the United States are not statistically significant, although the immigrant–native gaps in France (–47 points = –15.736 + –31.436), Norway (–49 points), and the United States (–38 points) are larger than the gap in the United Kingdom (–31 points). In other words, the immigrant–native performance gap favoring native students is considerable in all 11 countries.

To Model 1, Model 2 adds students' demographic characteristics and family SES variables. As expected, these student-level variables account for a substantial part of the effect of immigrant status. For instance, the immigrant–native gap in the United Kingdom is reduced from 31 points in Model 1 to 20 points in Model 2. An important question to be asked is to what degree countries differ in the extent to students' demographic and socioeconomic characteristics account for the effect of immigrant

Table 2 Regression analysis of predicting student's reading performance

	Model 1	Model 2	Model 3
Intercept	529.401***	429.243***	433.612***
Country (reference: UK)			
Austria	–12.983**	–19.525***	–19.092***
Belgium	–6.227	–5.012	–3.304
Denmark	–25.191***	–18.766***	–18.734***
France	–16.879***	–13.278***	–12.948***
Germany	–20.841***	–29.931***	–28.418***
Luxembourg	–54.022***	–53.734***	–53.971***
Norway	–18.829***	–27.337***	–24.615***
Sweden	–6.036^	–8.942**	–8.573**
Switzerland	–14.9**	–19.357***	–18.594***
US	–18.3**	–9.21*	–8.453*
Immigrant	–31.436**	–19.882**	–6.187
Interaction: immigrant X country			
Austria	–47.491***	–33.639**	–21.994*
Belgium	–68.121***	–41.374***	–42***
Denmark	–41.26***	–25.777**	–16.769^
France	–15.736	0.805	–0.68
Germany	–48.342***	–26.387**	–15.321^
Luxembourg	–56.959***	–29.346***	–27.56**
Norway	–17.686	–2.909	5.663
Sweden	–24.459*	–15.813^	–5.842
Switzerland	–49.477***	–37.666***	–33.563***
US	–7.04	14.298	20.137*
Female		25.107***	24.758***
Intact family		23.143***	23.414***
Number of siblings		–5.873***	–5.747***
Parental education (reference: lower secondary or less)			
Upper secondary		20.529***	16.721**
Tertiary		26.469***	22.972***
Missing		–16.481*	–17.376*
Parental occupation		1.258***	1.235***
Home possessions of classical culture		15.368***	15.398***
Home educational resources		11.801***	11.171***
Foreign language spoken at home			–36.263***

Note: Total N = 54,896.
^$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

status. In other words, would the rank of countries in the degree of immigrant–native gap change after student-level variables are taken into account?

In order to facilitate interpretation, Fig. 3 presents across models the reading gap between immigrant and native students in a specific country relative to the corresponding gap in the United Kingdom as a reference country. The comparison

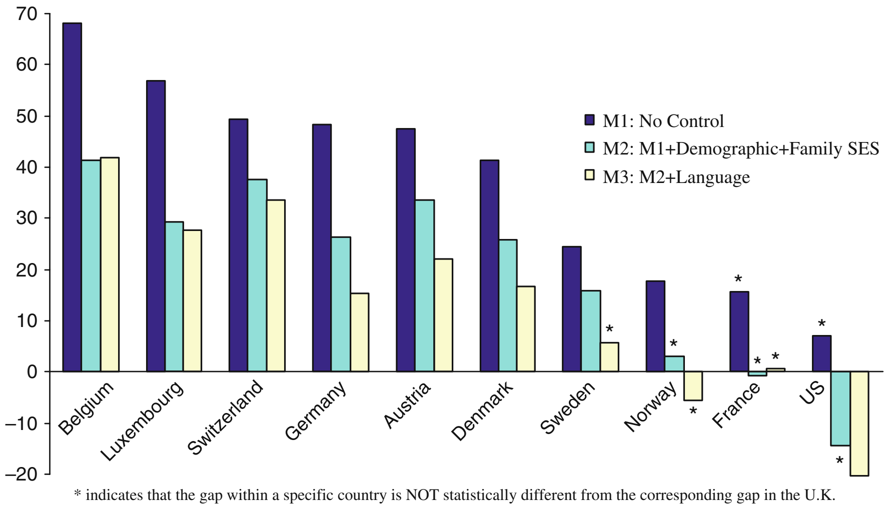

Fig. 3 Immigrant–native gaps in reading performance (compared to the corresponding gaps in the UK)

between Model 1 and Model 2 shows that the reading gap is reduced more significantly in other countries than in the United Kingdom once student-level variables are controlled. For instance, in Model 2, the reading gap in Austria is larger by 40 points that the corresponding gap in the United Kingdom, while the gap was 70 points larger in Model 1. This reflects the fact that socioeconomic differences between immigrant and native families are more substantial in other European countries than in the United Kingdom, as already discussed in Table 1. It is interesting, however, to see that the reading gap in other European countries, except for Norway and France, is still larger than the gap in the United Kingdom even though the difference in the gap between the United Kingdom and other countries is substantially reduced.

Model 3 adds language minority status to Model 2. Additionally controlling for language minority status reduces further the difference in the immigrant–native gap between the United Kingdom and such countries as Austria, Denmark, and Germany. The reading gap in Sweden is no longer statistically different from the gap in the United Kingdom. The difference between the United Kingdom and each of Belgium, Luxembourg, and Switzerland hardly changes after language is taken into account.

In Fig. 3, the reading gap is particularly large in countries such as Belgium, Luxembourg, Switzerland, and Austria, while the gap is relatively narrow in France, Norway, Sweden, and the United Kingdom. Interestingly, the former are where immigrant students are more likely to be in lower grades than their native peers of the same age. Note that although France has practiced grade retention policy, the difference in grade distribution between immigrant and native students is relatively small among those countries with grade retention (Fig. 2a, b).

HLM Results

From the result in Fig. 3, cross-national variation in the degree of immigrant–native gap seems to be related to the higher likelihood of grade retention among immigrant students in countries with grade retention policy. In order to formally test this association, we now move on to discuss the result of two-level HLM in Table 3. The first model (M1) simply allows the effect of immigrant status to randomly vary across countries without modeling the variation.

In M2, we model the effect of immigrant status to vary across countries according to the country-level variable of grade retention. As described earlier, the variable indicates the difference between immigrant and native students in terms of the percentage of those whose grades are below modal grade of native students. Therefore, larger values of this variable indicate the greater likelihood of grade retention among immigrant students relative to their native peers. Given that the effect of immigrant status is negative (–38.885), the significantly negative coefficient of the cross-level interaction between immigrant status and grade retention means that the negative effect of immigrant status (i.e., lower achievement of immigrant students) becomes larger in countries with a larger difference between native and immigrant students in the percentage of those whose graders are below modal grade of native students. In other words, the result confirms that the reading gap between immigrant and native students tends to be larger in countries where immigrant students are more likely to be in lower grades than their native peers. This conclusion remains the same even after language minority status is taken into account in M3.

The interaction effect is not only statistically significant, but it is also substantial in the size. In M3, the coefficient of –1.37 means that 1% increase in immigrant–native difference in percentage of students below modal grade leads to the increase of the negative effect of immigrant status by 1.37. Note that the difference between immigrant and native students whose grades are below modal

Table 3 HLM results of the effect of immigrant status on reading performance

	M1	M2	M3
(The coefficients of other individual-level variables are not shown)			
Fixed effect			
Immigrant	–39.038***	–38.885***	–23.401***
	(5.351)	(3.370)	(3.395)
Effect on the slope of immigrant status			
Immigrant–native difference in percentage of students below modal grade		–1.350**	–1.370**
		(0.342)	(0.336)
Random effect			
Variance of the slope of immigrant	296.1	106.5	101.8
% of variance explained	–	64.0	65.6

category is 36% in Belgium, while the difference is 4% in Norway (see Table 1). Hence, the reading gap between immigrant and native students is expected to be 44 points (32 × –1.37) larger in Belgium than the gap in Norway, other things held constant.

The Effect of Grade Within Country

Finally, Fig. 4 summarizes how the reading gap between immigrant and native students changes across models in each of six countries that have a relatively large discrepancy in grade distribution between immigrant and native students. The first bars in Fig. 4 indicate the immigrant–native performance gap when demographic variables and family SES are controlled. The next bars show the immigrant–native performance gap when grade is included in the model in addition to demographic variables and family SES. Except for Switzerland and France, controlling for grade substantially reduces the performance gap between immigrant and native students in the other four countries, which indicates the mediating role of grade for the effect of immigrant status. Note that as already seen in Fig. 2a, b, Switzerland and France show a relatively small discrepancy in grade distribution by immigrant status among countries with grade retention practiced.

The third bars indicate the immigrant–native gap when language minority status is added to demographic variables and family SES. The final bars show the gap when both grade and language are controlled in addition to demographic variables and family SES. Comparing the third and final bars indicates that except for Switzerland and France, the reading gap between immigrant and native student is further substantially reduced with grade controlled, even after language minority status is taken into account. Now, the reading gap between immigrant and native students is no longer significant in Germany.

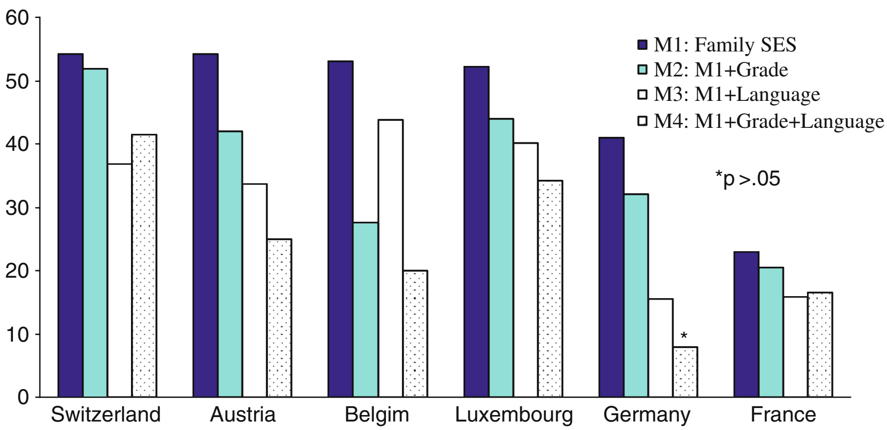

Fig. 4 Changes in the reading gap between immigrant and native students across models (separate OLS regression for each country)

Conclusion

Our results show considerable variation in the immigrant–native performance gap among our 10 European countries. Overall, France, Norway, and the United Kingdom, along with the United States, show relatively smaller performance gaps between immigrant and native students, while Switzerland, Belgium, Denmark, and Luxembourg show relatively larger gaps. Except for the United Kingdom, poorer socioeconomic conditions of immigrant families than native families are important sources of underachievement of immigrant students. However, even after socioeconomic conditions are taken into account, the immigrant–native gap still remains significant in all 10 European countries, which suggests that the immigrant–native gap is not entirely due to socioeconomic differences between immigrant and native families, but depends on other factors as well.

Among potential factors that may affect immigrant students' education, we focused on grade. Although socioeconomic background of immigrant students is difficult to be changed by educational policy, the effect of grade may be modified depending on how educational systems deal with the issue. For instance, if different grade distributions between immigrant and native students are related to the immigrant–native performance gap, educational policy markers and researchers may reconsider their grade retention policy.

Most of all, 10 European countries are heterogeneous in grade distributions by student's immigrant status. In one group of countries including Denmark, Norway, Sweden, and the United Kingdom where students are automatically promoted to the next grade (no grade retention), immigrant students do not differ in their grade distributions as native students. In another group of countries, however, including Austria, Belgium, France, Germany, Luxembourg, and Switzerland where grade retention policy has been practiced, immigrant students than native students are more likely to be in lower grades.

Our major hypothesis was that countries, where immigrant students are more likely to be retained than their native peers of the same age, should have a larger performance gap between immigrant and native students given previous literature on negative consequences of grade retention. The regression analysis with country dummy variables and two-level HLM provides evidence consistent with the expectation.

A major problem with the result, however, is that we were not able to control for other potential factors that are correlated to grade retention. For instance, another potential education-related factor to be considered for cross-national comparison is the type of schools students attend. In countries with highly differentiated school systems such as Austria, Belgium, and Germany, students are segregated into different types of schools that offer distinctive curricula and credentials which are strongly linked to future educational and occupational attainment. Research has suggested evidence that in highly differentiated systems, students from poorer socioeconomic background and immigrant families are more likely to attend the lowest streams of schools (Schnepf, 2002; Baker, Esmer, Lenhardt, & Meyer, 1985). Students in different types of schools experience significant differences in academic orientation, curriculum, quality of teaching, and school climate, which will result in a growing academic gap. Therefore, the type of schools students attend may be an important mechanism through which the educational gap between immigrant and native students is produced.

Although intriguing, we could not consider this factor because school differentiation is highly correlated with grade retention among our 10 European countries. Countries with highly differentiated school systems are also those that have a larger discrepancy in grade distribution between immigrant and native students (such as Austria, Belgium, Luxembourg, Germany, and Switzerland). Countries such as Denmark, Norway, Sweden and the United Kingdom have both low levels of school differentiation and discrepancy of grade distribution by immigrant status. Therefore, it is not feasible to separate the effect of grade retention from the effect of school differentiation using our 10 countries.

However, in our final analysis, we find that students' grade substantially mediates the effect of immigrant status in those countries with larger discrepancy in grade distribution by immigrant status except for Switzerland and France. The result is consistent with the hypothesis that countries with a large proportion of immigrant students who are in lower grades than their native peers should have a larger gap in education between immigrant and native students.

On the other hand, the result also shows that even after grade is taken into account, the reading gap between immigrant and native students remains significant in those countries with high levels of grade retention among immigrant students except for Germany. This implies that factors other than grade should be also considered to understand relatively wide performance gap between immigrant and native students in those countries. Switzerland makes this case evident. Once family SES and language minority status are taken into account, grade does not account for the reading gap between immigrant and native students.

An important limitation of our study is not to consider heterogeneity among immigrant students by ethnicity or countries of origin. Recently some studies have shown that not only characteristics of destination countries but also those of origin countries are related to variation among immigrants in their economic and educational integration into host societies (Van Tubergen, Maas, & Flap, 2004; Levels et al., 2008). It has been well documented that in the United States, Asian and Latino immigrant students show significant differences in their educational outcomes (Feliciano, 2005; Schmid, 2001). PISA 2000 did not collect information on countries of origin of immigrant students, which prevented examining heterogeneity among immigrant students within countries.[6] Using data that have detailed

[6] PISA conducted another round of survey in 2003 and it did collect information on countries of origin for some countries (see OECD, 2004). But among 11 countries analyzed in this study, students in France, Sweden, and the United States were not asked of countries of origin. The United Kingdom did not meet the international standards for response rates. Therefore, the results for the United Kingdom in PISA 2003 were not reported. Furthermore, even for those countries where the countries of origin were collected, it is practically difficult to examine differences among immigrant students by countries of origin because of the modest sample sizes in PISA 2003. Moreover, because of its focus on mathematics literacy, only a small proportion of students had reading scores in PISA 2003. Considering these various reasons, we did not look at PISA 2003 for this study.

information on countries of origin, future research should pay serious attention to potential differences among immigrants within countries by their ethnicity and countries of origin.

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How Do School Regimes Tackle Ethnic Segregation: Some Insights Supported in PISA 2006

Miquel Àngel Alegre and Gerard Ferrer–Esteban

Introduction: The Salience of the School Composition Effect

The main purpose of this chapter is to examine how and to what extent do certain characteristics of educational systems influence school ethnic segregation across countries and regions. From our point of view, this object of analysis is relevant in itself. Nevertheless, its relevance is enhanced once we take into consideration that the social and ethnic composition of schools – and thus, the extent to which the distribution of different student groups among schools is even or uneven – contributes significantly to the explanation of inequalities amongst students' learning opportunities.

In general terms, since the publication of the Coleman report (1966), research has continued to corroborate the existence of significant effects of different school composition variables on pupils' outcomes (over and above the effects of the same variables at an individual level). Some studies focus on the influence of the socio-economic profile of classes and schools (Alegre & Arnett, 2007; Caldas & Bankston, 1997; Willms, 1986), others on the net effects attributable to their ethnic composition (Brown, 2001; Caldas & Bankston, 1998; Hanushek, Kain, & Rivkin, 2002), others on the aggregated and asymmetric impacts of the ability composition (prior achievement) in different school contexts (De Fraine, Van Damme, Van Landeghem, & Opdenakker, 2003; Grisay, 1996; Opdenakker & Van Damme, 2001), others testing the effects of more "atypical" variables such as cultural capital or "non-cognitive dispositions" (school attitudes and aspirations) (Nash, 2003). Risking over-simplification, main findings here show that students' academic results tend to increase when they attend schools with high shares of high SES students, high-ability students, native students and students holding high academic aspirations.

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More specifically, as ethnic segregation effects are concerned, recent studies have concluded that this pattern of school segregation has differential effects for immigrant students depending on their country of origin (Dronkers & Levels, 2007), resulting specific groups of immigrant students (once socio-economic background variables are controlled) even benefited of attending schools with higher proportion of students with the same immigrant background (for instance, those from northern and southern Europe, or from western, southern and eastern Asia). Less questionable and more widespread are the negative consequences on performance, both for native and immigrant pupils, associated with socio-economic school segregation (Dronkers & Robert, 2008; Heus, Dronkers, & Levels, 2008).

Partly as a reaction to the research emphasis on school composition, at the end of the 1980s the *School Effectiveness Research* (SER) paradigm emerged, its main message being that schools, through their own effort, "can make a difference" (and can therefore also be effective in reducing inequalities between their pupils' results) if they base their everyday work on the development of a whole set of pedagogic and organisational processes that have been shown to be positive in this sense (Reynolds, 2002; Teddlie & Reynolds, 2000), for example a climate of consensus, cohesion and cooperation among the teaching staff, the existence of an "orderly atmosphere" at the school, or the orientation of teaching practice towards academic success (Scheerens & Bosker, 1997).

Many criticisms have been made of the SER perspective and conclusions, most of them coming from researches that compare the net effects of both composition and process variables on students' outcomes. Indeed, while studies confirming that the effects of school composition on students' outcomes are far more significant than variables related to different pedagogic and organisational processes have gained support (De Fraine et al., 2003; Dumay & Dupriez, 2004), it has also been made clear that mutual interactions exist between the two sets of variables (Baker, Goesling, & Letendre, 2002; Dumay & Dupriez, 2007). Moreover, other qualitative studies have emphasised how the composition of schools (in socio-economic, ability or ethnic terms) widens or narrows the margin for the development of certain pedagogic and organisational processes and practices, as well as influencing the emergence of a more or less positive school climate (Lupton, 2005; Thrupp, 1999).

Theoretical Background: School Regimes and Education Equity

Institutional/Curricular Differentiation

Much of the literature preoccupied with the influence of the educational system on the dynamics of school segregation or on the possible accentuation of inequalities between pupils' and schools' performance has focused its attention on the different levels of curricular differentiation and stratification that these systems configure. For instance, various studies based on PISA (Programme for International

Student Assessment) data have noted a tendency for less comprehensive educational systems to increase those achievement inequalities that can be explained by the pupils' socio-economic and ethnic background (Alegre & Arnett, 2007; Duru-Bellat, Mons, & Suchaut, 2004; OECD, 2007). Reasonably, the basis of this process is the possibility of concentrating low ability students (with a high probability of also having a low socio-economic or immigrant status) in schools or academic tracks of less academic value. These sorting dynamics – be them explicit or not – not only limit the attainment profile of these students, but also enhance the possibility of the school composition effect accentuating achievement inequalities between schools.

However, the level of formal comprehensiveness (or differentiation) of the education system is not the only institutional factor that explains the existence of school situations with varying levels of segregation. There are other contextual factors conditioning into what schools students can be placed, for example the presence of private schools (more or less publicly funded), the level of diversification of the school network (in terms of ownership, religious orientations, whether they are selective or not, whether they are specialised or not, etc.) and the regulations framing parental choice and school choice procedures, etc. As they are tackled here, these factors end up drawing the tendencies of marketisation of educational systems.

The Logics of Quasi-Market School Developments

The Multi-Dimensional Nature of Quasi-Markets in Education

The dimensions that make up "market-oriented" school regimes are multiple, the existence of a diversified, differentiated and competitive institutional and educational supply; the existence of demand-based financing systems (money following the student); the presence of the private sector in the management, provision and evaluation of various schools; the existence of decentralised school management based on the internalisation of their operational benefits and costs, etc. At this point we should make clear that the orientation towards market principles, in education (as well as in the field of other public or semi-public services, such as health services), usually takes the form of "quasi-market" features. The hybrid trait of "quasi-markets" in education leads to a combination of both market and public control organisation procedures (Le Grand & Barlett, 1993). As Vandenberghe (1999) points out

> Quasi-markets form a subtle combination of the public funding principle – and the bureaucratic controls that inevitably go with it – and the marked-oriented, competition-driven approach of education. Both administrators and clients have the potential to exert some control over schools (1999, p. 273).

In fact, there are different paths that can lead school regimes to a "quasi-market" articulation. Three of these basic routes are the funding of private schools, the development of school voucher programmes and diversification of the public school supply, which we describe in detail here.

Funding private schools. This policy usually implies that, in return for it, private schools must meet the official standards and curriculum guidelines that they do not charge students for tuition fees (at least during the period of compulsory education) and that they do not implement selective admission processes based on students' social background, on ideological convictions or on prior achievement. This type of policy is common in countries where the private sector has an historical presence in the educational supply side, such as the Netherlands, Belgium, Ireland or Spain.[1] In these countries, the notion of "freedom of education" has been historically understood as both the freedom of institutions and individuals to establish non-state schools according to their own philosophical, ideological or religious values, and the freedom of parents to choose amongst public and private schools. In most of these cases, such a statement has been seen as a way in which to reconcile the demand of the Catholic and Orthodox Protestant Churches to preserve its autonomy in the field of education, in a school system that positions the freedom of school choice as one of the basic guarantees for promoting the principles of non-discrimination and democratisation in education (Wolf & Macedo, 2004).

Developing school vouchers programmes. In general terms, this policy aims to extend the opportunities for families to enrol their children at a private school. A number of school vouchers schemes exist, they can be targeted (conditional on family income) or universal; they can be conditional on school performance or not; they can work as a partial reimbursement system or as a fixed payment; they can include various expenditures (tuition, transport, meals, textbooks...) to a greater or lesser extent; they can cover public school expenses or just private schools fees; etc. In any case, it is worth noting that the funding strategy that underlies the concept of directly funding households in order to expand families' margins of school choice implies that public authorities lose control over school admission procedures. Various targeted school voucher schemes have been implemented in a number of states of the United States since the late 1980s (with key programmes being funded in Milwaukee, Cleveland and Florida). National-scale programmes are available in other countries, including universal schemes (introduced in Chile in 1980, and in Sweden and Denmark in the early 1990s), or targeted programmes (in Colombia in 1980 and in New Zealand in 1996). More recently, between 2001 and 2003, nine Italian regions have introduced a targeted voucher to reduce educational expenditures.[2] It goes beyond the scope of this chapter to review the available literature that has described these programmes or tried to assess their impacts (Brunello & Checchi, 2005; Hoxby, 2004; Ladd, 2002; Tooley, 2002). Let us just briefly note that

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[1] General conditions are established here so private schools can be subsided. Amongst others: compliance with language laws, adoption of an approved grade structure, having the required number of pupils and adequate facilities and school equipment, following the curricular guidelines set by the Government for all schools and accepting state inspection to ensure that all other requirements are met.

[2] Eight of these regions include expenditures from primary to upper-secondary education (Piedmont, Liguria, Lombardy, Veneto, Friuli Veneto Giulia, Emilia Romagna, Puglia and Sicily); one of them, Tuscany, only covers the upper-secondary education period.

there are serious concerns over the extent to which this policy has accomplished its main objective of increasing the overall "productivity" of the system by enhancing competition between schools (for students).

Diversifying the publicly maintained school supply. This strategy, which aims to open up the choice of different schools available to families, not only affects the extension of possible educational programmes that can be followed, but increases the number of different types of educational institutions offering such programmes. Educational reforms driven by the Labour Party since 1997 in England and Wales are often mentioned when assessing the process and impacts of such a strategy. The School Standards and Frameworks Act 1998 structured the school supply on the basis of four different types of maintained schools: Community schools (former "county schools"/LMS schools), set up, owned and fully funded by Local Education Authorities (LEA), who are also responsible for their admission procedures and employing their staff; Foundation schools (with a few exceptions, former "grant-maintained schools"), funded by LEAs, but owned by founding bodies or trustees that act as their admission authority and staff employer; voluntary controlled schools that mostly belong to the Church of England, but highly dependent on LEAs (funding, staffing and admission procedures); voluntary aided schools, owned either by school trustees or by founding bodies (both from Catholic Church and Church of England) who have a significant degree of independence from their LEA. Crossing these different categories of maintained schools, in secondary education there is still a considerable number of selective "grammar" schools, and the number of "specialist schools" has witnessed significant annual increases since they were first introduced in 1994.[3] Beyond the publicly maintained sector, in England and Wales there is a firm and internally diverse sector of independent schools, where new types of institutional features have begun to appear in the main cities (for example Academies, some of which were formerly City Technology Colleges).

Parental Choice, School Choice and School Segregation

Indeed, one of the main forces behind the tendency of a significant number of western countries towards the introduction of quasi-market criteria in the configuration of their public services (which include education) can be found in the fostering of a greater freedom of choice in terms of the type and profile of service to be received. In relation to the issues of school choice/assignment, quasi-market (or open enrolment) models are based on the premise of self-regulation as they depend on the balance between supply and demand for school places. In short, families compete against each other to enrol their children in an open market of possible schools,

[3] The Specialist Schools Programme helps schools, in partnership with private sector sponsors and supported by additional Government funding, to establish distinctive identities through their chosen specialisations. Any maintained secondary school in England can apply for specialist status in 1 or 2 of the 10 specialisations: arts, business and enterprise, engineering, humanities, languages, mathematics and computing, music, science, sports and technology. In 2007 around 85% of maintained secondary schools are in the specialist programme.

which, in turn, compete with each other to achieve the highest scores for academic excellence (something which, depending on the context, may lead to greater opportunities for public financing and/or private sponsorship) and to enrol those students that give them more opportunities to maintain or improve on these standards.

As has been confirmed by a number of quantitative and qualitative studies carried out in various countries and contexts (Ball, 2003; Bulkley & Fisler, 2003; Gewirtz, Ball, & Bowe, 1995; Gordon, 2003; McEwan & Carnoy, 2000; Waslander & Thrupp, 1995; West, Hind, & Pennell, 2004; Willms & Echols, 1992), this model tends to enhance the dynamics of school socio-economic and ethnic segregation. The schools in greatest demand quickly run out of places to offer, while those situated further down the ranking of excellence (and which generally accommodate the more socio-economically vulnerable or minority pupils) still have a large number of free places that are taken up by pupils that may not have satisfied the formal or informal admission criteria of the highly ranked schools, those that processed their enrolments too late or do not have the cultural capital required to be sufficiently competitive in the school selection market. Thus, in a market driven by student funding and open enrolment schemes, schools that both lose pupil numbers and gain – as a cause and as a consequence of the latter – greater proportions of disadvantaged students tend to fall into what Gorard et al. call “spirals of decline” (2003, p. 25). In other words, this “vicious circle” represents the result of the school social and ethnic segregation dynamics that can be enhanced by certain market-oriented policies of choice.

Multiple and diverse factors can explain the relation between market-oriented educational policies and processes of school social and ethnic segregation. First, in the frame of quasi-market configurations there are a considerable proportion of schools that act as their own student admission authority. Within some general legal constraints (e.g. schools cannot refuse to enrol a student on the basis of social, sexual, or racial arguments), these schools have the autonomy to set up their own admission criteria, which are usually applied in the event of oversubscription. Whether this autonomy is used for cream-skimming or not depends on the specific contents of such criteria. However, it is undeniable that this responsibility gives schools the possibility of deploying practices that tend to exclude those students that might be seen as “harder to teach”, or those who seem to give the school less chance to maintain or increase its average achievement level (Bowe, Ball, & Gewirtz, 1994; Lauder & Hughes, 1999; Miron & Nelson, 2002; West, 2006; Whitty, 1997). For instance, Gorard et al. (2003), in their analyses of the evolution of the segregation indices from 1989 to 2001 in different English and Welsh local authorities, reach the conclusion that schools that are selective, that are their own admissions authorities, or that are specialist, tend to enrol a higher proportion of advantaged students than the rest of schools, therefore increasing the level of school social and ethnic segregation in the local authority where they are placed. Jenkins, Micklewright, and Schnepf (2008) reach a similar conclusion when comparing the level of school social segregation demonstrated in different western countries. Despite the limitation of their strategy of using the PISA variables to account for measures of “school choice” and “parental choice”, their results suggest that cross-country differences in segregation are significantly associated with the prevalence of the selection of pupils by schools, while differences in parental choice do not appear to be strongly associated with differences in levels of social segregation.

Second, a number of studies have shown that middle-class native families tend to find themselves in a position with more opportunities to benefit not only from open choice schemes, but even when the margin for parental choice is formally constraint by public regulation (Ball, 2003; Bernal, 2007; Maloutas, 2007; Noreisch, 2007; Raveaud & Van Zanten, 2007). Factors such as a higher level of social and cultural capital, of strategic key competences, or of institutional relation skills, and more access to "contrasted" information, together with an economic position that facilitates the payment of transport costs or other fees resulting from certain school choices, may help to explain the reasons why

> (. . .) the middle class are adept at taking up and making the most of the opportunities of advantage that policies present to them. (. . .) Market rules of exclusion offer possibilities for strategic action which many middle-class families are very willing and very able to take up (Ball, 2003, pp. 26–27).

Third, schools within a quasi-market driven regime elaborate their own strategies to position themselves in line with the expectations and interest of the families and students they aim to attract. In a process of strategic interaction with other school actors and clients, they try to define a socio-educational and curricular project that can be attractive for some, as well as unsuitable for others. The notion of "educational niche" describes this phenomenon well, referring to a strategy that simultaneously seeks a specific position in a segment of the market (positional dimension) and constructs a particular "school identity or culture" (cultural dimension) (Dupriez & Cornet, 2005, p. 125). In this respect, a bidirectional active process of choice operates: families seek certain schools, and schools seek certain families.

Public Regulation of School Access

At the other end of the continuum we find school regimes rooted in public mechanisms of control and intervention. As regards the regulation of school choice and school access, here there is a wide range of possible measures: from the application of quota policies (reservation of places for pupils with learning difficulties or immigrant status, for instance) to the implementation of common prioritisation admission criteria for all public and private dependent schools (the most common being proximity to the pupil's home, the presence of siblings already enrolled at the chosen school, links between primary and secondary schools, the prioritisation of pupils in underprivileged socio-economic situations, or that have chronic illnesses, etc).

A number of these policies have not been exempt from criticism, regarding both their ideological assumptions and their real impacts. For instance, measures that focus on the school (re)distribution of disadvantaged students have been questioned not only because of their "liberal biases" or for concentrating their intervention on a specific segment of the school population (which is pushed aside from its social environment of reference), but because they often fail to correct the overall level of school social and ethnic composition.

Also the implementation of school catchment areas has been subject to controversy.[4] It is worth noting that this type of regulation has been generically situated as the "natural" opposite to the principles of open enrolment and quasi-market procedures. From this standpoint, advocates of these principles can reasonably argue that

> Markets, by reducing bureaucratic rules and procedures (such as catchment areas) enable families and individuals to make choices previously not open to them, including seeking a better quality of service elsewhere. The eradication of catchment areas, for example, may open up schools to families who were previously denied admission to what are locally thought to be "good schools" and/or well-resourced schools (Gorard et al., 2003, p. 15).

Although the delimitation of school catchment areas is not formally a targeted policy (it affects all students living in different zones), in practice, school zones can contribute to the reproduction of school segregation as they overlap with social and ethnic residential segregation (Gorard et al., 2003; Hoxby, 2000). In other words, enrolment areas are likely to be inequitable – and so, are likely to have inequitable impacts – given residential segregation. Nevertheless, it has to be made clear that these conclusions consider the incidence of just one of the many possible modalities of zonification, namely that which assigns each school to its immediate geographical catchment area. By way of contrast, other studies find that the levels of school ethnic segregation are likely to be reduced where school district fragmentation is lower (Reardon, 2008); where catchment areas are drawn to be internally diverse (socio-economically and ethnically) and to function as enrolment areas for more than one public school and more than one private-dependent school (Benito & Gonzàlez, 2007).

Most of the countries that still use student catchment areas as their main guideline for student allocation have progressively tended to make its design and rules of implementation more flexible (Alegre & Arnett, 2007). This would be the case of Scotland, Finland or Spain (to cite education systems included in our analysis). In recent years,[5] the public regulation of these countries has permitted families to opt for publicly maintained schools that are outside their area of residence, and even those in another local authority.

In Scotland and Finland, pupils are allocated "by default" to their nearby school. Families that opt for an alternative school have to actively apply for it (filling in a specific "placing request") and local authorities have the duty to grant this request when possible (depending on the availability of school places, and maintaining priority for students living in each school catchment area). This standard procedure,

[4] According to the PISA data, in OECD countries (on average) 47% of students are enrolled at schools where the principal reported that the fact of living in a particular area was a "prerequisite" or was given "high priority" for admittance to the school (OECD, 2007).

[5] In Scotland since the Education Act of 1981 came into force; in Finland since the introduction of educational legislation in 1999 (although in the larger Finnish cities the openness of zoning began in 1994); in Spain since 1985 (when the LODE was approved).

together with the comprehensive structure of both school regimes, helps to explain the relatively low numbers of “active choosers” in both countries.

In Spain, the zoning criteria are only displayed to rank students’ applications when they are applying to oversubscribed schools. More specifically, it serves to give priority to students that have marked their reference school as their first choice. The whole process of school allocation-admission is controlled by the local authorities. In practice, such a use of catchment areas, which is not a forced recruitment procedure, basically has a “deterrent effect”: by applying first to your local school of reference you avoid the risk of being allocated to the schools that still have vacant places at the end of the registration period (these are “less popular” schools).

To sum up, there is a wide and diverse range of possible components underpinning what we call here “school regimes”. Some of these factors concern the basic articulation (more or less comprehensive) of the educational career; others refer to the configuration (more or less “privatized”, more or less diversified, more or less subjected to public control) of the school networks offering these programmes; and last but not least, we find different scenarios framing parental choice and school admissions procedures. This chapter is concerned with a list of these contextual variables (see below) and the extent to which they affect school ethnic segregation across countries and regions.

Research Questions

This chapter aims to answer the following question: how and to what extent do characteristics of different school regimes influence school ethnic segregation? Or more specifically: does the level of curricular/institutional differentiation play a significant role in explaining the levels of school ethnic segregation that exist across countries and regions?; how and to what extent does the specific configuration of school networks and school processes contribute to explaining these levels of segregation? In accounting for these issues, we take as our point of departure the hypothesis that school regimes based on more differentiated curricular frameworks and on clear market-oriented school networks and processes will tend to show higher levels of school ethnic segregation than school regimes with more comprehensive curricular frameworks within which school networks and processes are more publicly controlled.

Methodology

Data and Sample

Our analysis considers data for 30 educational systems. Most of them correspond to national units (24 countries) while a few of them capture sub-national school features (6 regions). This selection attempts to account for the reality of "school regimes" with high levels of autonomy (even if they correspond to political sub-national units) as regards to the macro-variables we take into consideration. Whatever the case, we are dealing here with rich western countries and regions belonging to the OECD.

The main source of the information used to construct the variables of our analyses is the PISA 2006 database. As described below, we use PISA data to account for measures of students' and schools' ethnic background, as well as for indicators of schools' management and key proceedings.[6] As for the case of sub-national units, PISA categorises two types of regional units: "adjudicated regions" (where data adherence to the PISA sampling standards and international comparability was internationally adjudicated), and "non-adjudicated regions" (where data adherence to the PISA sampling standards at sub-national levels was assessed by the countries concerned). Two of our sub-national cases (Scotland and Belgium-Flemish Community) are considered "adjudicated regions", while the other four (Belgium-French Community, UK-England, UK-Northern Ireland and UK-Wales) are "non-adjudicated regions".

Variables, Measures and Statistical Procedures

As exposed before, whereas ethnic school segregation seems to have differential effects for depending on their country of origin, socio-economic school segregation has negative effects for immigrant students regardless of their origin (Dronkers & Levels, 2007). On the basis of this, our dependent variable accounts for the extent to which immigrant students are more likely than native students to attend schools with a more disadvantaged socio-economic intake. More specifically, the dependent variable is the ratio between the proportion of immigrant students (considering both first- and second-generation students) attending low ESCS[7] schools and the proportion of native students enrolled at schools of the same kind ("immig_comp"). We named this measure "ethnic segregation ratio". As low ESCS schools we consider those schools which enrolled at least a 60% of students placed at the lower ESCS tercile.

As independent variables we take into account the contextual macro-characteristics that form the basis of what we refer to as school regimes (Table 3). Our notion of "school regime" relies on two core components: the level of differentiation or stratification in the educational career, and the market configuration of the school network. As regards the first component, we consider two variables whose

[6] See OECD (2007) for a description of the PISA 2006 programme, as well as for a description of the national and sub-national sample numbers.

[7] The PISA ESCS index is composed of individual measures for parental occupational status, family level of education, and home possessions. See the PISA 2003 technical report (OECD, 2005, p. 316) for a detail explanation of its construction.

effects on student achievement inequalities have already been demonstrated in a number of studies: (1) the age of first selection in the educational career ("firstsel"); (2) the number of tracks available to 15-years olds ("tracks15").[8]

With regard to the second component of school regimes, we account for the following variables: the percentage of students attending private dependent schools ("priv_dep") and private independent schools ("priv_indep");[9] the percentage of students attending schools not subject to public control as regards the process of approving student admission ("sch_choice"); the percentage of students attending schools which compete with other schools for the same students ("sch_compet"); the percentage of students attending schools where procedures of student admission take students' academic report as a prerequisite or give it high priority ("sch_select").

Resulting from the study of specific national and regional regulations and policy statements, we include an independent variable aiming to describe the general frame or model of parental choice among public secondary schools deployed in each country or region. This variable ("choice_mod") consists of four categories: (1) Model of "forced recruitment areas"; (2) Model of "unforced assignment areas"; (3) Model of "restricted choice"; (4) Model of "open choice". These categories are described in Box 1 of the Appendix.

In order to assess how and to what extent school regimes variables contribute to explaining the levels of school ethnic segregation across countries and regions included, the statistical procedure carried out consists of the operation of multiple linear regressions, using different methods for adjusting the models (stepwise, backward and forward). The multiple linear regression formula is expressed as follows:

$$Y_i = \alpha + \beta_1 X_{2i} + \ldots + \beta_k X_{ks} + \varepsilon_i,$$

where Y is the outcome variable, X_k refers to the explanatory variables, α is the intercept, β_k is the regression coefficient for the variable k and ε accounts for the residual.

We should here introduce a clarification. In the interaction analysis presented below (Table 1) a variable of school social segregation is accounted for. By doing so, we aim at assessing to what extent is social segregation correlated with all other variables included in the analysis, including school ethnic segregation. Results are described in the following section. Nonetheless, such variable of social segregation is not added in regression models. The reason why we have taken this option lies on two main arguments. The first one deals with the possibility of

[8] Tracks are defined here as parallel educational itineraries that divide students into different school settings (not necessarily into different institutions) and that lead to different credentials with distinct academic value.

[9] Private dependent schools are here considered as schools which are privately managed but receive public funding, while private independent schools are privately managed and not publicly funded.

conceiving

school social segregation as independent variable; the second argument addresses the option of considering this same variable as dependent variable, next to school ethnic segregation. With regard to the first, we should place emphasis on the argumentative line on the basis of this paper. Essentially, we aim at describing institutional effects on a specific type of school segregation, an argument which goes beyond the interactions existing between social and ethnic segregation, or even between social segregation and other independent institutional variables. As concerns the eventuality of placing social segregation as dependent variable, one could argue that ethnic segregation exists because social segregation exists, or even more, that both segregation processes exist above all in high differentiated, selective and market-oriented school regimes because selection by ability exists. All this can be true, but it does not question the option of focusing on institutional effects on ethnic segregation. At the end of the day, we are not trying to prove that specific school regimes, or the schools themselves, segregate on the basis of ethnic background. What we are trying to confirm is that, within specific school systems, immigrants are more likely to end up being segregated than native students, existing multiple possible explanations for that.

Whatever the case, we keep social segregation variable in the correlation analysis, which can give an interesting clue to uncover significant interactions existing between social school segregation and ethnic segregation, and between social segregation and institutional independent variables. In order to account for the level of school social segregation that exists in each of the countries and regions under consideration we use the Hutchens index, a square root index based on the dissimilarity index parameters (Hutchens, 2001, 2004).[10] It can be expressed by the following formula:

$$H = \sum_{i=1}^{S} \left| \left(\frac{p_i}{P} \right) - \sqrt{\frac{p_i}{P} \frac{r_i}{R}} \right|.$$

Here, p_i and r_i are, respectively, the number of pupils in the selected group and the rest of pupils in school i. P and R are the total number of students in each group (selected group and the rest of pupils) in all the schools considered in the analysis (for our purpose, the total number of schools in each educational system). Possible values range from 0 (when in every school the proportion of the selected group of students is exactly the same as its total proportion at a regional level) to 1 (maximum level of segregation). More specifically, we use the Hutchens index to assess the evenness (and unevenness) of the distribution between schools of students in the lower ESCS tercile.

[10] For an interesting discussion of the use of school segregation indices, see Allen and Vignoles (2007).

Results

School Regimes and School Ethnic Segregation: An Overview

Before assessing how and to what extent certain features of school regimes contribute to explaining measures of school ethnic segregation, we first show a general overview of such measures across the countries and regions under consideration.

As shown in Fig. 1, there is a first set of school regimes showing ratios of school ethnic segregation lower than 1. These are: Poland, Canada, Australia, Iceland, Portugal, New Zealand, Finland, Norway and UK-Wales. In these cases, immigrant students are less likely than native students to attend socio-economically disadvantaged schools. There is no doubt of the diversity these countries represent in terms of immigration realities and policies. For instance, while Scandinavian countries together with Wales and Poland have low shares of immigrant students amongst the total school population, other countries such as Canada, Australia and New Zealand, although having significant proportions of students with an immigrant

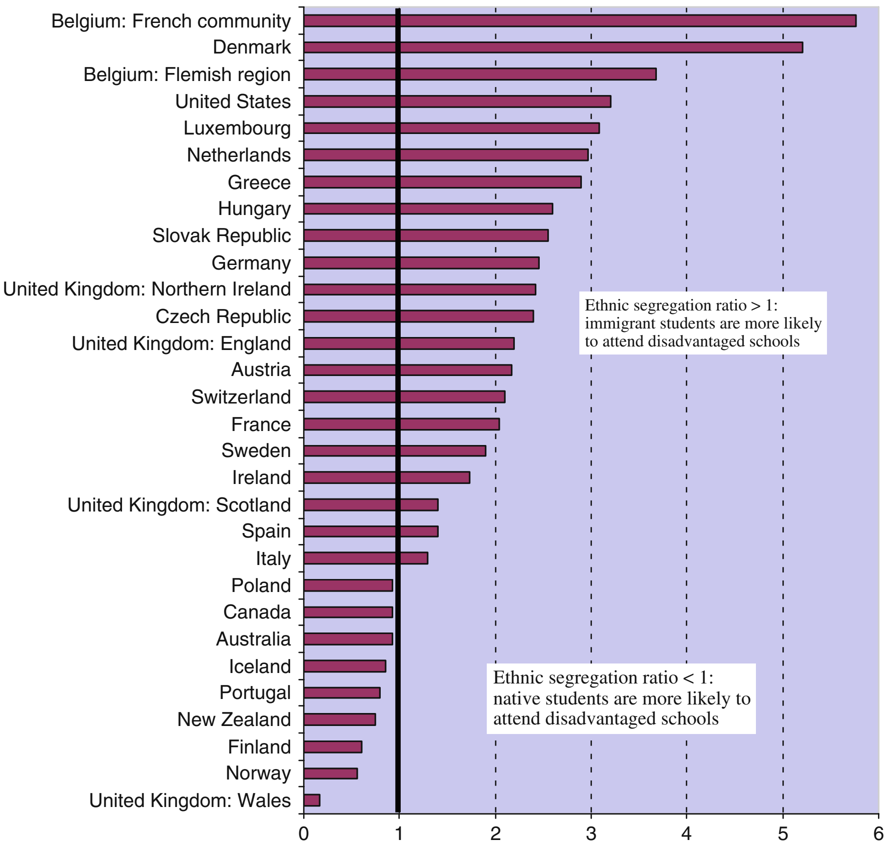

Fig. 1 Ethinic segregation indices across countries and regions

background, have been implementing immigration policies favouring the better qualified. Whatever the case, it is noteworthy that all the countries in this group show higher levels of school comprehensiveness.

At the other end of the spectrum, we find school regimes characterised by considerable high ratios of ethnic segregation. This is particularly the case of Belgium-French community, Denmark, Belgium-Flemish community, United States, Luxembourg, Netherlands and Greece. In such countries the percentage of immigrant students attending disadvantaged schools is at least three times higher than the percentage of native students attending the same schools. What should be pointed out here is that, besides school regimes highly stratified such as Belgium (Flemish and French communities), Luxembourg and Netherlands, we find in this same group countries whose school system is clearly comprehensive (such as Denmark or the United States). Beyond the significant differences existing among these countries and regions with regard to migration realities and histories, this latter evidence points to the discussion of the weight school differentiation has when it comes to assess school regime effects on school ethnic segregation.

The rest of school regimes under consideration are placed in between both sets of countries. This draws a quite heterogeneous group of countries and regions, in terms both of migration contexts and school general settings. Also diverse are the ratios of ethnic segregation these school regimes present, ranging from the case of Italy (1.3), Spain or Scotland (both 1.4), to the cases of Slovak Republic and Hungary (2.55 and 2.6, respectively).

School Regimes and School Ethnic Segregation: Correlations

Before proceeding to regression analyses, a correlation analysis has been carried out in order to confirm the association between school regimes factors and school ethnic segregation ratios across countries and regions, as well as to know the sense and strength of relationships between explanatory factors themselves.

As shown in Table 1, the age at which education systems operate their first selection into the educational career is the only contextual factor negatively correlated with ethnic segregation ratios (with an association variation of 31%). As expected, the number of school tracks available to 15-year olds is also correlated with ethnic segregation (association variation of 27%), since both early selection and the number of tracks available to 15-year olds are highly correlated. Other contextual factors considered as key school regime variables show statistically significant positive coefficients of correlation with measures of school concentration: students in private dependent schools (31%), students in schools competing with other schools (21%), students in schools not subject to public control as regards students admissions (45%), students in schools which consider students' academic records as an important criteria for approving admission (20%), and the model of parental choice among public secondary schools implemented in each country or region (16%). The only school regime factor not significantly correlated with ethnic segregation ratios is the proportion of students enrolled at private independent schools.

Table 1 School regimes' characteristics and ethnic segregation. Correlations

		(a) School social segregation	(b) First age of selection in the education system	(c) Number of school tracks available to 15 years olds	(d) Proportion of students in private dependent schools	(e) Proportion of students in private independent schools	(f) Proportion of students in schools competing for students	(g) Proportion of students in schools not subject to public control of admissions	(h) Proportion of students in schools with academic selection	(i) Process parental choice
1. School social segregation	Coef. corr.		–0.526**	0.433*	0.125	0.327	0.260	0.406*	0.435*	0.131
	p-value		0.003	0.017	0.512	0.078	0.166	0.026	0.018	0.491
2. First age of selection in the education system	Coef. corr.	–0.526**		–0.851**	–0.197	0.299	–0.137	–0.436*	–0.830**	–0.269
	p-value	0.003		0.000	0.298	0.108	0.469	0.016	0.000	0.151
3. Number of school tracks available to 15 years olds	Coef. corr.	0.433*	–0.851**		0.394*	–0.175	0.213	0.490**	0.645**	0.477**
	p-value	0.017	0.000		0.031	0.355	0.258	0.006	0.000	0.008
4. Proportion of students in private dependent schools	Coef. corr.	0.125	–0.197	0.394*		–0.012	0.385*	0.372*	0.192	0.427*
	p-value	0.512	0.298	0.031		0.949	0.036	0.043	0.318	0.019
5. Proportion of students in private independent schools	Coef. corr.	0.327	0.299	–0.175	–0.012		0.198	–0.111	–0.301	–0.049
	p-value	0.078	0.108	0.355	0.949		0.295	0.558	0.113	0.797
6. Proportion of students in schools competing for students	Coef. corr.	0.260	–0.137	0.213	0.385*	0.198		0.407*	0.154	0.559**
	p-value	0.166	0.469	0.258	0.036	0.295		0.026	0.424	0.001

Table 1 (continued)

		(a) School social segregation	(b) First age of selection in the education system	(c) Number of school tracks available to 15 years olds	(d) Proportion of students in private dependent schools	(e) Proportion of students in private independent schools	(f) Proportion of students in schools competing for students	(g) Proportion of students in schools not subject to public control of admissions	(h) Proportion of students in schools with academic selection	(i) Process parental choice
7. Proportion of students in schools not subject to public control of admissions	Coef. corr.	0.406*	–0.436*	0.490**	0.372*	–0.111	0.407*		0.447*	0.414*
	p-value	0.026	0.016	0.006	0.043	0.558	0.026		0.015	0.023
8. Proportion of students in schools with academic selection	Coef. corr.	0.435*	–0.830**	0.645**	0.192	–0.301	0.154	0.447*		0.280
	p-value	0.018	0.000	0.000	0.318	0.113	0.424	0.015		0.141
9. Process parental choice	Coef. corr.	0.131	–0.269	0.477**	0.427*	–0.049	0.559**	0.414*	0.280	
	p-value	0.491	0.151	0.008	0.019	0.797	0.001	0.023		0.141
School ethnic segregation	Coef. corr.	0.424*	–0.557**	0.516**	0.557**	–0.042	0.454*	0.671**	0.452*	0.402*
	p-value	0.020	0.001	0.004	0.001	0.825	0.012	0.000	0.014	0.028

**Values statistically significant at the 1% ($p < 0.01$)
*Values statistically significant at the 5% ($p < 0.05$)

We should point out a few notes on the way school social segregation correlates with the rest of variables. First, social segregation appears significantly (although not highly) positively associated with school ethnic segregation (association variation of 18%). Second, three institutional variables accounting for key school regime' factors maintain a significant correlation with school social segregation, an association which follow the same direction as for the case of ethnic segregation. This is the case of those variables which identify the level of institutional differentiation in the educational career – first age of selection (association variation of (28%), and number of tracks available to 15-year olds (19%) – and of those others regarding school admission/selection processes – proportion of students in schools not subject to public regulation of admissions (16%), and proportion of students in schools with academic selection (19%)). In contrast, all other school regime characteristics do not appear significantly correlated with school social segregation. All this seems to indicate that, indeed, school ethnic segregation and social segregation, although emerging as connected phenomena, have their own specificity and way of occurrence.

With regard to correlations between school regime factors, the variables which demonstrate a higher level of association are those referring to the institutional differentiation each educational system operates. Indeed, the first age of selection and the number of tracks available to 15-year olds are associated in 72% of their variation. Moreover, highly differentiated systems tend to have higher proportions of students at selective schools and at schools not subject to public regulation of students' admission. The number of school tracks offered to 15-year olds is positively associated with the proportion of students enrolled at schools not exposed to public control for admissions (association of 24%), with the proportion of students at schools that select students on the basis of their academic record (association of 42%), as well as with the general model of school choice applied in each country and region (23%). Complementary, the age of first selection in the educational career shows significant negative coefficients of correlation with the proportion of students at schools not affected by public regulation of student admission (19% of association) and at selective schools (69%).

Underpinning these correlations a positive association is found between considerable school responsibility for student admissions (not under public control) and the school practice of approving students' admission on the basis of their academic record (association of 20%). In other words, schools that have a considerable amount of autonomy in the process of student admissions seem to be more likely to apply selective practices on the basis of students' records. At the same time, the proportion of students at schools which are fully responsible for student admission is positively correlated with the proportion of students at schools competing with other schools for the same studentship (17%).

Finally, variables accounting for the national/regional level of parental choice – general model of parental choice and schools in competition with other schools – are highly correlated (31%). Both school choice variable show significant positive coefficients of correlation with the proportion of students at private dependent schools (18 and 15%, respectively)

School Regimes and School Ethnic Segregation: Regression Models

In this section, regression analysis models are operated in order to test how and to what extent school regime variables contribute to explain ethnic segregation ratios across countries and regions. More specifically, we account for the effect of those variables whose significant association with the dependent variable has been pointed out by the correlation analysis. These contextual variables are: first age of selection in the education system, proportion of students in private dependent schools, proportion of students in schools competing with other schools in the same area, proportion of students in schools not under public control for student admission and proportion of students in schools considering academic record in student admission (Table 2).

Model 1 account for the effect on ethnic segregation attributable to the first age of selection, and to the proportion of students enrolled in private dependent schools. The proportion of students at private independent schools is not included in this basic model as it shows no significant relationship with ethnic segregation ratios.

Results show that comprehensive systems tend to have lower levels of school segregation: an increase in the first age of selection in education systems is significantly related to a decrease in segregation values. On the other hand, this model shows that an increase in the proportion of students enrolled at private dependent schools is associated with an increase in the national/regional levels of ethnic segregation. Overall, the inclusion of these two variables – first age of selection in the

Table 2 School regimes' characteristics and ethnic segregation. Regression models

		Models			
		1	2	3	4
	Constant	5.117	3.880	1.751	–1.142
Explanatory variables: "School regimes"					
First age of selection in the education system	Coeff.	–0.248**	–0.240**	–0.171*	
	p-value	0.002	0.002	0.021	
% students in private dependent schools	Coeff.	0.026**	0.020*	0.017*	0.017*
	p-value	0.002	0.014	0.030	0.041
% students in schools competing for students	Coeff.		0.016	0.009	0.008
	p-value		0.086	0.283	0.376
% students in schools not subject to public control of admissions	Coeff.			0.023*	0.027*
	p-value			0.021	0.015
% students in schools with academic selection	Coeff.				0.010
	p-value				0.217
Explained variance (%)		48.3	52.2	60	53.4

**Values statistically significant at the 1% ($p < 0.01$)
*Values statistically significant at the 5% ($p < 0.05$)

education system, and the proportion of students in private dependent schools – contribute to explaining 48.3%, of the variance in ethnic segregation ratios across countries and regions.

When adding to the model the proportion of students in schools competing with other schools in the same area, no significant changes are observed with regard to the explanation of ethnic segregation ratios' variance (Model 2). Indeed, this variable loses its individual explanatory weight after accounting for the age of first selection or students in private dependent schools. In other words, at a national/regional level, whether students have more than one school competing for their enrolment, or not, does not influence national/regional levels of school ethnic segregation as the level of curricular differentiation and the presence of private dependent schools do.

In Model 3, the proportion of students in schools reporting not being subject to regulation control as regards the process of student admission is added. Resulting from the addition of this variable, a substantial increase (of 8 points) in the explanation of national/regional ratios of ethnic segregation is observed (60%). In other words, the patterns of the distribution of immigrant students seem to be clearly affected by the extent to which public authorities (regional/local or national) do – or do not – exert a considerable responsibility for approving students' admissions.

In Model 4 the proportion of students at schools that select students on the basis of their academic record is added replacing the variable of age of first selection. We proceed this way on the basis of the high correlation existing between both variables. When doing so, this new variable loses its individual significance, indicating that more than the extent to which schools report to be using students' record as a significant criteria for admission, what really matters for explaining disparities among national/regional ratios of school ethnic segregation is the extent to which schools are exposed to public regulation of student admission, or not, as well as the presence of private dependent schools.

To conclude, school regimes factors which show more significant effects on ethnic segregation across countries/regions are those related to their level of curricular differentiation, the presence of private dependent schools and the margin given to school choice. With regard to the latter, the most consistent factor in explaining segregation variance is the national/regional proportion of students at schools exerting a considerable responsibility for student admission.

Conclusions and Discussion

Effects of Institutional/Curricular Differentiation

With respect to the effects on ethnic segregation of the basic configuration of the academic career, our results complement the conclusions of those comparative studies showing that more stratified educational systems tend to generate more inequalities in achievement results obtained by native and immigrant students (OECD, 2007). Underpinning these conclusions, it has been also demonstrated that more stratified school systems tend to strengthen of the relation between individual socio-economic background and student performance; in contrast, although with critical exceptions, more comprehensive school systems tend to lower the weight of the social background as an explanatory factor of the variance in results obtained by students and schools (Alegre & Arnett, 2007; Duru-Bellat et al., 2004; OECD, 2007). In light of the fact that in a majority of countries a significant proportion of immigrant students not only have a low socio-economic status, but are more likely than native students to attend schools socio-economically disadvantaged, alongside the existing evidences for school composition effects, our findings would suggest that performance inequalities between immigrant and native students are partly due to the high levels of school social and ethnic segregation educational stratification tends to provoke. Of the variables used to capture the level of educational systems' institutional differentiation, one remains particularly significant in all of our models, the age of first selection in the educational career. This evidence confirms the hypothesis that school regimes based on early selection features generate higher levels of school ethnic segregation, basically profiting from the possibility of concentrating immigrant students in schools or academic tracks of less academic value.

This conclusion provides relevant insights for the policy debate centred on the equity and quality of school systems. Basic curricular configuration seems to be responsible for significant effects on school segregation (and thus on learning opportunities); and, as shown in other comparative studies, the extent to which students are selected early and sorted into different institutional tracks does not appear to be significantly associated with the national averages of student performance.

Effects of Public/Private Management

At this point, our results appear contradictory with comparative studies which conclude that, at a national level, a greater proportion of private schools is not significantly associated with larger socio-economic disparities in schooling outcomes (OECD, 2007), nor with school segregation measures of certain countries (Jenkins et al., 2008). In all probability these discrepancies are due to the distinction we operate between private dependent schools and private independent schools. This distinction allows us to reach findings which probably remain hidden when both types of private schools are grouped in the same category. In short, our analyses show no significant effects of the national/regional proportion of private independent schools on school ethnic segregation. In contrast, the national/regional proportion of private dependent schools always appears as a key factor when explaining school ethnic segregation: as this proportion increases, so does the national/regional level of school segregation.

Further analysis focused on the effects of private schools on student learning inequalities should account for the distinction between private dependent and independent schools, and examine in detail the sort of selection practices (formal and informal) that the two operate.

Effects of Parental Choice (Parents Choosing Schools)

One of the leitmotifs of contemporary educational reforms has been widening the margin of school choice available to families (Gewirtz et al., 1995; Le Grand & Barlett, 1993). Beyond the policy debate, however, it is worth pointing out that comparative educational research has not formulated conclusive arguments about the effects on education equity (and inequality) of various policies which aim to widen parental choice. Indeed, is not uncommon to find different studies reaching contradictory conclusions in this respect (Gorard et al., 2003).

As far as our analysis is concerned, it is important to note that the variables used to account for different levels of "parental choice" are inevitably limited. On the one hand, the use of the national/regional proportion of students at schools competing with other schools for the same studentship (from the PISA dataset) does not guarantee an analysis of a representative sample of schools with regard to this variable. On the other hand, the information gathered beyond the PISA dataset in order to categorise the general models of parental choice deployed in each country or region (forced/unforced assignment area, restricted choice or open choice) are unable to capture the diversity of local regulations and policies that are being implemented within each country and region.

Nevertheless, our results do allow us to suggest the existence of relevant tendencies. For instance, it is worth noting that the national/regional proportion of students at schools competing with other schools for the same students appears as a significant variable (positively associated with the level of school segregation) in a regression model that only combines it with the variable of age at first selection. However, once the proportion of students at private dependent schools is included, its significance is annulled. This suggests that the margin available for parental choice does not have relevant effects on school ethnic segregation after the characteristics of the basic configuration of the school network are controlled for. In short, our results do not support arguments which suggest that market oriented reforms will be accompanied by benefits in school equity, nor the opposite statement. An open choice model, although formally extending the range of school options available to families, does not in itself lead to greater heterogeneity across schools' ethnic composition; nor does it result in a more publicly regulated context of parental choice. Bearing in mind the necessity of approaching these results with caution, they seem to be in line with what Gorard et al. (2003) conclude in their study of school segregation in England and Wales: "choice policies do not appear to have either the full benefits their advocates had hoped or the dangers of segregation their opponents feared" (2003, p. 168).

Effects of School Choice (Schools "Selecting" Students)

By contrast, significant effects on segregation of the margin of autonomy schools have with regard to approving student admission have been shown. Here it is also necessary to be cautious. The variable, constructed from the PISA dataset and used to describe this margin of autonomy, takes into account the proportion of students in schools whose principals affirm not being under public control (neither by local/regional authorities, nor by national authorities) as regards the process of approving students' admission. Here, a representative sample of schools with regard to this variable is not assured.

Nonetheless, the effect of this variable appears solid and stable across all regression models: school regimes with a higher proportion of students at schools not subject to public regulation of students' admission tend to show higher levels of school ethnic segregation. Such an effect remains significant when the rest of the variables accounting for the basic configuration of the school network are controlled for, and this contributes considerably to explaining the variation in levels of school segregation measures.

It is worth highlighting that the variable used as a reference for school choice does not make any particular specification regarding which criteria for student admission is being applied by schools. At this point, we should turn to the discussion of the extent to which school selection practices specifically based on students' abilities (academic record) tend to increase school ethnic segregation. Indeed, there are a number of studies concluding the significance of such an effect (Jenkins et al., 2008; West et al., 2004). Our analysis corroborates these conclusions only in part.

We have taken as a reference variable the national/regional proportion of students at schools that give high consideration to student record when deciding on his/her admission. This variable is positively associated with national/regional levels of school segregation, as well as highly correlated with the level of stratification existing in the educational career. When the age of first selection is not included in the models, the proportion of students at schools which select by ability do not reduce the significance of the general level of responsibility for admission school regimes give to schools. This finding suggests that the very fact of schools being considerable responsible for student admission affects the distribution of less privileged pupils beyond the specific admittance criteria schools report to be applying.[11]

To sum up, it seems clear that, more than the margin given to families to select among different schools (parental choice), what fundamentally matters when it comes to explaining school segregation is the margin given to schools to intervene in student admission. When considered with regard to the policy debate, the implications of this conclusion are relevant, and have already been underlined in other studies (West, 2006): in order to generate the contextual conditions that could lead to an increase in ethnic heterogeneity within schools (and, consequently, to higher rates of equity in the academic outcomes obtained by students and schools), more public control of the student admission processes applied by schools with a high level of admission autonomy is needed.

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[11] Indeed, none of the possible selection criteria a school principal could claim to be using in the PISA questionnaire – "residence in a particular area", "student's academic record", recommendation of feeder schools', "parents' endorsements", "student's need or desire for a special programme", and "attendance of other family members at the school" – appear to be significantly associated with school segregation.

Appendix

Table 3 Explanatory variables: school regimes' factors

Institutional – curricular differentiation	
First age of selection in the education system	firstsel
Number of school tracks available to 15 years olds	tracks15
School management	
Proportion of students in private dependent schools	priv_dep
Proportion of students in private independent schools	priv_indep
Context of school choice	
Proportion of students in schools not subject to public control as regards the process of approving student admission	sch_choice
Proportion of students in schools considering academic record in admission	sch_select
Context of parental choice	
General model of parental choice among public secondary schools	choice_mod
Proportion of students in schools competing with other schools for students in the same area	sch_compet

Box 1 General models of parental choice (among public secondary schools)

(1) Model of *forced recruitment areas*, which includes those countries and regions whose local authorities oblige students to enrol at the public school that is located in their area of residence. The only way to avoid the assigned local school is to request a place in a private school that is not subject to such a regulation.
(2) Model of *unforced assignment areas*. As in the previous case, local authorities do establish the map of catchment areas corresponding to each public school. In the countries and regions that mainly follow this procedure, pupils are allocated "by default" to their local nearby school. However, families are permitted to opt for publicly maintained schools that are outside their area of residence, or even in another local authority.
(3) Model of *restricted choice*. Under these schemes families are given a wide margin of freedom to choose the public school to which they would like to send their children. In most cases, parents are asked to fill in an application form selecting their chosen schools in order of preference. The allocation criteria used by local admission authorities are implemented only in the case of

over-subscribed schools in order to give priority to the enrolment of those students who live in their catchment zone and who have placed these schools as their first choice.
(4) Model of *open choice*. In this case, families are free to choose any of the public schools in their local authority (or even beyond it). Here, no public regulations intervene to control the school choices in the hands of parents, nor the admission criteria to be implemented in the event of over-subscription.

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The Educational Attainment of Second Generation Immigrants from Different Countries of Origin in the EU Member-States

Jaap Dronkers and Fenella Fleischmann

Introduction

Immigrant integration has received lots of attention in social scientific research, but this has been concentrated on the "classical" immigration countries, most notably the United States. There, starting with the work of the Chicago School, a theory of assimilation developed according to which it was expected that immigrants would become more like natives over time socio-economically, spatially, socio-culturally and politically. This process of linear assimilation was perceived to occur over the life-course of first generation immigrants and reach near perfection in the second generation, thought to experience largely the same living conditions as their peers born of native parents. However, later waves of immigration from more diverse regions of origin led to the challenging of assimilation theory. Research among different ethnic groups in different urban settings in the US revealed that not all immigrant groups experience upward social mobility after arrival. While this still holds true for some immigrant groups, others were found to face downward assimilation into a socio-economic, but also racially or ethnically defined, underclass, while still other groups were neither incorporated into the middle-class nor into the underclass, instead remaining concentrated in ethnic niches or enclaves. The debate as to whether there is still a general trend of assimilation for all groups or whether there is a process of segmented assimilation at work is still ongoing in the United States (Alba & Nee, 1997; Perlmann & Waldinger, 1997; Portes & Rumbaut, 2001; Zhou, 1997).

In Europe, the debate about and research into the integration of immigrants is still much more recent, due to the fact that despite continuous population movements throughout the history of the continent and its shifting borders, most Western European countries have just started to acknowledge that they are currently immigration societies. Most southern European countries, on the other hand, have shifted

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from being primarily emigrant sending to immigrant receiving societies over the past 30 years. In addition, many European countries are characterised by strong regional divides, which sometimes go together with linguistic and/or ethnic cleavages within states, a factor that renders the integration of immigrants more complex since it is not always clear who the reference category for these newcomers is (Phalet & Kosic, 2005). Moreover, policy approaches to immigrant integration vary greatly between European societies which continue to define themselves as nation-states with heavy ethnic connotations. Germany, for instance, has only recently shifted its naturalisation policy from a *jus sanguinis* to a *jus solis* principle, thus hoping to improve the chances of a successful integration of second generation immigrants who, before the reform, were still legally considered non-nationals. France has followed the opposite approach with its policy of non-registration of ethnicity and its comparatively generous granting of citizenship to both foreign- and native-born populations (Brubaker, 1992). However, both countries and most of their fellow EU member-states are currently discussing, with the image of the 2005 youth riots in the French suburbs still fresh on their minds, whether, and if so, to what extent, the integration of immigrants has been successful in the past and how it can become more successful in the future.

In light of this public debate and the European Union's goal of defining a common immigration policy, there is a need for comparative research on the integration of immigrants across European societies in order to establish in which countries this integration has been most successful and to identify the policies or other macro-characteristics that enable such successful integration. To be more precise, we want to find out which characteristics, of both the countries of destination and the countries of origin, promote or hamper the integration of immigrants, taking into account their individual characteristics. In this study, we focus on the educational level of immigrants, thus limiting our scope to only one dimension of integration. We do this not only for practical reasons, but also in agreement with a number of scholars who have argued that the socio-economic integration of immigrants is the first step and a precondition for their spatial, socio-cultural and political integration (Geddes et al., 2004; Waldrauch, 2001). In European societies, educational attainment, in turn, is one of the most important predictors of further socio-economic integration, such as participation on the labour market and occupational status. We have analysed the latter dimensions of integration of male and female immigrants and have reported the results elsewhere (Fleischmann & Dronkers, 2007). With regard to educational attainment, we understand integration to be successful if there are no significant gaps between second generation immigrants and natives.

In addition to the differences in policies and other characteristics between the countries of destination, it is expected that the countries of origin also affect immigrants' socio-economic integration. As Kao and Thompson (2003) have argued, differences in religion and cultural values of immigrants lead to different evaluations of educational achievement, which can partly explain differential outcomes of immigrants coming from different regions of the world. Furthermore, the levels of expected and experienced discrimination in society differ between immigrant groups from different origins, which might partly be due to different levels of "visibility" of these immigrant groups. However, discrimination does not affect all immigrants in the same way: research into school performance in the US has found that expected discrimination has a discouraging effect on African-Americans (Ogbu, 1991), while providing an incentive for South-Asian Americans to perform even better (Sue & Okazaki, 1990).

While research on immigrant integration in Europe is still limited in comparison to studies conducted in the classical immigrant receiving societies, there are already numerous studies comparing the processes and outcomes of integration between European countries. However, many of them are limited either to a small number of countries of destination or to a small number of immigrant groups (for a recent example, see Böcker & Thränhardt, 2007). Others try to incorporate a larger number of countries of destination, either by analysing more countries separately (e.g. Heath & Cheung, 2007) or by comparing national statistics (e.g. Werner, 2003). There are several problems with this type of research. Obviously, separate analyses of different countries of destination do not allow for statistical testing across countries, so that the comparison remains on a more abstract, theoretical level. Moreover, the definition of who is an immigrant (and, to make things even more complicated, also the terminology, *cf.* Entzinger, 2006) differs between countries, leaving some doubts as to the usefulness of comparing national statistical data from these various countries. A more serious problem, however, is that comparisons taking into account only one immigrant group in multiple destinations or multiple immigrant groups in one destination do not allow one to disentangle the effects of the country of destination and those of the country of origin on the integration of immigrants. This is a serious drawback, since the composition of immigrant populations varies greatly between European countries. In contrast to the cross-classified multilevel analysis that we perform, a single comparative approach or a study including only a small number of countries of destination cannot establish whether these differential outcomes are due to factors at the individual level or due to macro-characteristics of the country of destination or the country of origin.

Only few studies using such a double comparative multilevel approach with educational outcomes as dependent variable have been published (Levels & Dronkers, 2008; Levels, Dronkers, & Kraaykamp, 2008). Using the PISA 2003 data, these studies made clear that both the sending and the receiving contexts affect immigrants' educational achievement in the countries of destination, and they identified a number of macro-characteristics of both the countries of origin and the countries of destination, such as GDP per capita and religious composition, which affect pupils' achievement. Ethnic school segregation was also a relevant factor, although less important than socio-economic school segregation, and it did not explain the effect of country of origin. A disadvantage of these studies is that only information about test scores of 15-year-old pupils was available, while the educational level attained by these pupils could not be assessed.

The second wave of the European Social Survey allows us to analyse the highest educational level achieved by immigrants, and, in addition, it provides information about the country of birth of the respondent and of both of his or her parents, thus allowing second generations of immigrants to be distinguished and the country of origin to be specified in each case.[1] In the following section, we elaborate on the micro-characteristics of individual immigrants and the macro-characteristics of the countries of origin and destination that we take into account in analysing educational level of second generation immigrants across 13 EU countries.

Data and Measures

We use the second wave of the European Social Survey (Jowell & The Central Co-Ordinating Team, 2005) which contains data, gathered in 2004 and 2005, from more than 45,000 respondents in 23 countries. The main aim of our chapter is to assess the impact of a number of social policies of destination countries on the educational attainment of immigrants. We measure the inclusiveness of social policies with the European Civic Citizenship and Inclusion Index and, unfortunately, at the time of writing this index was only available for the EU-15 countries. Since data from Italy were not yet available when we performed the analysis, we could only include 14 countries of destination. This number further decreased to 13 because we excluded data from Finland given the low number of immigrant respondents in this country.[2] Furthermore, we selected only respondents between the ages of 25 and 60 since these respondents will most likely have completed their education. Our final sample of 14,068 respondents contains 1,039 second immigrants (504 male and 535 female) from 132 different countries of origin.[3]

[1] The first wave of the European Social Survey did not allow for the precise coding of the countries of origin of the second generation of immigrants.

[2] There are only 25 respondents in the Finnish sample who can be properly classified as first or second generation immigrants and can be assigned a country of origin. However, the refusal rate of the question in which country the respondent was born is significantly higher in Finland than in other survey countries, resulting in a large number of persons for whom we do not know whether they are immigrants or natives. Given the limited information about these respondents, we decided to exclude them from the sample which lowered the number of immigrants in Finland to an unacceptably small number.

[3] We have conducted the same analyses together with first immigrant generation (Fleischmann & Dronkers, 2007). However, in most cases this first generation received their education in their countries of origin, which makes it misleading to estimate the effects of the country of destination on their educational level, because these effects rather reflect the selectivity of the migration towards these countries of destination and not the effects of the educational systems of these destination countries. We also tried to distinguish a so-called 1.5-generation, which consists of individuals who were born outside the country of destination, but who migrated at such a young age that they received most or all of their education in the destination country. A problem in the construction of this category is that the European Social Survey does not provide exact information about the years since migration, since this is measured categorically. Using the maximum of the categories in the survey (which systematically underestimates the age at migration) and selecting all immigrants who had migrated before the age of 14 based on this calculation resulted in a share of 10.8% of all immigrants constituting the 1.5 generation. In light of this small share despite very generous definition, we refrained from analysing this group of immigrants separately and included them in the deleted first generation.

We classified second generation respondents as immigrants if one or both parents were born outside the country of destination and the respondent is born in the survey country. Every respondent who is born outside the country of destination is classified as a first generation immigrant and thus not considered in this analysis. However, respondents who were born abroad but to two native parents are not classified as immigrants because we assume that these children of expats will be more like the native population than children of mixed marriages and children of first generation immigrants. In all other cases we classified respondents as native if both parents were born inside the survey country and the respondent is also born in the survey country. For immigrants, we used the following decision rules to establish the country of origin: if both parents were born in the same country, this country was classified as the country of origin. If both parents were born in different countries, we looked at the language spoken at home. If this corresponded to any of the two possible countries, this country was used. If not, we used the country of birth of the mother, arguing that "motherhood is a fact, whereas fatherhood is an opinion". With this procedure, we can distinguish 88 countries of origin, but many of them contain only few cases. We therefore aggregated countries into regions of origin using a slightly adapted version of the United Nations classification of geographical regions (United Nations Statistical Office, 2007). In the end, we distinguish 27 countries of origin and an additional 21 regions of origin, varying in numbers of immigrants from 1 (French Speaking Caribbean) to 141 (Germany). We maintained for comparison reasons the same categorisation as in Fleischmann and Dronkers (2007), but the selection of only second generation immigrants decreases the numbers of migrants strongly. Tables 1 and 2, which provide information about the dependent and independent variables per country/region of origin, list these countries and regions.

On the one hand, our measurement of immigrant status, which is based on information about the country of birth of respondents and of both of their parents, is much more accurate than taking only nationality into account. This is problematic especially for the second generation due to differences in access to citizenship between European countries. On the other hand, our classification gives rise to a number of problems, which can be solved neither with the data sets used here, nor with other available cross-national data. A first definitional problem is related to changing national boundaries and is particularly relevant to Europe. Due to the changes in the political frontiers after 1945 (the annexation by Poland of some formerly German territory; the extension of Russia at the expense of Polish territory) and due to the subsequent displacement of large populations, an unknown number of "indigenous" persons are measured as being born outside their country, e.g. a German respondent or his/her parents born in Königsberg (East Prussia) and now living in Germany or a Polish respondent or his/her parents born in Lvov (Ukraine) and now living in Poland. One can argue that by failing to make the distinction between genuine migrants and border changes, we overestimate the number of better-integrated immigrants. At the same time, this failure highlights a conceptual problem in defining an immigrant: for how many generations must a Polish family live in Germany before its members are no longer considered Polish? This issue also extends to the

Table 1 The average educational level of natives and second generation immigrants per country of destination and country of origin

		Country of destination	AUS	BEL	DEN	FR	GER	GR	IRE	LUX	NL	POR	ESP	SW	UK	Total
Natives	Country of origin	*N*	1,155	883	854	903	1,422	1,174	1,277	486	1,029	1,066	910	968	904	13,030
		Mean	2.36	3.06	3.19	2.69	3.22	2.51	2.61	2.73	2.91	1.64	2.30	2.80	2.73	2.67
Immigrant: country/ region of origin	Germany	*N*	26	6	17	6	n.a.	-	2	39	28	-	-	14	4	141
		Mean	2.52	3.17	3.24	2.83			3.00	2.56	2.71			3.36	2.75	2.79
	Portugal	*N*	–	–	–	4	1	–	–	17	–	n.a.	2	–	–	24
		Mean				2.75	3.00			1.45			1.50			2.71
	Italy (+ San Marino)	*N*	19	24	–	32	2	–	–	36	3	–	–	–	3	119
		Mean	2.32	2.50		2.47	3.00			2.64	2.67				3	2.53
	France	*N*	–	22	–	n.a.	3	–	–	27	1	1	1	–	1	56
		Mean		2.91			3.67			2.78	2.00	1.00	2.00		4.00	2.84
	Turkey	*N*	2	2	1	1	5	38	–	1	2	–	–	1	–	53
		Mean	2.00	2.50	2.00	3.00	2.80	2.08		3.00	2.50			3.00		2.23
	Former Yugoslavia (– Slovenia)	*N*	19	–	–	3	4	–	–	1	1	–	–	3	–	30
		Mean	2.11			2.67	3.50			3.00	1.00			4.00		2.57
	United Kingdom	*N*	2	4	2	2	–	–	2	–	1	–	–	2	n.r.	43
		Mean	3.50	3.75	3.00	2.50			3.00		2.00			3.00		3.12
	Poland	*N*	–	3	3	6	26	–	–	2	2	–	–	1	1	44
		Mean		2.67	2.67	1.67	3.46			3.50	3.00			2.00	4.00	3.07
	USSR (– Ukraine & Baltic countries)	*N*	–	–	–	–	2	3	–	–	1	–	–	1	1	8
		Mean					4.00	1.00			1.00			2.00	4.00	2.25
	Finland	*N*	–	–	1	–	–	–	–	–	–	–	–	39	–	40
		Mean			3.00									3.05		3.05
	Belgium	*N*	1	n.r.	–	2	–	–	–	22	6	–	–	–	–	31
		Mean	2.00			4.00				2.82	3.50					3.00
	Morocco	*N*	–	10	–	13	–	–	–	1	1	–	1	–	–	25
		Mean		2.80		3.15					2.00		3.00			2.96
	Albania	*N*	–	–	–	–	–	1	–	–	–	–	–	–	–	1
		Mean						0.00								0.00
	The Netherlands	*N*	4	17	–	1	2	–	–	7	n.r.	–	–	1	–	34
		Mean	2.50	3.18		3.00	3.50			3.14				4.00		3.18

Table 1 (continued)

	Country of destination	AUS	BEL	DEN	FR	GER	GR	IRE	LUX	NL	POR	ESP	SW	UK	Total
Spanish Caribbean	*N*	–	–	1	–	–	–	–	–	–	–	3	2	2	8
& South America	Mean			3.00								3.67	3.50	3.00	3.38
Western Africa	*N*	–	–	–	3	–	–	–	–	–	3	–	–	5	11
	Mean				3.00						2.00			3.40	2.91
Czech Republic	*N*	16	–	–	–	16	–	–	–	–	–	–	–	1	33
	Mean	2.38				3.31								3.00	2.85
Spain	*N*	–	4	–	15	–	–	–	3	1	2	n.r	2	2	29
	Mean		3.00		2.47				3.00	2.00	1.62		3.50	2.00	2.52
Romania	*N*	7	–	–	–	9	–	–	–	–	–	–	–	–	16
	Mean	2.00				2.89									2.47
Ireland	*N*	–	–	–	–	–	–	n.a.	–	–	–	–	–	29	29
	Mean													2.83	2.83
Remaining Southern	*N*	–	–	–	–	–	–	2	–	6	–	–	–	3	11
Asia	Mean							3.50		2.50				3.67	3.60
Remaining Northern	*N*	2	–	6	–	2	–	–	1	–	–	–	10	1	22
Europe	Mean	3.00		3.33		3.50			4.00				2.90	4.00	3.18
Algeria	*N*	–	–	–	19	–	–	–	–	–	–	–	–	–	19
	Mean				3.00										3.00
Hungary	*N*	4	2	1	–	8	–	–	1	–	–	–	1	–	17
	Mean	2.50	2.00	3.00		3.25			3.00				2.00		2.83
Remaining Northern	*N*	–	2	–	12	–	2	–	–	–	–	–	–	1	17
Africa	Mean		2.50		3.00		3.50							4.00	2.94
Western Asia	*N*	–	1	–	–	–	1	–	–	–	–	–	1	4	8
	Mean		4.00				3.00						3.00	2.75	3.00
India	*N*	–	–	–	–	–	–	–	–	–	–	–	1	15	16
	Mean												4.00	3.27	3.31
Remaining Eastern	*N*	4	–	–	–	–	3	–	–	–	–	–	–	–	7
Europe	Mean	2.50					2.33								2.43
Indonesia	*N*	–	–	–	–	–	–	–	–	17	–	–	–	–	17
	Mean									3.12					3.12

Table 1 (continued)

	Country of destination	AUS	BEL	DEN	FR	GER	GR	IRE	LUX	NL	POR	ESP	SW	UK	Total
Norway	*N*	–	–	6	–	–	–	–	–	–	–	–	12	–	18
	Mean			3.50									2.50		2.83
Eastern Africa	*N*	–	1	–	2	–	–		–	–	2	–	–	2	7
	Mean		4.00		4.00						1.50			1.50	2.33
South-East Asia	*N*	–	–	–	–	–	–	–	–	–	–	1	–	1	2
	Mean											2.00		4.00	3.35
United States	*N*	–	–	1	–	4	1	2	2	1	–	–	–	1	12
	Mean			3.00		3.00	2.00	3.00	3.50	4.00				2.00	3.50
Dutch Caribbean	*N*	–	–	–	–	–	–	–	–	9	–	–	–	–	9
and South America	Mean									2.67					2.67
Remaining Southern	*N*	3	1	–	–	2	–	–	–	–	–	–	–	3	9
Europe	Mean	3.33	3.00			3.00								3.00	3.11
Brazil	*N*	–	–	–	–	–	–	–	–	–	–	1	–	–	1
	Mean											4.00			4.00
Switzerland	*N*	4	–	–	2	–	–	–	–	–	–	–	1	–	7
	Mean	2.00			3.50								3.00		3.00
Angola	*N*	–	–	–	–	–	–	–	–	–	2	–	–	–	2
	Mean										0.50				0.50
East Asia	*N*	2	–	–	–	–	–	–	–	2	–	–	–	2	6
	Mean	2.50								3.00				3.00	2.83
Pakistan	*N*	–	–	–	–	–	1	–	–	–	–	–	–	2	3
	Mean						2.00							2.00	2.00
Ukraine	*N*	–	–	–	–	2	–	–	2	–	–	–	–	–	4
	Mean					3.00			2.00						2.50
Remaining Western	*N*		7	–	1			–	1	–	–	–	3	–	12
Europe	Mean	–	2.86		1.00				2.00				3.33		2.75
Middle Africa	*N*	–	2	–	–	–	–	–	–	–	–	–	–	–	2
	Mean		4.00												4.00
English Caribbean	*N*	–	–	1	–	–	–	–	–	–	–	–	–	11	12
& South America	Mean			3.00										2.64	2.67

Table 1 (continued)

	Country of destination	AUS	BEL	DEN	FR	GER	GR	IRE	LUX	NL	POR	ESP	SW	UK	Total
Australia and New Zealand	*N*	–	–	–	–	–	–	1	–	1	–	–	–	–	2
	Mean							4.00		3.00					3.50
Remaining Northern America	*N*	–	–	1	–	–	–	–	–	–	–	–	–	2	3
	Mean			2.00										3.50	3.00
Southern Africa	*N*	–	1	–	–	–	–	–	–	–	–	–	–	1	2
	Mean		4.00											2.00	3.00
French Caribbean	*N*	–	–	–	1	–	–	–	–	–	–	–	–	–	1
	Mean				4.00										4.00
Total	*N*	123	96	42	124	96	50	38	164	77	10	10	98	101	1,039
	Mean	2.37	3.25	3.17	2.73	3.25	2.08	3.16	2.75	2.83	1.30	2.90	3.04	2.96	2.80

Source: European Social Survey 2004 (unweighted data).

Table 2 Independent variables per country of destination (natives vs. second generation immigrants)

Country		Age	Parents' highest educational level	% Belong to a non-Christian religion[a]	How religious are you[b]	Intensity religious practice[c]	% Speaking minority language at home	% Immigrant with 1 native parent	% Immigrant from neighbour-ing countries	% Immigrants from EU-15 countries	% Citizenship of the country of destination	% Immigrant from former colonies/ territories
Austria	Immigrant	42.8	2.25	7.3	4.91	4.80	0.81	80.50	67.48	45.53	96.78	43.90
	Natives	42.8	2.05	2.4	5.20	4.77	0.43	0	0	0	99.91	0
Belgium	Immigrant	39.9	2.31	12.5	4.84	5.78	2.88	56.73	47.12	75.00	86.54	2.88
	Natives	42.8	2.69	1.59	4.40	5.87	0.11	0	0	0	100.00	0
Denmark	Immigrant	38.7	4.00	4.8	4.71	5.74	0.00	95.24	69.05	71.43	95.24	7.14
	Natives	43.6	3.19	1.4	4.09	5.81	0.12	0	0	0	99.88	0
France	Immigrant	42.7	1.88	28.2	3.51	6.08	4.03	67.74	48.39	52.42	98.39	38.71
	Natives	43.3	2.05	0.0	3.34	6.02	4.99	0	0	0	100.00	0
Germany	Immigrant	42.4	3.50	4.2	3.40	5.65	2.08	75.00	40.63	17.71	95.83	27.08
	Natives	43.7	3.40	1.1	3.56	5.69	0.14	0	0	0	99.93	0
Greece	Immigrant	51.1	1.08	2.0	7.63	3.34	2.00	54.00	86.00	0	100.00	0
	Natives	42.1	1.45	1.2	6.89	3.77	1.02	0	0	0	99.91	0
Ireland	Immigrant	40.6	2.97	0.0	4.61	4.04	2.63	94.74	78.95	86.84	100.00	0
	Natives	43.5	1.87	0.3	5.75	3.33	3.92	0	0	0	99.69	0
Luxembourg	Immigrant	39.6	2.07	3.0	3.82	5.53	9.09	68.48	53.94	93.94	80.00	0
	Natives	43.9	2.38	1.4	4.01	5.39	0.00	0	0	0	100.00	0
Netherlands	Immigrant	42.8	2.49	3.9	4.39	6.03	1.30	81.82	45.45	53.25	97.40	33.77
	Natives	43.7	2.36	1.0	4.65	5.51	1.75	0	0	0	99.81	0
Portugal	Immigrant	41.3	1.80	10.0	4.00	5.05	0.10	60.00	20.00	30.00	90.00	50.00
	Natives	42.0	1.07	0.2	4.95	4.47	1.69	0	0	0	99.53	0
Spain	Immigrant	47.2	1.27	9.1	3.82	4.45	27.27	81.82	36.36	36.36	90.91	27.27
	Natives	41.2	1.37	1.0	4.03	5.39	14.58	0	0	0	97.41	0
Sweden	Immigrant	39.4	2.74	2.0	3.01	6.11	5.10	74.49	63.27	84.69	93.88	52.04
	Natives	43.2	2.27	0.8	3.35	6.06	0.10	0	0	0	100.00	0

Table 2 (continued)

Country		Age	Parents' highest educational level	% Belong to a non-Christian religion[a]	How religious are you[b]	Intensity religious practice[c]	% Speaking minority language at home	% Immigrant with 1 native parent	% Immigrant from neighbouring countries	% Immigrants from EU-15 countries	% Citizenship of the country of destination	% Immigrant from former colonies/ territories
United Kingdom	Immigrant	37.9	3.07	8.9	4.69	5.19	3.00	65.35	34.66	42.57	99.01	76.24
	Natives	42.2	2.61	1.2	3.84	5.65	0.88	0	0	0	99.67	0
Total	Immigrant	41.3	2.47	8.2	4.27	5.44	3.95	71.90	53.90	58.52	93.26	28.49
	Natives	42.9	2.21	1.0	4.55	5.13	2.27	0	0	0	99.68	0

Source: European Social Survey (2004), unweighted data.

[a]This percentage does not include non-religious respondents, but only those who rate themselves as belonging to a non-Christian religion (Islam, Judaism, Eastern religions, other non-Christian religion).

[b]0 = Not at all until 10 = very religious.

[c]How often do you attend religious services apart from special occasions and how often do you pray apart from religious services? 1 = Never until 7 = everyday.

large number of immigrants originating in former European colonies whose grandparents migrated to Europe. Their grandchildren, born in these immigrant receiving countries, are measured as native born. However, typically in these countries this third generation will continue to be considered "immigrants", especially if they are a "visible minority". Therefore, they might still have lower levels of education and labour market outcomes than natives within these countries (Portes & Rumbaut, 2001).

An additional weakness of the European Social Survey as a data source is that immigrants are not oversampled in this survey which leads, first of all, to a low *N* and, second, introduces a potential bias towards the better integrated immigrants For instance, second generation immigrants who have a low proficiency in the national language of the survey country are less likely to be included in the survey, since the ESS takes no special measures to reach this group which often differs in their response rates to surveys from the native population.

When using the term immigrant in the remainder of this chapter, we mean a second generation immigrant, unless explicitly stated otherwise.

Dependent Variables

The European Social Survey provides an internationally comparable measure of educational attainment, by assessing the highest level of education reached by respondents with the 7-point ISCED-97 (UNESCO, 1997) scale which ranges from 0 (not completed primary education) to 6 (second stage of tertiary education). However, due to a different measurement in the UK, we had to collapse the categories "upper secondary" and "post-secondary, non-tertiary" and the categories "first stage of tertiary" and "second stage of tertiary". This recoding restricts us to a less precise 5-point scale, but is considered the lesser evil by the authors. The alternative would have been to exclude all data from the United Kingdom, which is not desirable given the importance of this country for comparative research on immigration in Europe and, in addition, because of the resulting reduction in the *N* at the highest level.[4] Table 1 gives the average educational level of first and second generation immigrants per country of destination and origin and the average educational level of the natives of each country of destination.

Independent Variables: Individual Characteristics

Table 2 gives the average values of the independent variables per country of destination for natives and second generation immigrants separately, while Table 3 does the same but per country of origin.

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[4] We imputed missing values for the highest level of education of the respondent (31 cases among natives, 21 among immigrants), using the mean of groups sorted according to gender, immigrant status, immigrant generation and country of origin in the case of respondent's education. We did this in order to keep in the analysis the maximum number of immigrants.

Table 3 Independent variables by main country of origin of second generation migrants ($N > 10$)

Country/region of origin	N	Age	Parents' highest Educational level	% belonging to non-Christian religion[a]	How religious are you[b]	Intensity of religious practice[c]	% Speaking minority language at home	% Immigrants with one native parent	% Immigrant from neighbouring country	% Citizenship of country of destination	Immigrant from colony/territory to (colonial) centre
Germany	141	43.2	2.8	1.4	4.2	5.5	0.7	92.2	88.6	96.5	0.0
Italy	119	43.6	1.4	1.7	4.5	5.6	4.2	54.6	42.9	79.0	0.0
France	57	42.2	2.4	1.8	3.6	6.0	0.0	87.7	96.5	98.2	0.0
Remaining Western Europe	54	40.1	3.2	0.0	4.4	5.4	1.9	85.2	81.5	100.0	53.7
Turkey	53	46.1	1.2	20.8	7.1	3.8	9.4	43.2	71.7	92.5	0.0
Poland	44	43.0	3.1	9.1	3.4	6.1	0.0	77.3	61.4	100.0	59.1
United Kingdom	43	39.7	3.1	0.0	4.8	4.4	2.3	93.0	90.7	97.7	0.0
Finland	40	38.1	2.4	2.5	2.7	6.0	7.5	67.5	97.5	95.0	97.5
Remaining Northern Europe	40	42.4	3.1	2.5	3.5	5.8	2.5	85.0	80.0	92.5	35.0
Remaining Eastern Europe	39	43.8	2.4	2.6	4.6	5.0	0.0	82.1	48.7	100.0	41.0
Remaining Northern Africa	36	39.6	2.4	55.6	3.6	5.8	2.8	66.7	0.0	97.2	86.1
The Netherlands	34	41.4	2.9	0.0	3.8	5.7	0.0	91.2	58.8	91.2	0.0
Czech Republic	33	45.4	3.1	3.0	3.5	5.5	0.0	72.7	48.5	97.0	48.5
Belgium	31	42.9	2.8	0.0	4.4	5.7	0.0	87.1	96.8	93.6	0.0

Table 3 (continued)

Country/region of origin	*N*	Age	Parents' highest Educational level	% belonging to non-Christian religion[a]	How religious are you[b]	Intensity of religious practice[c]	% Speaking minority language at home	% Immigrants with one native parent	% Immigrant from neighbouring country	% Citizenship of country of destination	Immigrant from colony/territory to (colonial) centre
Former Yugoslavia	30	37.8	1.7	6.7	4.4	5.1	3.3	50.0	0.0	100.0	63.3
Spain	29	40.9	1.7	0.0	3.9	6.2	3.4	69.0	58.6	96.6	0.0
Morocco	25	34.0	2.2	88.0	4.7	5.4	16.0	48.0	4.0	100.0	52.0
Portugal	24	31.9	1.3	8.3	5.0	5.2	50.0	12.5	8.3	33.3	0.0
Southern Asia	24	37.4	2.8	37.5	4.1	5.1	4.2	58.3	0.0	100.0	83.3
South-East Asia	20	41.6	3.5	0.0	4.5	5.9	0.0	75.0	0.0	95.0	85.0
Romania	17	44.1	2.4	0.0	4.0	5.3	0.0	70.6	0.0	94.1	0.0
Northern America	15	41.3	3.5	0.0	3.7	5.8	0.0	100.0	0.0	93.3	26.7
English Caribbean and South America	12	37.2	2.6	0.0	5.8	4.5	0.0	33.3	0.0	100.0	91.7
Western Africa	11	35.5	3.0	18.2	4.9	4.7	0.0	45.5	0.0	90.9	100.0
Remaining Southern Europe	10	33.1	2.6	0.0	5.1	4.5	0.0	90.0	30.0	100.0	60.0
Total		41.3	2.5	8.2	4.3	5.4	3.9	71.9	53.9	93.3	28.5

Source: European Social Survey (2004), unweighted data.

The effect of parental education on the educational attainment of their offspring is a well-established fact in sociology (see e.g. Boudon, 1974; Breen & Jonsson, 2005; Gambetta, 1987). There is mixed evidence concerning the question whether this effect works the same for immigrants as for native students (Hustinx, 2002; Van Ours & Veenman, 2003). However, despite the interactions that may occur, a considerable main effect of parental education is still expected to occur among second generation immigrants. *We expect that the higher the education of their parents, the higher the educational attainment of second generation immigrants will be.* [5]

We use dummies that indicate the religious group the respondent belongs to.[6] In addition, we assess religiosity with a self-classification measure where respondents indicated their degree of religiosity on a 10-point scale ranging from "not religious at all" to "very religious". Lastly, we control for the intensity of religious practice which we assess with a composite measure that includes the answers to the questions "How often do you attend religious services, apart from special occasions?" and "How often do you pray apart from during services?". Both questions were answered on a 7-point scale that we reversed so that higher values indicate a higher intensity of religious practice. Including individual religion is not common in the analysis of socio-economic integration of immigrants, but we have two reasons to expect effects in this respect: first, the cultural habitus of a religious group might affect educational outcomes, for example through the differential evaluation of achievement (Kao & Thompon, 2003). Second, European societies react differently to different religious groups, the primary example being the approach towards Muslims after 9/11. *We therefore hypothesise that religious affiliation and the extent to which individuals follow the practices of their religious community will affect their educational attainment*, but we do not have clear expectations with regard to the signs of the effects for different religious groups.[7]

In the multilevel analyses, which are based exclusively on the immigrant sample, we additionally take into account whether respondents speak a minority language at home, whether they hold the citizenship of the country of destination and whether they are born to one native and one immigrant parent. Based on earlier findings (Levels & Dronkers, 2008), *we hypothesise that immigrants who speak a minority*

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[5] We imputed missing values for the highest level of parental education (556 missing values, 135 of which among immigrants), using the mean of groups sorted according to gender, immigrant status, immigrant generation and country of origin.

[6] In the multilevel analysis, we contrast Muslims and those who are not affiliated with any religion with all others. This residual category mainly consists of Christians (Catholics, Protestants and Eastern Orthodox) plus very few affiliates of Judaism, Eastern and other religions. The latter groups were, however, too small to be separated in the analysis.

[7] Respondents in France did not indicate the religion they belonged to if they classified themselves as being religious (which 58.7% of natives and 60.1% of the immigrants in France did). For natives, we assume that if they are religious, they will belong to a Christian religion, hence the percentage of French natives who belong to a non-Christian religion is estimated to be 0. For immigrants who indicated that they belong to a religion, we imputed this religion using information about the country of origin, religiosity, the intensity of religious practice and the educational level.

language at home will have lower educational levels. On the contrary, *we expect immigrants who are citizens of their destination country and those second generation migrants who are born to one native and one immigrant parent to have higher educational levels*.

We argue that immigrants from certain countries of origin are likely to have higher educational levels than immigrants from other countries or regions of origin. Therefore, we coded the information according to whether the country of origin is a neighbouring country of the country of destination,[8] whether the country of origin is one of the EU-15 member states (plus the largely comparable countries and silent EU member-states, Switzerland and Norway) and whether the country of origin is a former colony or territory of the country of destination.[9] *We expect immigrants from countries which are part of any of these categories to have higher educational levels than immigrants who come from countries which are less historically and culturally connected to the countries of destination in our analysis*.

Independent Variables: Macro-characteristics of Destination

The main focus of our chapter is the question whether, and if so how, indicators on the macro-level, both of the countries of destination and the countries of origin, affect immigrants' educational levels in the 13 EU countries under study. With regard to the countries of destination, we use indicators of the policies geared towards immigrant integration, the type of welfare state regime, the presence of left-wing parties in government and the net migration rate.

As a measure of immigrant integration policies, we use the European Civic Citizenship and Inclusion Index (Geddes et al., 2004) which has recently been developed for the EU-15 member-states. This index contains five dimensions: labour market inclusion, long-term residence rights, family reunion, naturalisation and anti-discrimination measures. We recoded index scores so that values between –1 and 0 represent less favourable policies on these dimensions, while values between 0 and 1 stand for more favourable policies, i.e. policies that are more inclusive of immigrants. The assessment of each country's policies in these areas is based on an ideal, not real, legal framework, which means that the creators of the index made a judgement as to how close certain national policies came to what they consider to be ideal for the integration of immigrants. Next to the five separate dimensions, we

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[8] We use a liberal definition of neighbouring countries which also includes countries who share sea borders with the country of destination. A list of the matches of neighbouring countries is provided in the appendix.

[9] These are, in the first place, countries that have been or still are colonies (for instance India for the UK, the Spanish-speaking countries of Latin America for Spain, and Brazil for Portugal). But, in the case of Austria, Germany, the UK and Sweden they also included those countries that were a part of their former territories (for example Hungary, Czechoslovakia, and the former Yugoslavia for Austria; Norway for Sweden).

include the (unweighted) mean score across these dimensions. *We test the hypothesis that the gap in educational attainment between second generation immigrants and the native population is smaller in countries that score high on this Index than in countries that score lower on the EII.*

Furthermore, we test the effects of different types of welfare regimes of the countries of destination. Based on the classic typology of Esping-Andersen (1990) and the work of Kogan (2007), we distinguish between the liberal welfare regime, represented by the United Kingdom and Ireland in our data, which is characterised by a market approach to social institutions such as the labour market and the educational system. The social-democratic welfare regime (represented by Sweden and Denmark in our analysis), on the contrary, is characterised by a high standard of universal social insurance for citizens with a strong equalising objective that is to be reached for a large part through the educational system. In conservative welfare regimes, social insurance is state-based instead of market-based, but, in contrast to the social-democratic welfare regime, there is no aim of equalisation of status and class differentials which finds its expression in a more stratified educational system with early selection into different tracks. We classify Belgium, France, Germany, Luxembourg and the Netherlands as countries with conservative welfare regimes. We furthermore distinguish the Southern or Mediterranean welfare regime which is found in Greece, Portugal and Spain, and which shares some commonalities with the conservative welfare regime, but additionally knows rather low levels of welfare benefits and expenditure for public goods, such as education (for a more detailed description of the different types of welfare state regimes, we refer to Kogan (2007) and Esping-Andersen (1990)).[10] *Because of its equalising objective which is pursued through the comprehensive school system, differences in the educational attainment between second generation immigrants and their native peers are expected to be lowest in the social-democratic welfare regime.*

We additionally control for the presence of left-wing parties in the government during the past 30 years. Based on the data provided by Beck et al. (2000), we compute a total score for every country assigning a 1 for every year in which the government is exclusively made up of left-wing parties and 0.5 for every year in which a left-wing party takes part in a coalition with one or more centre or right-wing parties. This measure has been used in previous cross-country research on immigrant integration (Tubergen, 2004; Tubergen et al., 2004), based on the assumption that left-wing governments will develop policies that are more favourable to immigrant

[10] Kogan (2007) found a positive effect of the liberal welfare state on immigrants' labour market integration, in the form of higher labour market participation and lower unemployment. However, it is difficult to derive hypothesis on educational outcomes from this finding. On the one hand, the prospect of easy access to the labour market might increase second generation immigrants' incentives to invest in education in order to reach a high occupational status. On the other hand, easy access to the labour market and low unemployment rates can also go together with low average occupational status for immigrants. Furthermore, an abundance of job opportunities might actually lower the educational attainment of the second generation, since staying longer in education increases its short-term costs in the form of foregone earnings, while the long-term benefits of higher education are less secure.

integration. However, the problem with this indicator is that it is merely a proxy for concrete policies. In the presence of the policy indicators described above, we expect little additional explanatory power of the presence of left-wing parties in the government. The general expectation is that *the presence of left-wing parties in the government promotes the equality between the educational level of second generation immigrants and their native peers*.

Our last macro-indicator with respect to destination countries is the net migration rate. This indicator is taken from the CIA World Factbook (2007). Countries with higher net migration rates can be expected to be better able to deal with immigrant integration. *We therefore expect a negative relation between the net migration rate of a destination country and the gap in educational attainment between second generation immigrants and natives.*

Independent Variables: Macro-characteristics of Origin

We also want to analyse whether indicators on the macro-level of the countries of origin affect the educational levels of second generation immigrants in the 13 EU countries under study. It is important to find out whether the characteristics of the countries of origin of the immigrant generation continue to affect their children. Such effects are not straightforward and they raise the question of how these origin effects are transmitted to the second generation. The "exposure" of the second generation to effects of the country of origin can work through media and transnational contacts, such as frequent travel to the parents' home country. In addition, transmission of characteristics of origin countries to the second generation is likely to occur through the socialisation processes within families and immigrant communities. Moreover, discrimination against specific ethnic minority groups identified by common origin might lead to the persistence of origin effects in native-born generations. This persistence partly blurs the distinction between effects at the individual level and effects at the macro-level of the country of origin. For instance, affiliation with a certain religion occurs at the individual level and is usually passed on from parents to children. At the same time, immigrants' affiliation to a religion that is not commonly found among the majority population in the destination country, such as Islam in Europe, is also to a large part a consequence of the country of origin, especially in cases where such origin countries are very homogeneous in terms of religion. This situation applies to important immigrant groups in Europe, such as Turks and North-Africans who come from countries in which more than 90% of the population are Muslims (Brown, 2000). A similar argument can be made for parental education, which, for the second generation, is also largely a function of the average level of education in the country of destination. As a consequence, a part of the macro-effects of the country of origin will already be present in our model through controls for individual-level effects, which makes it less likely for indicators of macro-characteristics of origin countries to reach significance. We therefore limit the list of these indicators to a few comprehensive measures.

First, we use the scale of the 2006 Human Development Index (UNDP, 2007) as a comprehensive measure of the economic and social development of countries of origin. This index combines information on GDP per capita, education, life expectancy and gender inequality and ranks countries according to these indicators. *We expect immigrants from less developed countries (i.e. those with a higher Index-score) to have lower individual educational levels due to the larger economic and cultural differences between their countries of origin and of destination.*

We also take into account the net migration rate of the origin countries, which we again took from the CIA World Factbook (2007). A negative score on this indicator identifies countries with large degrees of emigration. These are mostly the typical source countries of labour migration, such as Turkey, the Maghreb countries and, more recently, the post-socialist countries of Eastern Europe. The net migration rate of origin countries is, however, not only associated with the characteristics of labour migration. It also influences the feasibility of the emergence of ethnic communities in the destination countries. If the net migration rate of a specific country of origin is lower, immigrants from this country are more likely to encounter fellow country (wo)men in their destination countries, which, in turn, increases the exposure of the second generation to the culture of the origin country and therefore enhances the continued effects of the characteristics of origin countries in the second generation.

Lastly, we include a dummy variable for the prevalent religion in the country of origin. A religion was classified to prevail in one country if at least 50% of the population belonged to this religious group (based again on information from the CIA World Factbook); if necessary, different Christian denominations were aggregated in this procedure and a country was classified "prevalently Christian" if more than 50% of the population belonged to any Christian denomination. If less than 50% of the population belonged to a single religious group, the country was classified as having no prevalent religion. The prevalent religion in the country of origin is an indicator of the cultural distance between the country of origin and the country of destination which has been used in comparable research (Tubergen, 2004; Tubergen et al., 2004). *Due to the larger cultural distance, we expect immigrants from non-Christian countries to have lower educational levels in EU countries.*

Individual Characteristics and Educational Attainment of Immigrants and Natives

Table 1 provides an overview of the uncontrolled mean scores on educational attainment of natives and second generation immigrants. Figures 1 and 2 summarise and differentiate these scores of Table 1. Figure 1 shows the educational levels of males and females separately per country of destination and Fig. 2 per country of origin. They make clear that there is considerable variation across the 13 countries of destination in terms of the size and direction of the gaps between natives and immigrants. In addition, we can note clear gender differences. Moreover, the figures illuminate that there is also considerable variation in educational level between second generation immigrants from the most important countries of origins, which are in most cases European countries. However, since the mean scores depicted in these tables and figures are not controlled for individual characteristics, it is not clear whether the between-country differences are due to the differential composition of

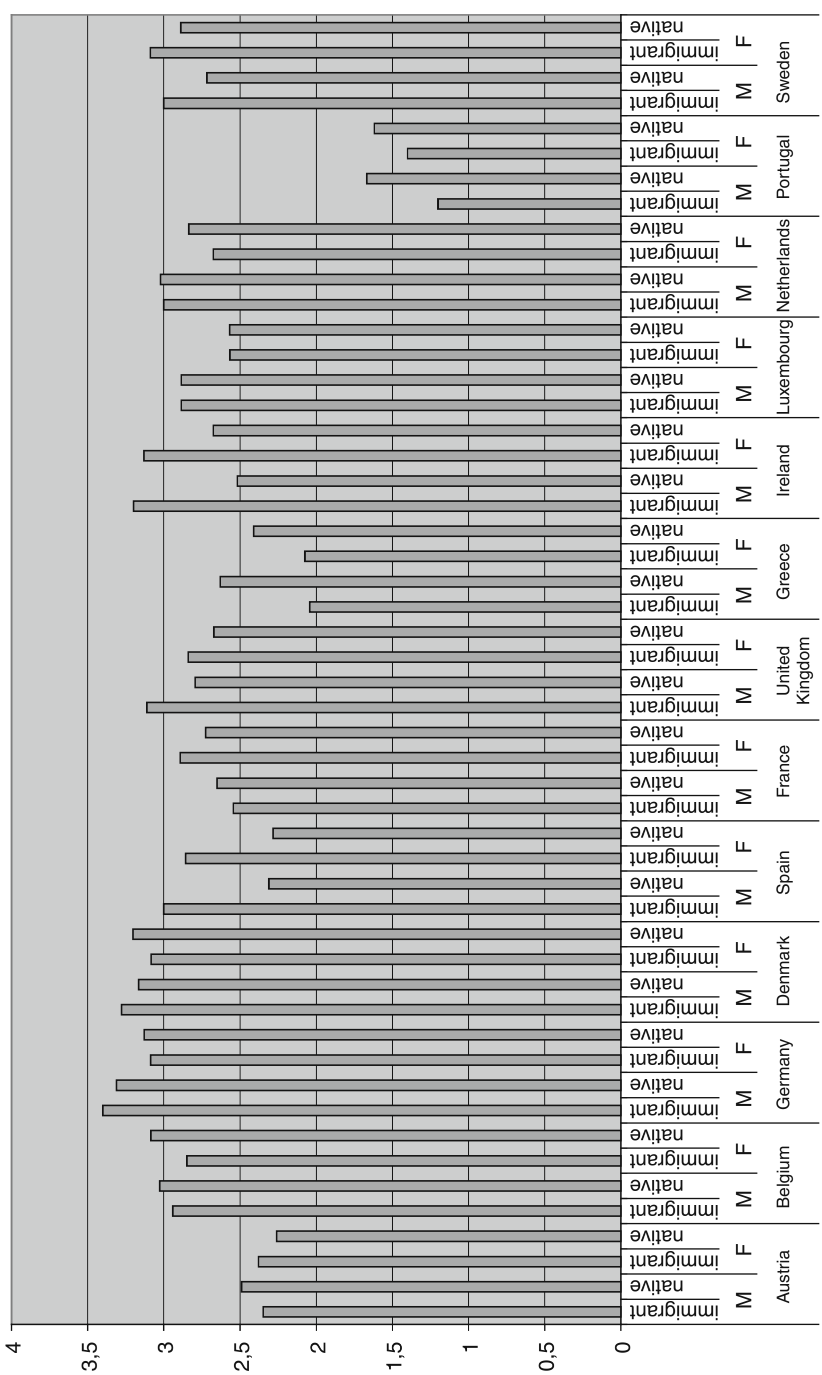

Fig. 1 Differences in highest educational level between male and female natives and second generation immigrants in the 13 EU countries

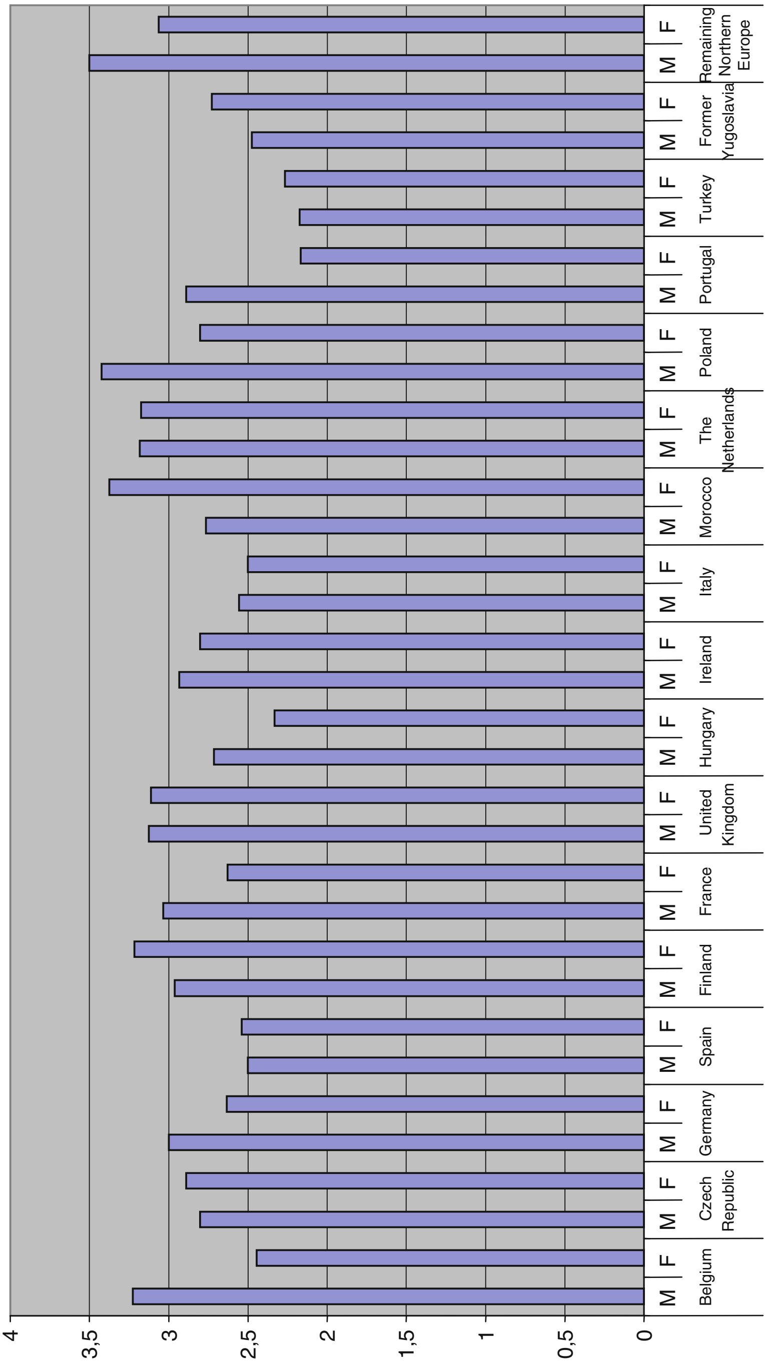

Fig. 2 Differences in highest educational level for male and female second generation migrants from the most important countries of origin in the EU ($N > 20$)

immigrants and natives in the various destination countries or whether they result from processes at the macro-level such as different policy approaches towards the integration of immigrants.

Comparing the Educational Levels of Male Immigrants and Natives

In Table 4 we use OLS-regression to compare directly the educational level of male natives and second generation immigrants in the 13 EU countries.

In the first model we observe considerable differences in the average educational levels between the 13 EU countries. But the second model shows that there is no significant difference between the educational level of natives and second generation immigrants. In model 3 we control also for age and parental educational level

Table 4 Regression coefficients of the effects on education of male second generation immigrants and natives $N = 6{,}475$

	Model 1	Model 2	Model 3	Model 4
Austria	−0.162**	−0.161**	−0.248**	−0.386**
Belgium	0.380**	0.380**	0.203**	0.114(*n.s.*)
Germany	0.678**	0.679**	0.324**	0.219**
Denmark	0.533**	0.535**	0.217**	0.110(*n.s.*)
UK	0.186**	0.186**	0.020(*n.s.*)	−0.067(*n.s.*)
Greece	−0.034(*n.s.*)	−0.032(*n.s.*)	0.049(*n.s.*)	0.286**
Ireland	−0.103(*n.s.*)	−0.100(*n.s.*)	−0.091(*n.s.*)	−0.231**
Luxembourg	0.246**	0.242**	0.147*	−0.014(*n.s.*)
The Netherlands	0.381**	0.382**	0.252**	0.158*
Portugal	−0.977**	−0.974**	−0.809**	−0.970**
Sweden	0.105(*n.s.*)	0.106(*n.s.*)	−0.007(*n.s.*)	−0.076(*n.s.*)
Spain	−0.322**	−0.319**	−0.229**	−0.391**
Second generation		0.028(*n.s.*)	0.024(*n.s.*)	0.051(*n.s.*)
Parents' educational level			0.236**	0.232**
Age			0.021*	0.018*
Age^2			0.000**	0.000**
Parental education missing			−0.348**	−0.338**
Roman Catholic				0.206**
Eastern Orthodox				−0.439**
Islam				−0.522**
Intensity of religious practice				0.019*
Constant	2.639**	2.635**	1.967**	1.930**
R^2 adjusted	0.144	0.144	0.263	0.270

Source: European Social Survey, 2004 (unweighted data).
Note: Significant coefficients are marked with * = p <0.05 and ** = p <0.01 ***.
The effect of the dummy for missing values on education is not included since it is not significant.

and these variables have the expected effects, but there is still no difference between the average educational levels of male immigrants and natives. Neither is there a significant interaction between parental educational level and second generation, indicating that the positive effect of parental background is equal for second generation male immigrants and natives.[11] In the last model we add more control variables to the equation. We find a negative effect of having a missing value on parental education, suggesting that the information on parental education is not missing at random, but occurs more frequently in cases of respondents with a low educational level. In addition, we find significant effects of the individual religion on educational achievement. Adherents of Islam and Eastern Orthodoxy, most of which will be second generation immigrants instead of natives, have a lower educational level than comparable respondents (including the other immigrants). We have tested a large number of possible interactions between the immigration variables and other independent variables, but none of them are significant.

We find no significant effects of the macro-characteristics of origin countries. This is not surprising in the light of the finding that the second generation does not differ significantly from natives in the highest educational level achieved. However, the negative and significant effects of some religious affiliations (Islam, Eastern Orthodoxy) can be interpreted as origin effects, which, however, operate at the individual instead of the macro-level as described above.

Comparing the Educational Level of Female Immigrants and Natives

In Table 5 we use OLS-regression to directly compare the educational level of female natives and second generation immigrants in the 13 EU countries.

Table 5 shows that the level of education of both native and immigrant women differs greatly between the 13 EU countries, but we find no significant differences in educational outcomes between the second generation and natives. Not surprisingly, we find that parental education has a positive effect on the highest educational level achieved, and having a missing value for parental education has a negative effect on educational achievement. More interesting are the effects of religious affiliation: while Roman Catholic, Protestant, Eastern non-Christian and Jewish women are more educated than their non-religious peers, Eastern Orthodox women have much lower levels of education, while Islamic women have an educational level equal to their non-religious peers. We have tested a large number of possible interactions between the immigration variables and other independent variables, but none of them are significant.

Furthermore, we find one significant origin effect: women from former colonies or territories have higher educational levels than their peers. But the positive and

[11] This non-significant interaction is not shown in the table, since the interaction entered stepwise into the regression model. For reasons of readability, we only present significant interactions.

Table 5 Regression coefficients of the effects on education of female second generation immigrants and natives $N = 7{,}593$

	Model 1	Model 2	Model 3	Model 4
Austria	−0.476**	−0.476**	−0.463**	−0.602**
Belgium	0.313**	0.314**	0.161**	0.075(*n.s.*)
Germany	0.379**	0.381**	0.013(*n.s.*)	−0.128*
Denmark	0.449**	0.451**	0.135**	−0.043(*n.s.*)
UK	−0.059(*n.s.*)	−0.059(*n.s.*)	−0.240**	−0.367**
Greece	−0.350**	−0.347**	−0.190**	0.018(*n.s.*)
Ireland	−0.059(*n.s.*)	−0.056(*n.s.*)	−0.006(*n.s.*)	−0.123*
Luxembourg	−0.180**	−0.184**	−0.224**	−0.349**
The Netherlands	0.078(*n.s.*)	0.080(*n.s.*)	0.024(*n.s.*)	−0.094(*n.s.*)
Portugal	−1.133**	−1.129**	−0.873**	−1.007**
Sweden	0.160**	0.161**	0.108*	0.003(*n.s.*)
Spain	−0.452**	−0.448**	−0.284**	−0.422**
Second generation		0.035(*n.s.*)	−0.034(*n.s.*)	−0.076(*n.s.*)
Parents' educational level			0.263**	0.261**
Age			0.027**	0.025**
Age^2			0.000**	0.000**
parental education missing			−0.239**	−0.226**
Intensity of religious practice				0.017*
Eastern Orthodox				−0.360**
Roman Catholic				0.179**
Protestant				0.104**
Eastern religions				0.419*
Jewish				0.836*
Origin: former colony/territory destination country				0.184*
Constant	2.748**	2.744**	2.006**	1.959**
R^2 adjusted	0.155	0.155	0.303	0.309

Source: European Social Survey, 2004 (unweighted data).
Note: Significant coefficients are marked with * = p <0.05 and ** = p <0.01 ***.
The effect of the dummy for missing values on education is not included since it is not significant.

significant effects of some religious affiliation (Eastern non-Christian, Jewish) and the negative of Eastern Orthodoxy can also be interpreted as origin effects, although not of certain counties of origin but of certain cultures of origin.

In conclusion, we want to draw the attention to the fact that especially the effect of religion varies between men and women. While affiliation with Islam has a negative effect on the educational attainment of males, it is insignificant for women. Moreover, other religious affiliations positively affect the educational levels of women (Roman Catholic, Protestant, Eastern non-Christian, Jewish), but not those of males. However, the intensity of religious practice has a positive, but modest, influence on the educational level of both genders.

The Effects of Social Policies on Immigrants' Educational Achievement

The OLS regression analyses presented in the previous section do not take the nested structure of the data into account. However, they make clear that the educational levels of immigrants are influenced by indicators that refer to the culture of origin, more specifically religion. Furthermore, the previous analyses did not allow us to identify and correctly model all micro- and macro-factors that might lead to differential educational achievement levels. In order to reach an accurate estimation of the effects of these micro- and macro-indicators, a multilevel analysis is needed. We use a cross-classified multilevel model, since the individual immigrants in our data are nested both within countries of origin and within countries of destination, but these two levels crosscut each other instead of being nested within each other. We specified the country of origin as the second level and the country of destination as the third, i.e. variance terms indicated by the letter *v* refer to the country of destination and those with the letter *u* to the country of origin. Since these two levels are only relevant to immigrants and not to natives, we restrict our multilevel analyses to the immigrant population in our data. This has the advantage that we can now include a number of individual characteristics of immigrants, such as the language spoken at home, whether an immigrant holds the citizenship of the destination country and whether he/she is the child of a mixed marriage between a native and an immigrant. In the joint analyses with natives, these indicators could not be included since their estimation would be dominated by the much larger group of natives for whom they are not applicable. Although we use only immigrants in the multilevel analysis, we include the average educational level of the native population in every model as an independent variable, so that we can assess the difference between second generation immigrants and natives.

We build our multilevel models in Table 7 (males) and Table 8 (females) in the same way. Model 0 contains only the variance components. The variance components of the higher levels indicate the relevance of including these levels in the analysis. Although, in general, most variation occurs between individuals, a substantive part might also occur between countries of origin and countries of destination. Model 1 contains three characteristics of individual immigrants (having one native and one immigrant parent, speaking a minority language at home and holding the citizenship of the country of destination) and the mean educational level of the male or female natives of the country of destination. As a consequence of including the latter independent variable, the constant can be interpreted as the difference in the dependent variable of second generation immigrants in comparison to the average outcomes of natives. In model 2 we add the human capital variables and individual religious affiliation, religiosity and the intensity of religious practice. Model 3 further adds interactions between parental education and three relevant immigrant characteristics (minority language at home; citizenship of country of destination; Islam). Model is not displayed in Tables 7 and 8, since in these series of models, we add, one by one, the macro-characteristics to Model 3 of these Tables 7 and 8. The effects, their standard errors and the change in Log Likelihood that

Table 6 Macro-characteristics in the multilevel regressions of the educational attainment of male and female second generation immigrants: Coefficients, standard errors and improvement in model fit, based on the addition of the macro-variable to Model 3 of Tables 7 and 8

		Males	Females
Destination effects	EII: Labour market inclusion	0.130(0.132)0.970	0.178(0.172)0.960
	EII: Long-term residence rights	0.047(0.164)0.077	0.295(0.187)2.300
	EII: Family reunification	0.307(0.169)3.292	0.350(0.187)3.040
	EII: Naturalisation	0.580(0.225)*6.572	0.675(0.213)*8.294
	EII: Anti-discrimination	0.097(0.080)1.451	0.147(0.101)2.000
	EII: Total index score	0.241(0.161)2.229	0.368(0.187)*3.540
	Liberal welfare regime	0.173(0.122)2.015	−0.007(0.142)0.003
	Social-democratic welfare regime	0.033(0.113)0.086	0.027(0.924)0.024
	Conservative welfare regime	0.098(0.092)1.132	−0.040(0.109)0.137
	Southern welfare regime	−0.181(0.256)1.001	0.206(0.275)0.557
	Presence of left-wing parties in government	−0.009(0.015)0.108	0.012(0.014)0.764
	Net migration rate	0.010(0.015)0.108	−0.015(0.021)0.486
	Net migration rate	0.001(0.019)0.001	−0.012(0.018)0.459
Origin effects	Human development index	0.000(0.001)0.174	0.001(0.001)1.079
	Prevalently Christian country	0.091(0.098)0.870	−0.124(0.095)1.698
	Prevalently Eastern-Orthodox country	0.194(0.191)1.037	−0.075(0.181)0.170
	Prevalently Islamic country	0.074(0.130)0.320	0.101(0.124)0.663

Source: European Social Survey (2004), unweighted data.
Note: Every cell contains the following information: the size of the coefficient, followed by the standard errors in brackets and then the gain in –2 Log Likelihood that results from including the specific indicator. Significant coefficients are marked with * = p <0.05.

results from including these variables are displayed in Table 6 for the analysis of male and female immigrants. On the basis of these tests, we include the significant macro-characteristics of country of destination and of country of origin in Model 5. In Model 6, we add dummies for specific regions of origin. Finally, Model 7 is a reduced model which shows only the significant explanatory variables. In the analyses displayed in the tables, all effects are fixed.

Multilevel Analysis of the Highest Level of Education of Male Immigrants

Table 7 presents the results of the multilevel analysis of the highest level of education of male immigrants.

Model 0 shows that the vast majority of the variance in the educational achievement of second generation male immigrants is at the individual level (more than 80%), while the rest of the variance is mostly at the country of destination level and hardly at the country of origin level. This result (which is not exceptional

Table 7 Coefficients (and standard errors) of the multilevel regression of highest level of education of male second generation immigrants, N = 500

	Model 0	Model 1	Model 2	Model 3	Model 5	Model 6	Model 7
Mean education of male natives		1.130(0.213)	0.775(0.150)	0.777(0.150)	0.912(0.158)	0.919(0.164)	0.936(0.151)
One native, one immigrant parent		0.041(0.096)	−0.160(0.93)	−0.159(0.093)	−0.144(0.093)	−0.172(0.094)	−0.145(0.089)
Speaking minority language at home		0.006(0.206)	0.082(0.189)	0.184(0.283)	0.142(0.281)	0.142(0.281)	
Citizenship of destination country		0.298(0.165)	0.236(0.147)	0.101(0.215)	0.147(0.214)	0.112(0.220)	
Age			−0.004(0.033)	−0.002(0.033)	−0.006(0.033)	0.002(0.033)	
Age^2			0.000(0.000)	0.000(0.000)	0.000(0.000)	0.000(0.000)	
Parental education			0.217(0.025)	0.130(0.104)	0.151(0.104)	0.128(0.105)	0.133(0.068)
Parental education missing			−0.518(0.183)	−0.518(0.183)	−0.554(0.182)	−0.559(0.182)	−0.558(0.182)
Number of children			0.030(0.031)	0.028(0.032)	0.024(0.031)	0.025(0.032)	
Roman Catholic			0.034(0.086)	0.034(0.086)	0.060(0.086)	0.059(0.087)	
Eastern Orthodox			−0.381(0.193)	−0.366(0.195)	−0.178(0.207)	−0.318(0.239)	
Islam			−0.491(0.230)	−0.734(0.293)	−0.705(0.291)	−0.816(0.310)	−0.435(0.216)
Intensity of religious practice			0.004(0.027)	0.007(0.027)	0.005(0.027)	0.003(0.027)	
Parental education* Citizenship of destination country				0.089(0.105)	0.075(0.1059	0.093(0.105)	0.112(0.066)
Parental education* Speaking Minority language at home				−0.039(0.127)	−0.039(0.127)	−0.038(0.126)	
Parental education* Islam				0.185(0.144)	0.176(0.144)	0.186(0.143)	
EII: Naturalisation policies					0.573(0.225)	0.489(0.246)	0.668(0.202)
Origin: EU-15+						−0.116(0.150)	
Origin: Neighbouring countries						0.115(0.105)	

Table 7 (continued)

	Model 0	Model 1	Model 2	Model 3	Model 5	Model 6	Model 7
Origin: Former colony/territory						−0.079(0.1049	
Origin: Post-socialist countries						−0.182(0.143)	
Constant	2.813(0.131)	−0.636(634)	0.263(0.791)	0.319(0.799)	−0.089(0.810)	−0.102(0.819)	−0.257(0.430)
v_{0kl} (destination variance)	0.176(0.085)	0.023(0.020)	0.000(0.000)	0.000(0.000)	0.000(0.000)	0.000(0.000)	0.000(0.000)
U_{0jkl} (origin variance)	0.028(0.030)	0.012(0.025)	0.000(0.000)	0.000(0.000)	0.000(0.000)	0.000(0.000)	0.000(0.000)
E_{0ijkl} (individual variance)	0.832(0.057)	0.840(0.057)	0.699(0.044)	0.695(0.044)	0.686(0.043)	0.682(0.043)	0.694(0.044)
-2Log Likelihood	1,365.377	1,346.843	1,239.550	1,236.812	1,230.389	1,227.296	1,236.095

Source: European Social Survey (2004), unweighted data.

Table 8 Coefficients (and standard errors) of the multilevel regression of highest level of education of female second generation immigrants, $N = 523$

	Model 0	Model 1	Model 2	Model 3	Model 5	Model 6	Model 7
Mean education of female natives		0.803(0.153)	0.554(0.177)	0.479(1.72)	0.542(1.36)	0.569(1.50)	0.489(0.125)
One native, one immigrant parent		0.019(0.102)	−0.094(0.092)	−0.068(0.092)	−0.035(0.092)	−0.016(0.094)	
Speaking minority language at home		0.051(0.254)	0.216(0.225)	0.840(0.318)	0.862(0.317)	0.876(0.319)	0.907(0.314)
Citizenship of the destination country		0.229(0.205)	0.376(0.186)	0.749(0.286)	0.778(0.284)	0.791(0.285)	0.711(0.283)
Age			0.079(0.036)	0.075(0.036)	0.070(0.035)	0.071(0.035)	−0.013(0.004)
Age^2			−0.001(0.000)	−0.001(0.000)	−0.001(0.000)	−0.001(0.000)	
Parental education			0.247(0.024)	0.434(0.091)	0.453(0.091)	0.453(0.091)	0.426(0.091)
Parental education missing			−0.127(0.162)	−0.117(0.160)	−0.151(0.160)	−0.166(0.160)	
Number of children			−0.040(0.034)	−0.038(0.033)	−0.033(0.033)	−0.033(0.033)	
Roman Catholic			0.025(0.100)	0.030(0.098)	0.007(0.092)	0.005(0.092)	
Protestant			0.088(0.138)	0.092(0.136)	0.188(0.135)	0.154(0.137)	
Eastern Orthodox			−0.110(0.219)	−0.123(0.212)	0.123(0.195)	0.120(0.239)	
Jewish			2.189(0.861)	2.573(0.878)	2.546(0.874)	2.684(0.875)	2.495(0.880)
Non-Christian eastern religions			0.755(0.353)	0.758(0.350)	0.769(0.349)	0.782(0.349)	0.803(0.345)

Table 8 (continued)

	Model 0	Model 1	Model 2	Model 3	Model 5	Model 6	Model 7
Intensity of religious practice			−0.033(0.026)	−0.032(0.026)	−0.035(0.026)	−0.032(0.026)	
Parental education × Speaking minority language at home				−0.376(0.136)	−0.394(0.135)	−0.394(0.135)	−0.425(0.135)
Parental education × Citizenship of the destination country				−0.187(0.093)	−0.203(0.093)	−0.203(0.093)	−0.183(0.093)
EII: Naturalisation policies					0.675(0.213)	0.616(0.244)	0.504(0.185)
Origin: EU-15+						−0.021(0.147)	
Origin: neighbouring countries						−0.075(0.105)	
Origin: former colony/territory						0.113(0.105)	
Origin: post–socialist countries						−0.124(0.130)	
Constant	2.746(0.097)	0.351(0.459)	−0.746(0.901)	−0.873(0.918)	−1.047(0.877)	−1.191(0.890)	.607(0.466)
v_{0kl} (destination variance)	0.085(0.047)	0.000(0.000)	0.015(0.013)	0.013(0.012)	0.000(0.000)	0.003(0.007)	0.000(0.000)
u_{0jkl} (origin variance)	0.029(0.032)	0.043(0.030)	0.000(0.000)	0.000(0.000)	0.000(0.000)	0.000(0.000)	0.001(0.016)
E_{0ijkl} (individual variance)	0.889(0.060)	0.873(0.059)	0.697(0.044)	0.684(0.043)	0.682(0.042)	0.675(0.042)	0.697(0.046)
–2Log Likelihood	1,454.801	1,346.843	1,302.952	1,292.543	1,284.251	1,281.089	1,295.905

Source: European Social Survey (2004), unweighted data.

in cross-national comparisons of educational achievement of native students, the vast majority of the variance is also at the individual level, *cf.* Dronkers & Robert, 2008) underlines the overriding importance of individual differences between immigrants in comparison with their origins and destinations. But at the same time this large importance of individual differences does not mean that characteristics of the country of destination are irrelevant. With the analyses of Table 6 and the last models of Table 7 we try to find these relevant characteristics of country of destination.

Model 1 contains three immigration characteristics and the average educational level of the male natives in the countries of destination. By including the latter variable, the variance at the country of destination becomes insignificant. But the positive effect of this macro-variable is interesting in itself. It tells us that second generation male immigrants achieve a higher education level in those countries where their native counterparts also have higher educational levels on average. This positive effect cannot be explained by a higher educational level of their immigrating parents (either by the selectivity of the parents themselves, or the immigration authorities), because also after inclusion of parental education in Model 2 (which should take care of this selectivity effect) the positive effect of this macro-variable remains significant and positive. Thus, a more optimistic interpretation of this positive effect remains: countries of destination in which natives have a high educational level also promote the educational level of their immigrants, suggesting that educational systems work similarly for children of native and of immigrant parents. The three immigration characteristics have no significant effects on educational achievement. Citizenship of country of destination comes closest to a significant positive effect, and having mixed parents (one native, one immigrant) closest to a significant negative effect.

Model 2 has no surprises and largely resembles the final model of the OLS regression of Table 4. Only the significant positive effect of Roman Catholicism found previously is now insignificant, probably because the multilevel analyses takes better care of the nested structure of the data. Eastern Orthodox and Islamic religious affiliation still negatively influence the educational attainment of second generation male immigrants, despite control for parental educational background and immigration history. The significance of the effect of Eastern Orthodoxy dwindles after further controls (especially of naturalisation policies of the EU countries), but the negative effect of Islam remains strong and negative.

In Model 3, we test some interactions between parental educational level and immigration or religious characteristics, in order to see whether the effect of the latter is influenced by the social position of the immigrating parents. None of them are significant. The interaction of parental educational level and citizenship almost reaches significance in our most economical Model 7. The citizenship of the country of destination affects the educational level of second generation male immigrants more if they have higher educated parents.

In Model 4 (not displayed in Table 7) we add, one by one, the macro-characteristics to Model 3 of Table 7. The parameters of these added macro-characteristics are given in Table 6. We find only one significant macro-effect for male education: the naturalisation dimension of the European Civic Citizenship and Inclusion Index. None of the other macro-characteristics comes even close to a significant effect. Hence, our hypotheses on the possible effects of types of welfare state regimes, the presence of left-wing parties in the government and the net migration rate are rejected.

In Model 5 of Table 7 we see a small improvement of the fit of the model by adding the macro-variable naturalisation policy (decreases in individual variance and Log likelihood), but the addition hardly changes the strength or direction of the other individual variables. This suggests that this macro-variable is not directly related to the other independent variables. More favourable naturalisation policies are found to be positively associated with the educational attainment of second generation immigrants. In Model 6 characteristics of the relation between the country of destination and origin are added (neighbours; colony; post-socialist), but these variables have no significant effects.

In the final Model 7 all insignificant variables are deleted one by one, starting with those which had the smallest effect, but we kept those few insignificant variables which were necessary for a good fit of the equation. The final equation can be summarised as follows: (1) There are no significant gaps in educational attainment between second generation male immigrants and their native peers in the 13 EU countries studied; (2) second generation male immigrants in the EU with higher educated parents achieve higher educational levels, especially if they have the citizenship of their country of destination; (3) second generation male immigrants in the EU who do not know the educational level of their parents achieve lower educational levels; (4) second generation male immigrants in the EU with Islamic religion achieve lower educational levels than comparable male immigrants with other religious affiliation; (5) second generation male immigrants in the EU who are in a country of destination with a high average educational level of male natives achieve higher educational levels; (6) second generation male immigrants in the EU who are in a country of destination with more favourable naturalisation laws and policies achieve higher educational levels.

Multilevel Analysis of the Highest Level of Education of Female Immigrants

Table 8 presents the results of the multilevel analysis of the highest level of education of female immigrants.

Model 0 shows that the vast majority of the variance in the educational achievement of second generation female immigrants is at the individual level (nearly 90%, more than for male immigrants), while the rest of the variance is mostly at the country of destination level and hardly at the country of origin level. Again, this large importance of individual differences does not mean that characteristics of the countries of origin and destination are irrelevant. With the analyses of Table 6 and the last models of Table 8 we try to find these relevant characteristics of country of destination.

Model 1 contains three immigration characteristics and the average educational level of the female natives in the countries of destination. By including the latter variable, the variance at the country of destination becomes insignificant. But the positive effect of this macro-variable tells us that second generation female immigrants achieve a higher education level in those countries in which the native counterparts also have on average higher educational levels, although the effect is smaller than the analogous one for the male immigrants. This positive effect cannot be explained by a higher educational level of their immigrating parents (either by the selectivity of the parents themselves, or the immigration authorities), because even after inclusion of parental education in Model 2 (which should take care of this selectivity effect) the positive effect of this macro-variable remains significant and positive. Thus, we can conclude again that countries of destination in which natives have a high educational level promote also the educational level of their female as well as male immigrants. The three immigration characteristics have no significant effects on educational achievement, but in Model 3 two of them become significant together with the introduction of their interactions with parental educational background. Female immigrants who speak a minority language at home are not affected by their parental education, since the interaction cancels out the positive influence of parental education. Figure 3 shows the two slopes of parental education for immigrants who speak a national language at home and those who speak a minority language. Since the cut-point of both lines is to the left of the parental education scale, the penalty of speaking a minority language at home is largest among female immigrants with the most highly educated parents. However, among immigrants whose parents have maximally completed primary education, those who do not speak the national language at home achieve a higher level of education.

Citizenship of country of destination has a significant positive effect on educational achievement of second generation female immigrants with lowly educated parents. On the other hand, female immigrants whose parents have completed tertiary education are slightly negatively affected by holding the citizenship of the survey country. Figure 4 shows the two slopes of parental education for second generation female immigrants who hold the citizenship of the survey country and those who do not.

Model 2 again largely resembles the final model of the OLS regression of Table 3. Only the significant effect of the Jewish religion affiliation has remained significant, probably because the multilevel analyses takes better care of the nested structure of the data, making the effects of the other religions insignificant.[12]

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[12] Islam has no significant effect in the multilevel analysis for the female immigrants, again replicating the results of the OLS-regression for the female immigrants.

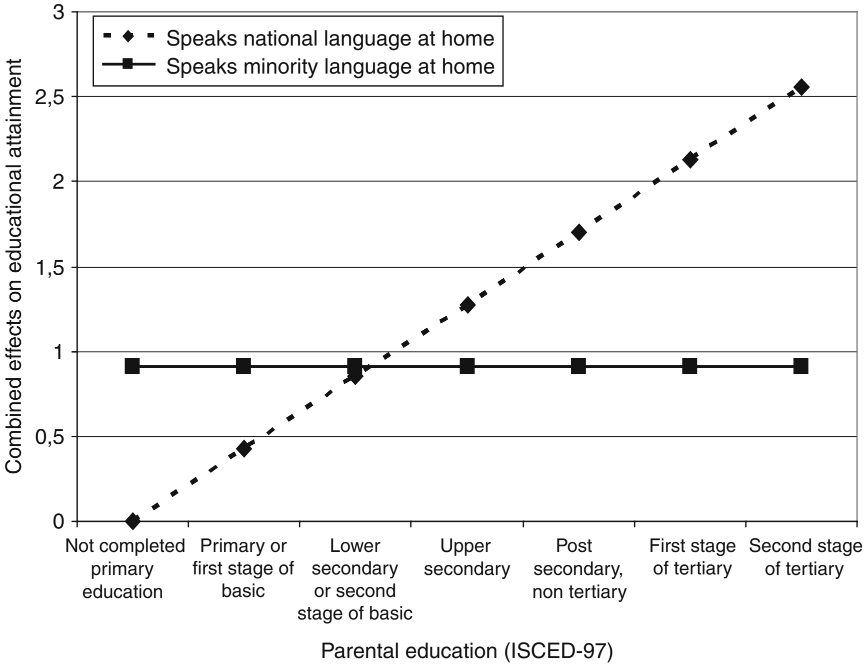

Fig. 3 The effects of parental education and language spoken at home on the educational attainment of female second generation immigrants

In Model 4 (not displayed in Table 8) we add, one by one, the macro-characteristics to Model 3 of Table 8. The parameters of these added macro-characteristics are given in Table 6. We find two significant macro-effects for female education: the naturalisation dimension of the European Civic Citizenship and Inclusion Index and the summary score of all dimensions of this Index. None of the other macro-characteristics comes even close to a significant effect. Hence, our hypotheses on the possible effect of types of welfare regimes, inclusion and labour-market policies, the presence of left-wing parties in the government and the net migration rate of the origin and destination countries are rejected, with one exception (naturalisation).

In Model 5 we see that only the naturalisation dimension has a significant effect if introduced together with the summary score of that dimension. There is a further small improvement of the fit of the equation by this addition (decreases in individual variance and Log likelihood), but the addition hardly changes the strength or direction of the other individual variables. This suggests that this macro-variable is not directly related to the other independent variables. In Model 6 characteristics of the relation between the country of destination and origin are added (neighbours; colony; post-socialist), but these variables do not reach significance.

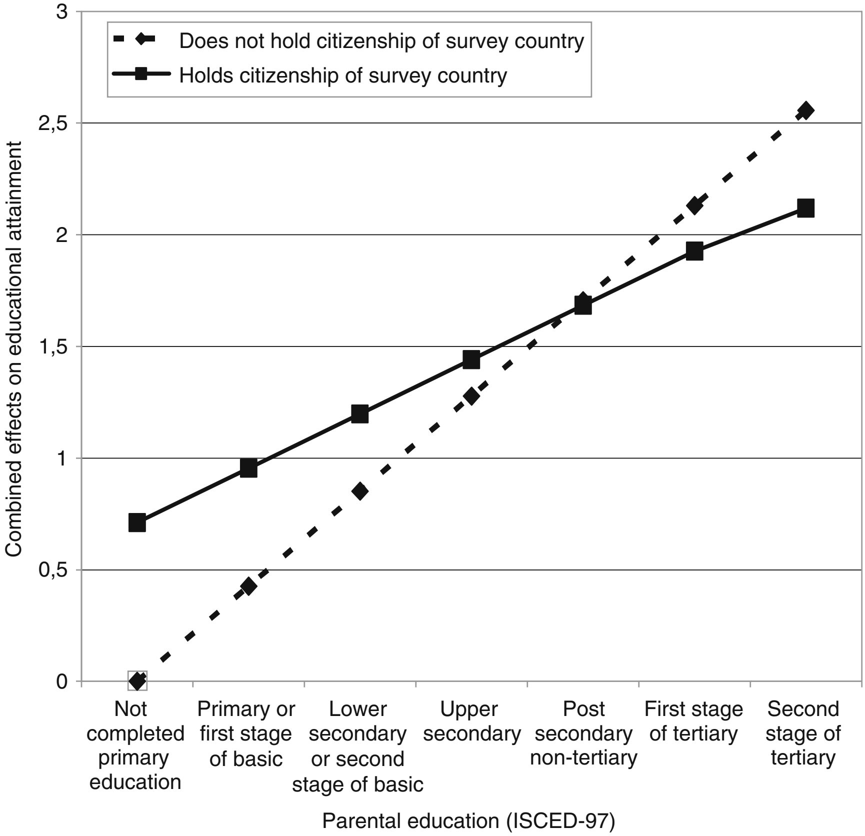

Fig. 4 The effects of parental education and citizenship of the survey country on the educational attainment of female second generation immigrants

In the final Model 7 all insignificant variables are deleted one by one, starting with those which had the smallest effect, but we kept those few insignificant variables which were necessary for a good fit of the equation. The final equation can be summarised as follows: (1) There are no significant gaps in educational attainment between second generation female immigrants and their native peers in the 13 EU countries studied; (2) second generation female immigrants in the EU with higher educated parents achieve higher educational levels, although this effect is somewhat attenuated if they have the citizenship of their country of destination; (3) speaking a minority language at home decreases educational attainment among immigrants with highly educated parents, but has a positive effect among those whose parents have maximally completed primary education; (4) citizenship of the EU country of destination has a significant positive effect on educational achievement of second generation female immigrants with lowly educated parents, but the effect becomes negative for those with higher educated parents; (5) second generation female immigrants with the Jewish religious affiliation achieve higher educational levels than other comparable female immigrants in the EU; (6) second generation female immigrants in the EU who are in a country of destination with high educational level of female natives achieve higher educational levels; (7) second generation female immigrants in the EU who are in a country of destination with more flexible naturalisation laws and policies achieve higher educational levels.

Discussion and Conclusion

The aim of this chapter was to analyse the educational attainment of second generation immigrants from different countries of origin in 13 EU countries, relative to that of the natives of these EU countries. We focused on second generation immigrants, who are born in the country of destination, because they have received their education in the country of destination.[13] Differences between their educational attainment processes and that of the natives cannot be explained by differences in the educational systems of the country of destination. The consequence of using the European Social Survey for this analysis is that our selection of second generation immigrants will be biased towards the better-integrated immigrants, instead of the illegal first generation immigrant who dominates the popular view on immigrants in Europe. That means that our estimates are conservative ones that might underrate the "real" effects of immigration. In other words, the significant effects found in this analysis with established immigrants cannot be generalised to all immigrants in the EU. The problem of generalisability applies also to our finding of the absence of gaps in educational attainment between second generation immigrants and their native peers. Finally, our operationalisation of the concept of "immigrant" is sensitive to the changes in the state borders after both World Wars and the accompanying replacement of large groups of persons (Greeks from the current Turkey to Greece; Poles from the current Ukraine to Poland; Germans from the current Poland to Germany; Frenchmen from the current Algeria to France). These displaced persons are a part of our immigration operationalisation, which highlights the conceptual problems in defining immigrants in Europe. Although our findings might, at face value, tell an optimistic story about the integration of second generation immigrants into European educational systems, we want to caution the readers about drawing too strong conclusions and especially of extrapolating from our findings to immigrant groups that are not well represented in our data.

[13] This is, however, an assumption that needs to be qualified by the findings of other research on educational careers of immigrants where it is frequently found that second generation immigrants, although being born in the country of destination, spend a part of their childhood in the country of origin, often in the care of members of the extended family. Hence, they might complete a part of their education, most likely at the primary level, in the country of origin.

Individual Effects

Our first hypothesis concerning the effect of parental education the educational level of second generation immigrants is supported for male second generation immigrants: the higher the parental education, the higher the respondents' education. For female immigrants, however, this positive effect only occurs if they do not speak a minority language at home. On the other hand, if they do speak a minority language, they are not affected by parental education.

Our second hypothesis about the importance of citizenship of the country of destination was partly supported for female immigrants, but not for male immigrants. We found that citizenship of the EU country of destination has a significant positive effect on educational achievement of second generation female immigrants whose parents have maximally completed upper secondary education. Among female immigrants with more highly educated parents, the effect of citizenship is negative, but rather small. We conclude that, at least among the female second generation, citizenship is more important for respondents from lower social origins. Although it is somewhat surprising that citizenship actually has a negative effect for women with tertiary educated parents, these female immigrants still achieve significantly higher levels of education than those with more lowly educated parents. Citizenship has no effect for male immigrants.

Our third hypothesis about the importance of speaking a minority language at home was contradicted for female immigrants. We found that speaking a minority language at home increases the educational attainment of second generation female immigrants in the EU for those female immigrants whose parents maximally completed primary education. Speaking a minority language at home, however, decreases the educational attainment for second generation female immigrants with parents with secondary education and even more so for those with tertiary educated parents. Speaking a minority language at home has no effect for male immigrants. The fact that, for female immigrants, the effect of language use depends on the level of parental education shows that speaking the national language at home has a different meaning for those with highly educated parents compared to those with more lowly educated parents. Lowly educated first generation immigrants will have much more problems in learning a new language. For immigrants with highly educated parents, on the other hand, speaking a minority language at home can be considered as a valid indicator of a lower degree of cultural integration. It is therefore not surprising that immigrants who do not speak the national language at home, although their favourable parental background provides them with the capacities to do so, have lower outcomes in terms of education. That speaking a minority language at home is an asset for female second generation immigrants with lowly educated parents might be explained along the same lines. Since lowly educated parents are likely to have a low level of proficiency in the host country language, they might also have less authority over their children who are better equipped to communicate in the national language of their country of residence. As a consequence, parental influence on their children might be lower, which also applies to the rather negative influence of low parental education on the educational attainment of the second generation. Another potential explanation might be that second generation immigrants who speak the national language at home and have lowly educated parents who are unlikely to be fluent in this language, have acquired limited proficiency in two languages (that of the host country and that of the parents' origin country) which results in lower educational attainment. It might have been more beneficial for them to gain a high level of proficiency in their parents' mother tongue first, which could then make it easier to learn the host country language and to attain a higher level of education. However, since the respondents in our sample in general do not live with their parents anymore, we do not know whether the language they speak at home corresponds to the language spoken in their parental home when they grew up.

Religion

We assumed that religious affiliation of immigrants affects their educational outcomes. This hypothesis is partly supported. Second generation male immigrants in the EU with the Islamic religion achieve lower educational levels than comparable male immigrants with other religious affiliations. Second generation female immigrants with Jewish religious affiliation achieve higher educational levels than comparable female immigrants in the EU. We found comparable negative effects of Islamic religion on four dimensions of labour market participation of immigrants (Fleischmann & Dronkers, 2007). We suggested three possible explanations for this Islam effect, which are also relevant for the negative effect on male educational attainment. First, it is possible that Muslims have a different religious habitus from non-Muslims that makes them less likely to succeed in European school systems, for instance if one of their religious values partly contradicts one of the conditions of success in these institutions. However, before drawing any strong conclusions based on a possible religious explanation, it deserves more detailed investigation, for instance with the help of religious variation within Islam (e.g. between Sunnites and Shiites).[14] A second explanation of our result might be discrimination against Muslims, be it direct or indirect, in the 13 EU countries. We are aware that this is a strong claim, but the persistence of the negative effect of being a Muslim after controlling for parental education makes this second explanation plausible. A third explanation is the deviant selectivity of the "guest workers" who were imported from three Islamic countries (Morocco, Algeria, Turkey). The selection of these "guest workers" deviated from that of other immigrants from different countries of origin: they came from the poorest and most underdeveloped regions of these countries and were specifically selected on low skills in order to avoid competition for native skilled workers in a number of European countries (Belgium, France,

[14] Unfortunately, we cannot take this large variation into account since it is not measured in the European Social Survey.

Germany, the Netherlands, Sweden). Due to this extra-large distance between origin and destination of these “guest workers”, their children have more problems in the educational systems than other migrants to Europe (also because they maintain family and marriage links with their regions of origin). The Muslim religion variable picks up this “guest worker” background, which we cannot measure directly with our data. With the data at hand we cannot exclude any of these three possible explanations, but whatever explanation will be correct, the negative effect of being a Muslim on male educational achievement is a serious problem for European societies and their ability to integrate the most important part of the non-European immigrants, which adheres to the Islamic religion.

We do not find a negative effect of Islam on female educational attainment. The absence of this negative effect might reflect the liberating effect of immigration to Europe for Muslim women, because they might have more opportunities for educational success in Europe than in their country of origin.

We found that second generation female immigrants with the Jewish religious affiliation achieve higher educational levels than comparable female immigrants in the EU. This positive effect of the Jewish religion could be explained by the high value of education within Judaism. But we have no good explanation why we find this positive effect only for women.

Macro-effects

The average educational level of the natives of the countries of destination is the most important macro-characteristic of the country of destination affecting individual educational achievement of both male and female second generation immigrants. This means that the more opportunities an educational system of a country of destination offers to the natives, the more second generation immigrants will profit from these opportunities as well.

The second significant macro-characteristic of the country of destination is its naturalisation policy. The more generous the naturalisation laws are of a country of destination, the higher the educational level of both male and female second generation immigrants. A possible explanation of this positive relation is that the generosity of the naturalisation laws of a country of destination indicates the relative openness of that society towards outsiders like immigrants. In contrast to findings from Switzerland, where a very strict naturalisation policy leads to selectivity in naturalisation so that higher educated second generation immigrants become Swiss citizens more often than their lower educated counterparts (Fibbi, Lerch, & Wanner, 2007), our results indicate that relative openness in terms of naturalisation policy might encourage the second generation immigrants to achieve more in education.

Other macro-characteristics of countries of origin and destination have no significant effects on educational outcomes of these immigrants, so all our hypotheses on their possible effects must be rejected.

Appendix

Table 9 Countries of origin classified as neighbouring countries per country of destination

Country of destination	Neighbouring countries
Austria	Switzerland, Liechtenstein, Italy, Germany, Czech Republic, Slovakia, Hungary, Slovenia
Belgium	France, The Netherlands, Germany, Luxembourg, United Kingdom
Germany	Denmark, Poland, Czech Republic, Austria, Switzerland, France, Luxembourg, Belgium, The Netherlands, United Kingdom
Denmark	Germany, Sweden, Norway, United Kingdom
Spain	Portugal, France, Morocco
Finland	Sweden, Norway, Russian Federation, Estonia
France	Belgium, Luxembourg, Germany, Switzerland, Italy, Spain, United Kingdom
United Kingdom	Ireland, Belgium, The Netherlands, Germany, France, Denmark, Norway
Greece	Albania, Macedonia, Bulgaria, Turkey, Cyprus
Ireland	United Kingdom
Luxembourg	Belgium, Germany, France
The Netherlands	Belgium, Germany, United Kingdom
Portugal	Spain
Sweden	Denmark, Norway, Finland, Estonia, Latvia, Lithuania, Poland

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Talking the Same Language: How Does Education in the Mother Tongue Affect the Pupils' Scholastic Achievement in the Parallel School Systems?

Adél Pásztor

Introduction

Schooling and the labour market outcomes are considered to be the main indicators of minority integration in current sociological research. So far, the study of integration processes has mainly concentrated on the scholastic performance of various immigrant groups across countries, while giving little attention to the performance levels of non-immigrant ethnic minorities. While the PISA results of pupil's reading, mathematical and scientific literacy skills pointed at a large gap between the scholastic performances of native pupils compared to pupils of foreign background across many industrialised countries, little is known about the performance of pupils belonging to an autochthonous group. Though, many European countries have ethnic minorities who are not descendants of migrants or migrants themselves, but are either indigenous or have settled in that country a long time ago. At times, they are referred to as autochthonous minorities, other times as national minorities or simply ethnic or linguistic groups with varying status in their country of living.[1] Current sociological research has not widely analysed the scholastic achievement and educational pathways of European autochthonous minorities, hence we don't know if there is a convergent "minority experience" in terms of schooling throughout Europe.

In this study, I will use the term "autochthonous" to refer to indigenous ethnic groups while looking into the "parallel" schools of Swedish-speaking Finns in Finland, Hungarian speakers in Slovakia and German speakers of Bolzano, Italy. Empirical analysis will attempt to shed light on the question whether there are significant differences between countries in the degree of integration of

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[1] Some ethnic minorities are officially recognised minority groups having special rights and privileges; others have particular language rights, while another may have no rights at all. To complicate the situation even more, the same minority group might be officially recognised in some countries but not in the others.

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autochthonous groups and illustrate what the features are of the educational systems favouring their integration. As a result, the inclusion of autochthonous pupils would not only add a further interesting point to the analysis of ethnic inequalities but will complete the mosaic of ethnic differences in educational achievement.

Theoretical Framework

Breton's Theory of Institutional Completeness

The beginning of the twentieth century was marked by the emergence of theories of assimilation based on the "American example". Starting from Park and Burgess' (1921) definition of assimilation in the early 1920s, Milton Gordon (1964) built up a multidimensional view on the process through which immigrant individuals were expected to assimilate into the mainstream. Although the classical theories of assimilation were very influential, they were based on micro level only, i.e., on immigrant individuals, and neglected the group levels of ethnic change. As a result, these theoretical frameworks cannot be easily adapted to assess the integration of autochthonous groups who didn't individually move but were incorporated into their "host societies" at a group level. Therefore, Breton's theory of integration of ethnic groups may offer better prospects for adaptation for the aims of my analysis.

In the same time as Gordon developed his classical theory of assimilation, Raymond Breton (1964) drew up an alternative view on ethnic assimilation based on Canada. According to Breton, the integration of immigrants should not be seen from a purely assimilationist perspective. Between the immigrants' absorption into the host society and the other end, the immigrants' possible unintegration, he saw a third way, i.e., immigrants establishing "a network of social affiliations extending beyond the boundaries of any one community" (Breton, 1964:193). Given that primary group affiliations of immigrants are crucial for their integration into the host society, he introduced the term "institutional completeness" referring to the degree to which an ethnic community could perform all of the services required by its members. Breton expected a linear relationship between the degree of institutional completeness and the level of integration of certain ethnic groups. His concept helped to explain various groups' resistance to assimilation while successfully maintaining cultural boundaries.

By focusing on the integration of immigrants – instead of their assimilation – Breton identified three distinct directions of their possible absorption: the community of their own ethnicity, the native community and other ethnic community. He strongly supported the idea that, "the integration of immigrants cannot really be studied without taking into account the fact that it can be achieved in at least two directions, that is, within the native or within the ethnic community" (Breton, 1964:202). Specifically, Breton went on to study the influence of the institutional completeness of the immigrant's own ethnic community on the direction of his social integration. According to his view, ethnic communities generally vary in their social organisation ranging from informal networks up to formal organisations. In the first stage, the community consists of a network of interpersonal relations of its members, which in the further stages can develop into a more formal structure containing organisations of various sorts (religious, educational, political, recreational, national, professional, etc.). Some ethnic communities may have welfare and mutual aid societies; may operate their own radio and TV channels, publish their own newspapers and periodicals and sustain commercial and service organisations. Finally, they may have their own churches and sometimes their own schools. In an ideal situation, the ethnic community could perform all the services required by its members, so that they never have to make use of native institutions in terms of education, work, clothing, food, medical care or social assistance.

The ability of the ethnic community to attract the immigrant into its social boundaries is the main focus of Breton's theory. The central factors underlying the formation of ethnic organisations he identified as social and cultural differentiation, the level of group resources and the pattern and rate of migration. First and foremost, the differentiating characteristics of an ethnic group can constitute the basis for the formation of ethnic organisations. Considering language, religion and colour, language differences were associated with the highest degree of institutional completeness in his research. Overall, the more different the people of a certain ethnicity were from the members of the native group, the easier it was for them to develop their own institutions to satisfy their needs, even though the mobility potential of immigrants could have been significantly reduced by such factors. According to Breton, once a formal ethnic structure has developed, it had the effect of reinforcing the cohesiveness of already existing networks and of expanding these networks by strengthening the ethnic identity of their members. Still, it doesn't necessarily prevent its members from establishing relations outside its boundaries. "The existence of an institution in the group would tend to have observed effect on the cohesiveness of the ethnic group irrespective of the orientation towards the native and its own national culture" (Breton, 1964:197).

Breton's theoretical concept was originally based on immigrants, but many researchers adopted institutional completeness to determine the persistence or lack of persistence of ethnic groups in specific settings. Vallee (cited in Roberts 1979) identified two key variables that explain the persistence of French groupings outside Quebec: group autonomy and the institutional completeness; the latter related to ethnic community decision-making for assessing their continuation potential. The theoretical concept has been validated by determining both the number and the range of such institutions present in the region of French speakers. Similarly, Joy (cited in Roberts 1979) asserts that for the sake of maintaining their ethnic identity Canadian French speakers are generally hesitating to move into areas with low level of institutional completeness of their ethnic community.

Breton's concept has been exposed to criticism by various scholars. Baureiss (1981) argued that his theory fails to explain the decline of activities within ethnic communities, neither the disappearance of certain ethnic communities in spite of the continuing immigration flows. Another important shortcoming of his argument is that he saw the formal organisations freely competing to tempt its members, through which he ignored the discriminatory treatment from the host society which ethnic groups might have encountered. Accordingly, the group's resilience towards assimilation might not be the only factor responsible for the evolvement of institutional completeness, rather it is very likely that the discrimination experienced in the host society pushes people towards their ethnic community, i.e., the outside discrimination and "the forces of attraction" work hand in hand.

Serious criticism targeted Breton's operationalisation of the concept, which failed to do justice to its theoretical promise (Roberts & Boldt, 1979). On the one hand, he ignores the complexity of ethnic organizations; only three types of ethnic institutions are included into his index of institutional completeness. While he assigns to the religious institutions the greatest effect in keeping the immigrant's personal associations within the boundaries of the ethnic group – given the dominant role they hold in the community – he totally omits ethnic schools and voluntary associations in spite of his own view that they are "not only numerous but also very significant in the social life of any ethnic community" (Breton, 1964:195). He does so under the assumption that the distribution of these associations among various groups would be about the same as the distribution of the included associations.

On the other hand, he simply applies an enumerative approach and relies on the amount and the complexity of formal organisations in which immigrants are involved in determining the level of integration of an ethnic group. In line with his argument, the more formal organisations an ethnic community offers to the new immigrant, the greater is its absorbing capacity. Roberts and Boldt (1979) point out that the mere existence of ethnic institutions, i.e., "the number of churches, welfare organisations, newspapers and periodicals in each ethnic community" (Breton, 1964:195) would be sufficient in determining an ethnic group's institutional completeness as it ignores the possibility that "there are particular characteristics of ethnic institutions that may make some significantly more effective than others as instruments of boundary maintenance, and their effect is therefore not simply additive" (Roberts & Boldt, 1979:103). They urge to add a qualitative dimension to the concept, referring to the importance of the nature (kind and intensity) of role relationships within ethnic institutions and to the control these institutions exercise over their members: "the extent to which shared role expectations are 'imposed and received' versus 'proposed and interpreted' " (Roberts & Boldt, 1979:104). While Baureiss agrees that the degree of integration cannot be assessed unless the quality of organisations is analysed, he goes beyond this point by calling for a rigorous assessment of the ethnic institutional structure; the latter will be the aim of this chapter.

Data, Methods and Research Question

Following Breton's theoretical framework, my main research question is whether institutional completeness ensures social integration where I associate the highest level of institutional completeness with having separate school systems within the national system of education referred to as parallel schools later. In line with the criticism, I abandon the enumerative approach and study the characteristics of the parallel systems by assessing their quality, and I do so through comparing the scholastic achievement of students attending such schools.

I propose to use the PISA (Programme for International Student Assessment) data measuring the scholastic achievement of 15-year-old students across several OECD and non-OECD countries.[2] Throughout the analysis, students of the parallel school systems will be compared with each other in terms of their scholastic performance. First, I compare the mean achievement of students across all subjects for general overview; then, I concentrate on the mathematics test results in order to guarantee the highest level of comparability between the two parallel systems.[3] To ensure that the achievement level of pupils could not be attributed to their social background and other related factors, I control for the demographic and socio-economic characteristics of students together with other school-related factors. In order to ensure high level of comparability across countries, I intend to reflect on each country or region's history, language policy and the character of the educational institutions in more detail.

Overall, concentrating on Finland, Slovakia and Bolzano (Italy), I will attempt to examine whether there are significant differences between countries in the degree of integration of autochthonous groups and whether the effects of institutional completeness can be generalised, i.e., they work in the same way in all of the objects of my analysis.

Mapping the Educational Terrain

Finland

In Finland, the Swedish speakers form the largest non-native group; they are defined as those Finns who speak Swedish as their mother tongue. The Swedish-speaking population is primarily concentrated in the western regions and the coastal areas of the country totalling 292,000 people (about 5.6% of the country population). The Aland Island,[4] which forms an autonomous region, has a monolingual Swedish

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[2] As for the PISA country samples, the existence of the parallel school system was taken into account by the sample construction: the country samples are stratified in order to represent the 15-year-old population regarding the language of instruction (see Table 5).

[3] Given that the main difference between the two educational systems lies in the language of instruction, a comparison based (solely) on the reading competence would imply comparing the acquisition of different languages. Hence, I concentrate on the mathematic performance with contrasting it to reading scores.

[4] Soon after the Finnish independence Swedish speakers of the Aland Islands required to join Sweden. The Council of the League of Nations solved the conflict by confirming the sovereignty of Finland over the islands in exchange for a high degree of cultural and political autonomy. Now, the Aland Islands are a self-governing province in all areas such as education, culture, health

population, but the majority of Finland Swedes are bilingual. Given that both the Swedish and the Finnish language are national languages of Finland, a sizeable proportion of the native Finnish population is bilingual too. Hence, it is likely that close to 600,000 Finnish citizens use Swedish in their everyday lives (NFP Finland, 2004; Swedish in Finland 1992, 1999, 2004; The Swedish language in education in Finland, 1997).

The history of Finland Swedes is the history of Finland; their origin dates back to the eleventh and thirteenth centuries when they settled on the western and southern coasts and islands. Since that time, the community has been divided into two groups: the rural population consisting of farmers and fishermen (both Finnish and Swedish), and the urban upper class made up from the Swedish nobility and bourgeoisie. The latter led the country through the Kingdom of Sweden, the Russian Empire and even at the time of the independence of Finland. After being part of Sweden for 650 years, Swedish was the official language of the territory until the independence in 1917. Hence, the Swedish upper class always played a crucial role in the history of Finland. Given that Finland Swedes tend to be overrepresented in the upper class, the overall wide social distinctions have always been more important than the ethno-linguistic ones (Swedish in Finland 2004).

The Constitution of Finland states that Finnish and Swedish are the official languages of the country and guarantees the right to use their mother tongue to all citizens in any official relation with the state and public administration. Swedish and Finnish are clearly differentiated by having an independent social life as well, including their own cultural centres and theatres, operating two radios and a TV channel and publishing nine Swedish newspapers. The religious life is divided too: the Lutheran State Church operates on linguistic grounds where the Swedish-speaking population forms its own parishes placed under an autonomous Swedish-speaking bishopric.

Swedish speakers have the right to education in their own language at all levels of the educational system, i.e., from kindergarten up to university. Finland Swedes have their own public, independent education system. There are Swedish day-care centres, basic and comprehensive schools, as well as upper-secondary and vocational schools and polytechnics. While two universities operate primarily in Swedish, there are quotas for Swedish-speaking students at Finnish universities in different fields. The Swedish speakers regard their schools as “the foundation of the Swedish language and culture in Finland, and deems them necessary for preserving the linguistic heritage of the Swedish-speaking minority” (NFP Finland, 2004: 20).

The parents have the right to choose the language of schooling for their children. Given that Swedish has still a high prestige in the country, about a quarter of pupils enrolled into Swedish schools actually come from mixed or even Finnish-speaking families. The Swedish primary and secondary schools are mainly located in the coastal areas having the highest density of Swedish-speaking population.

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care, social issues, municipal administration, postal services, radio and TV and local business and industry.

The Swedish-speaking institutions are provided a complete syllabus parallel to the majority of Finnish-speaking schools. The Swedish syllabus emphasises the role and use of Swedish language by giving adequate training in the majority language at the same time in order to ensure that the pupils become bilingual.

To guarantee the bilingualism of Finnish speakers, too, and to ensure that the Swedish speakers can use their language in every situation of life, Finnish speakers are required to learn the language of the other group as well. Practically, whereas most Swedish speakers choose Finnish as their first foreign language in the third grade – and later in the seventh English, Finnish speakers generally do it the other way around. Consequently, Swedish speakers speak much better Finnish than Finnish speakers speak Swedish.

Given that the Finnish law prohibits the collection of statistics identifying individuals by race, ethnicity or minority status, comprehensive data on the participation and performance of these minorities in education are scarce.[5] Apart from the relatively small ethnic groups, which are still missing from the international surveys, the Swedish speakers were well represented in the PISA sample, hence a comparison of their education achievement to the Finnish speakers is feasible to accomplish.

The Finnish PISA sample covered 5,796 students in 197 schools (Table 5). Over 20% of tested students were Swedish speakers (1,192) who attended 50 schools with Swedish language instruction. Hence, the proportion of Swedish schools made about 25% of the total number of schools in the country sample (Kupari, 2004). As for geographical distribution, the Swedish schools were concentrated in smaller settlements, given that 60% of the included schools are in villages or smaller towns having less then 15,000 people. A further 40% of Swedish schools is evenly distributed between larger towns and cities. The Finnish schools were more likely to be found in cities and larger towns (57%) only 11% is placed in villages having less then 3,000 people.

While the gender distribution is 50–50 in the Finnish sub-sample, the Swedish schools have slightly higher proportion of females than males (52.8%). All the 15-year-olds were attending a comprehensive secondary school at the time of the data collection. Private schools didn't seem to be typical for Finland, as the large majority of students attended public institutions. Actually, twice as many Finnish schools were private than Swedish, the latter comprising only 2.7% of all schools in the country sample.

Figure 1 shows the mean achievement scores of the 15-year-olds in the four subject areas (maths, reading, science and problem solving). Within Finland, the Finnish schools' performance stands out, even though the Swedish[6] school students'

[5] Studies generally have to rely on indirect measures such as the mother tongue and nationality of students – if available at all – to get some information. Still, it doesn't provide a solution for the Sámi, Roma and the Tartars who can be easily included among the native group.

[6] Throughout the analysis I distinguish students regarding the language of instruction of the school they attend. Therefore, generally, by saying "Finnish school student" I refer to students attending a school with Finnish language instruction, while the label "Swedish school student" refers to students attending schools with Swedish language instruction in Finland and so on.

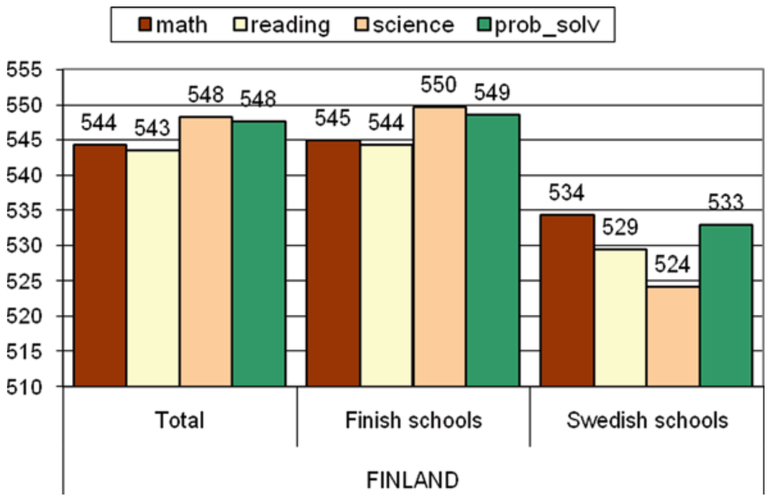

Fig. 1 Mean scholastic achievement by subjects, Own calculations based on PISA 2003 data

achievement is not considerably lower. The highest gap between the two schools is in science, the smallest in mathematics (all are statistically significant).

As for gender differences (Fig. 2), while boys slightly prevail in mathematics, girls seem to dominate the rest of the subjects, having the highest advantage over the "stronger gender" in reading. The comparison of the two parallel school systems doesn't change the described situation; boys and girls are similarly advantaged or disadvantaged in the tested subjects, irrespective of the language of the school attended.

Looking at the relationship between mothers' education level and the children's achievement (Table 1), a similar trend emerges in both of the systems:

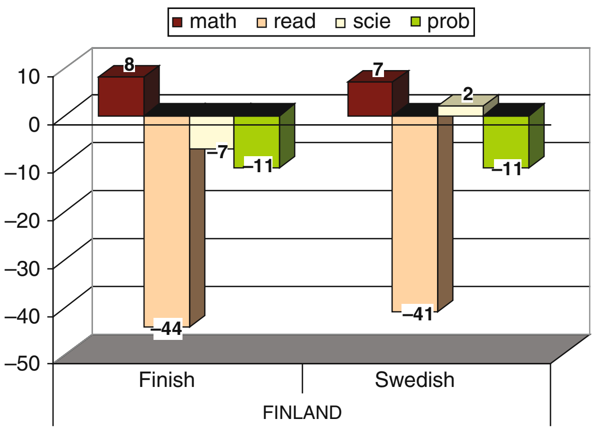

Fig. 2 Gender differences in mean achievement (male minus female) Own calculations based on PISA 2003 data

Table 1 Mean scholastic achievement by mothers' education, Own calculations based on PISA 2003 data

	Swedish					Finnish				
	Maths	Reading	Science	Problem solving	N	Maths	Reading	Science	Problem solving	N
Primary and lower sec.	514	514	502	519	486	520	523	529	530	8.878
Secondary	529	526	518	526	1.783	545	546	548	548	31.328
Tertiary	559	549	550	556	964	565	559	571	566	13.195
Missing	479	475	478	483	74	507	499	506	508	1.175

the performance of pupils is rising with higher levels of parental schooling, even though the mean achievement of Swedish pupils is slightly lower than their Finnish counterparts.

In the next step, we confirmed these results via regression analysis in order to check whether the mentioned differences in achievement are the result of the different school systems or only attributable to the different background characteristics of their students. According to the OLS regression, there is a 10.5 point difference in mathematics achievement between the Finnish and the Swedish school students' performance, which slightly increases to 11.5 after controlling for the background of students (including variables of parental education, parental occupation and home possessions together with gender and grade). Overall, the model is significant with an R^2 of 16.5% ($N = 57.884$). For comparison, the differences are slightly larger by the reading performance, starting from 14.8 point up to 17 after controlling for the students' characteristics (R^2=23.3) but overall the gaps are not considerably enlarged.

Slovakia

The Hungarian national minority comprises the largest minority group in the Slovak Republik (520,000 people, about 10% of the population). Hungarians are mainly concentrated in the southern part of the country, residing in mostly rural areas along the 500-km-long Hungarian–Slovak border. Hungarians have lived at that territory since the tenth century and for centuries they were the majority population; first within the Hungarian state and later within the Austrian–Hungarian monarchy. The minority–majority relations have changed radically after the World War when due to the Trianon Treaty of 1921 they became a minority. But the borders were changing again in 1938 when Southern Slovakia was annexed by Hungary after the Vienna Arbitration. In 1945, the territory was "returned" to the newly established state of Czechoslovakia. Following the war, Hungarians were deprived of citizenship and about 44,000 Hungarians were deported to Czechia as manual workers, and further 65,000 were resettled in Hungary in the frame of an "exchange program". The exodus of Hungarian intellectuals from Slovakia twice in this century resulted in a rather low socio-economic status and low overall level of education of the minority population, and thus relatively low prestige of Hungarian language (Hungarian in Slovakia, 1992, 1999, 2004; NFP Slovakia, 2004; The Hungarian language in education in Slovakia, 2005).

The Hungarian minority of Slovakia is highly organised. Besides the political parties, there are several associations, foundations and funds representing the general interests of the Hungarians of Slovakia. There is a relatively large number of Hungarian print media (newspapers and magazines) and the state TV has its own Hungarian section broadcasting on weekly basis. In the regions mostly populated by Hungarians, the television programmes of the neighbouring Hungary can be received too. Regarding church affiliation, in the southern part of the country masses in both Hungarian and Slovak languages are offered.

The educational needs of the Hungarian population are covered by a separate educational system parallel to the Slovak one,[7] which teaches the very same national curriculum (translated into Hungarian language). While pupils attending the Hungarian schools are taught the Slovak language from the first grade of primary school, no Hungarian language education is offered in the Slovak schools. Hence, the only way for Hungarian children to become bilingual and literate in both languages is via the minority school system.

The Hungarian population have the right to be educated in their mother tongue from preschool level until higher education. Hence, the vast majority of Hungarian school-aged population attends schools with Hungarian language instruction. Mother tongue education at primary school level is widely accessible in the areas densely populated by Hungarian speakers. However, most of the Hungarian schools were not newly created but rather "inherited" from the original Hungarian school system, which functioned in the area before the great World Wars. Overall, schools with Hungarian language instruction are most numerous at primary school level, whereas their numbers tend to decrease towards the higher levels given the structural inequalities of the minority educational system. For example, at secondary school level, the parallel Hungarian school system is slightly skewed towards the gymnasia (college prep. track), which offer full Hungarian language instruction keeping the long-standing traditions in the area. Conversely, the technical and vocational schools being created subsequently in the fifties are not so numerous. Until very recently, there was no Hungarian higher education institution either, university education in Hungarian language was limited to the (minority) teacher profession offered by two Slovak universities. In 2003, as an incentive to raise the proportion

[7] The constitution of the Slovak Republik guarantees the rights of ethnic minorities to be educated in their mother tongue at levels relative to their size and regional distribution. The legislation differentiates the Hungarian language, the Ukrainian and Ruthenian languages and other less widely spoken languages (Czech, Croatian, Polish, Bulgarian, German and Roma) for the purpose of school instruction. Hungarians are allowed to use their language in contacts with local authorities in municipalities were they reach at least 20% of the population.

of university-educated minority population, a new public university was founded, offering courses in theology, economics and pedagogy in Komarno.

As for the PISA sample, the existence of the parallel Hungarian school system was regarded by the sample construction, allowing us to compare the educational achievement of both groups. The Slovakian PISA sample was stratified by the language of instruction (Hungarian or Slovak). After the exclusion of problematic cases, 7,346 students in 281 schools were forming the country sample (Table 5). This sample included 426 Hungarian students attending 19 schools with Hungarian language instruction (Národna správa PISA, 2003), where about 40% of the surveyed 15-year-olds were still in primary school (primary schools last for 8 years in Slovakia), the rest attended some sort of secondary school.

Concerning the characteristics of the schools included in the sample, 12% of majority schools and 15% of minority schools were private schools. While 8% of majority primary schools are private, all minority primary schools are public institutions. Regarding the secondary level, the proportion of private institutions in the minority sample exceeds that of the majority, by reaching 23% (compared to 14%). This can be explained by the structural inequalities of the minority school system, i.e., the demand for minority schools facilitated the grounding of private institutions to cover the needs of Hungarian students for secondary schooling at diverse tracks.

As for school location, over half (55%) of the minority schools are located in villages and small settlements up to 15,000 inhabitants. The same applies only to one-third of the majority schools. The relatively high proportion of small settlement minority schools is due to the geographical dispersion of the Hungarian population. Hungarians in Slovakia are living in mostly rural areas. In 435 villages and towns, the proportion of Hungarians is over 50%. In the more urbanised areas, and especially in the larger towns, their proportion is below 10%, e.g., in the capital of Slovakia only about 4% (Census 2001).

The mean school achievement through the four test subjects is close to the OECD mean with the exception of reading, which shows weaker results (Fig. 3). These findings go hand in hand with the national curriculum, which tends to emphasise natural sciences over humanities and social sciences. As for differences between the parallel school systems, there are no major differences across the four subject areas. The largest difference is in mathematics totaling 6 points in favour of the majority school students, while minority school children's literacy in reading and science is 1 point higher than that of the natives (these differences are not statistically significant). Hence, according to the PISA data, the two school systems show similar results in terms of educational performance.

The gender-related differences (Fig. 4) are more remarkable in terms of school achievement posing a question on the influence of teacher expectations on students' performance levels. While males have an advantage of about 20 points in mathematics tests in both of the schools, the minority school system tends to encourage female students by reducing their disadvantage in science and problem solving to almost 0 compared to their male counterparts. However, minority boys' reading

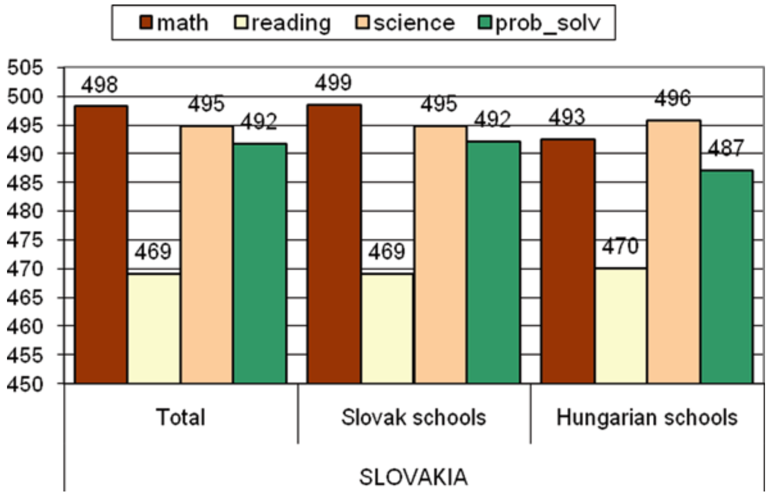

Fig. 3 Mean achievement by subjects, Own calculations based on PISA 2003 data

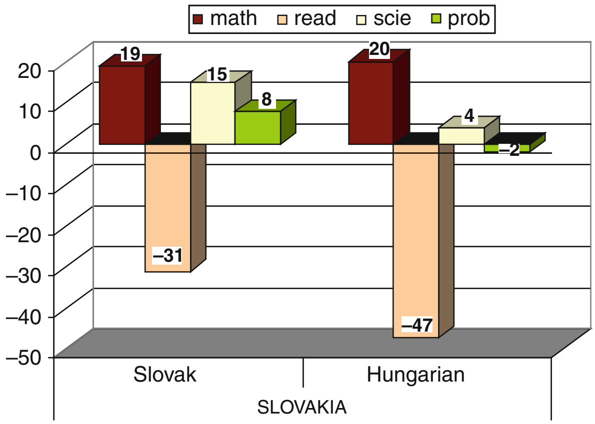

Fig. 4 Gender differences in mean achievement (male minus female) Own calculations based on PISA 2003 data

achievement suffers, as they lag behind the girls considerably, given the 47 points of difference.

While the relationship between mothers' education and children's performance is similar in both of the systems (Table 2), there seems to be a positive effect of the minority school system in integrating disadvantaged children. Overall, there is a smaller gap between students coming from lower-educated parents (mother having lower secondary education or less) and students from more advantageous background in the minority school system, which points at the importance of schooling in equalising inequalities.

Table 2 Relationship between the students' scores and their mothers' level of education, Own calculations based on PISA 2003 data

	Hungarian					Slovak				
	Maths	Reading	Science	Problem solving	N	Maths	Reading	Science	Problem solving	N
Primary and lower sec.	442	437	450	444	345	418	400	400	412	5.021
Secondary	494	472	496	488	3.229	496	468	493	489	56.207
Tertiary	545	514	566	538	389	556	515	556	550	10.957
Missing	418	361	357	410	100	415	383	410	395	819

The results of the OLS regression analysis only slightly mediate the original 6 point difference in mathematics scores, which is increased to 8 points by controlling for the background characteristics of the students with an R^2 of 26.6% ($N = 77{,}067$). As for reading performance, the difference between the students' achievement in the parallel school systems is non-significant.

Italy: Bolzano

The Italian Constitution recognises and protects several *linguistic minorities* in their respective regions throughout Italy. The German population of South Tyrol, for example, has ample autonomy and protection under the law, although it comprises less than 1% of the total population. About 287,000 people or 69% of the population of South Tyrol has German as its mother tongue, while the rest of the population is either Italian (27%) or Ladin (4%) (German in Italy, 1992, 1999, 2004; NFP Italy, 2004; The German language in education in South Tyrol, 2002).

Regarding the history of South Tyrol, the region was settled by Bavarians and Longobards since the sixth and ninth century. As part of the Frankish Empire and later the Holy Roman Empire, the region had a strategic importance being a bridge to Southern Italy. The Earldom of Tyrol went over to the Habsburgs in 1363 who ruled in until 1918. With the dissolution of the Austrian–Hungarian monarchy, the Italian-speaking province Trentino was attached to Italy, and according to the London Treaty, Italy has annexed the southern part of Tyrol, inhabited by ethnic Germans and Ladins. The territorial arrangements were later confirmed by the Treaty of Saint-Germaine in 1919. Starting from 1926, a strong Italianisation was implemented in the region. After the Second World War, the German-speaking majority requested reunification with Austria, which had been rejected. With the Treaty of Gruber-De Gasperi (1946), the German speakers would have granted special rights but the implementation of the statutory order delayed. As a consequence, between the 1950s and 1960s anti-Italian insurgency has risen in Tyrol, which put pressure on the central government resulting in a high degree of autonomy for the province (1972).

To some extent, South Tyrol is still divided by ethnic lines: each resident has to declare his language group at the census. The German language has a high prestige in the province claiming that German is of value for social mobility. Public jobs are assigned by ethnic quotas, requiring proficiency in both languages. Regarding the media, there are three main German language newspapers and several periodicals, and many books are published in German. The province has one public radio station and numerous private ones, and German language television can be received from Austria. There are many German language associations and the church is highly regarded as giving institutional support for German.

The educational system offers the same rights to both German and Italian speakers. Accordingly, two parallel but separate school systems function next to each other in the province; giving access to education in the mother tongue from preschool until university level. The school choice is not dependent on the nationality, rather the parents are given the opportunity to choose the language of schooling for their children. Overall, Germans usually attend schools with German language of instruction, and Italians attend mostly Italian schools, but it is not rare to see Italian pupils enrolled in German schools due to the higher prestige of the language. Either way, all the pupils have to master each other's language, which is taught by native teachers from the first or second grade of primary schooling. While university education is not accessible in German language in Italy, many students study at higher education institutions in the nearby Austria, mostly at the universities of Innsbruck, under similar treatment as native students. From 1997, a new university opened its doors, the Free University of Bolzano, offering multicultural education in three languages.

Regarding the Italian PISA sample, Bolzano as a region fully met the PISA standards having representative data for both the Italian and the German-speaking group. Within Bolzano, there were 1,264 students from which 253 attended Italian schools, while the rest enrolled into German institutions (Table 5). On the overall number of 43 schools in the sample German schools comprise 79%. The German schools have a slightly higher proportion of girls, while in Italian schools there is a relative gender balance.

About 90% of Italian schools are located in towns up to 100,000 people; by German schools the ratio is 71% indicating that almost a third of German schools are in the settlements of less than 15,000 people. Private schools are not characteristic in the region, as only 6% of German schools are private while none of the Italians are so. While almost half of the Italian and more than a third of German students attend (classical, linguistic or scientific) high school, they are well represented in technical institutes as well (40 vs. 36%). Overall, the vast majority of pupils attends an upper secondary school (solely 2.7% of Germans is still enrolled in lower secondary).[8]

[8] The Italian students were enrolled into 9 upper secondary schools; the German students were dispersed between 26 "Oberschulen", 3 "Mittelschulen" and 5 "Berufschulen".

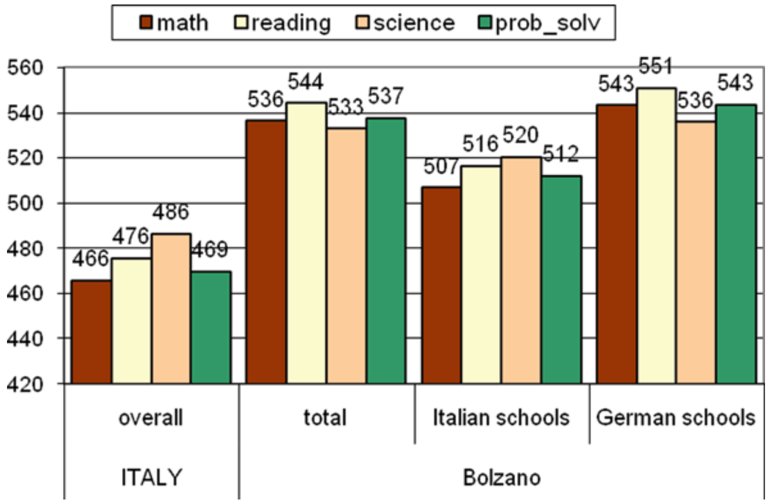

Fig. 5 Mean achievement in all subjects, Own calculations based on PISA 2003 data

The province of Bolzano doesn't show clear similarities in terms of achievement neither to Italy as a whole, nor to the neighbouring Austria. The 15-year-olds of the region stand out in scholastic achievement having higher scores than the OECD average in all the test subjects (Fig. 5). Within Bolzano, there are clear differences between the two school systems (all statistically significant): while German schools' achievement scores are the highest, Italian school students' performance is much lower, albeit still considerably higher than the country average.

As for gender (Fig. 6), there are slight differences between the achievement of males and females within the two systems. Boys in the Italian schools of Bolzano

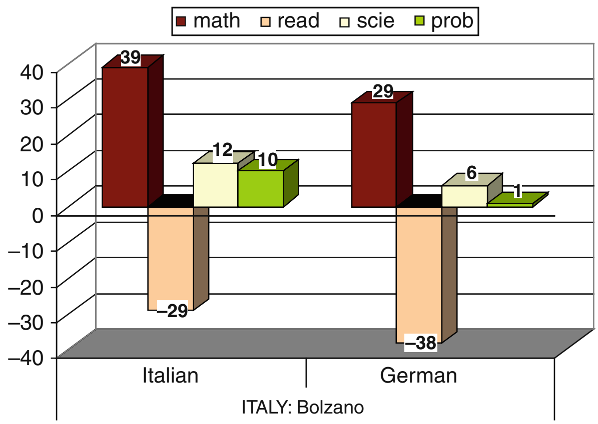

Fig. 6 Gender differences (positive value indicates the advantage of males over females) Own calculations based on PISA 2003 data

Table 3 Relationship between the students' scores and their mothers' level of education, Own calculations based on PISA 2003 data

	German					Italian				
	Maths	Reading	Science	Problem solving	N	Maths	Reading	Science	Problem solving	N
Primary and lower sec.	532	542	522	536	864	509	510	507	509	164
Secondary	543	551	538	543	1.701	510	524	527	516	376
Tertiary	594	605	583	590	184	506	516	517	514	104
Missing	557	499	530	528	59	390	356	496	409	12

outperform girls in all subjects but reading. The gender differences are similar within the German schools, although the absolute differences slightly differ from that of Italian schools.

The relation between the mother's education and the child's achievement differs in the two parallel systems (Table 3). While maths achievement doesn't seem to vary by mother's education in the Italian stream, there is a linear relationship between the two variables in the German system.

Need to be mentioned, that private schools are a real source of advantage in Bolzano. Those German students who attend private schools gain 77 points in maths achievement over their mates in public institutions, achieving a top ceiling of 615 points. Italian schools are all public, and they are lagging behind the German public schools in the region, but they still do much better than the average Italian schools.

The regression analysis doesn't explain the difference between the two systems. In fact, controlling for the background characteristics further increases the gap from 36 points up to 48 in favour of the German school students. In the same time, the model explains 30% of the variance in educational achievement of 15-year-olds ($N = 3.464$). As for reading, the starting gap of 34 increases to 42 after controlling for the students' background (R^2=26.8%).

Across the Three Contexts

Summing up the between-school differences at cross-country level (Fig. 7) provides us an interesting picture. While in Bolzano German speakers outperform their Italian mates in terms of scholastic achievement, Swedish speakers of Finland show slightly lower performance than their Finnish-speaking peers. At the same time, there is no substantial difference between the scholastic achievement of Hungarian and Slovak school students in Slovakia.

The next graph (Fig. 8) shows the distribution of the students' maths achievement in terms of the two school systems. Substantial differences are to be found

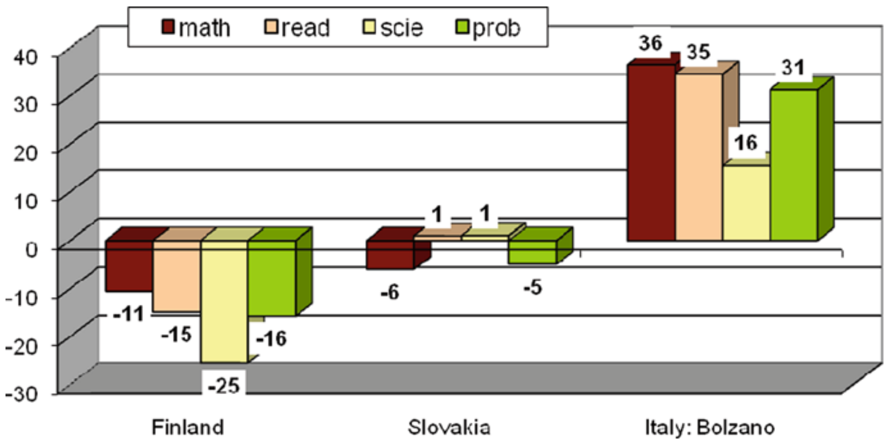

Fig. 7 Mean achievement score differences between the parallel systems across countries (e.g., Swedish school students' scores minus Finnish school students' scores etc.)

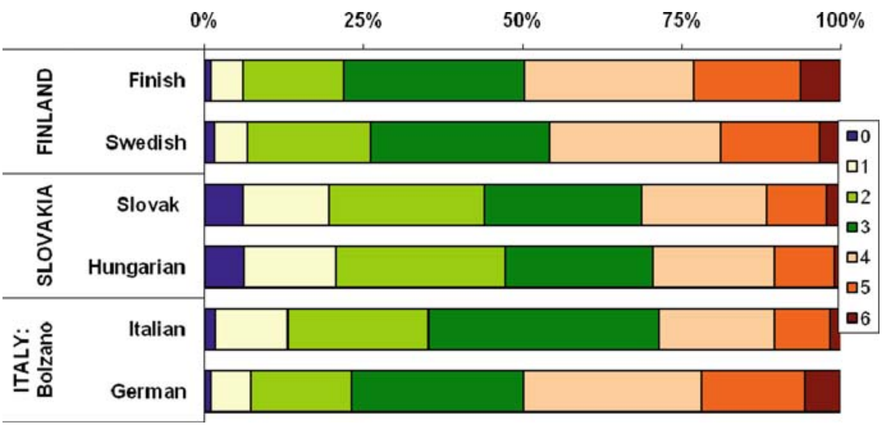

Fig. 8 Distribution of maths achievement in levels

between Italian and German students in the province of Bolzano, while the distribution of mathematics scores within the other countries are more similar than different. In Finland, the proportion of Swedish students in the higher performing group is smaller than that of Finnish, similarly to the Slovakian situation where we have a slightly higher proportion of Slovaks at the top level, albeit the differences are smaller.

As for gender differences in maths performance, there are no large differences between the two school systems in both Finland and Slovakia, while the gender gap is enlarged in the minority school systems of Bolzano. There is no private school effect in Finland, actually private school students do little worse than their public school counterparts (minus 2 points compared to 5). In the case of Slovakia, private schools pose a similar level of advantage to both minority and majority pupils

(28 compared to 33 points), while in Bolzano, where there are no private schools for the Italian students, the attendance of private institutions for German pupils has a large positive effect resulting in 77 points difference (which is more than one proficiency level).

OLS regression analysis (Table 4) is provided in order to control for these effects together with additional factors related to the specificities of the school environment. The dependent variable is the mean mathematics achievement of students. The independent variables are entered into the regression analysis in blocks (I weight cases using the student weight and replace missing data by the mean).

In the first block I added the countries (reference group: Finland) to compare the differences between the average performance of students followed by the parallel school systems. In the second block I control for the socio-economic background of students and for demographic characteristics. Given that the test has been administered to 15-year-olds instead of controlling for age, I use grade reflecting the potential retention of students. The ESCS – used as a control for the socio-economic background – is a composite measure consisting of the parents' highest educational level, their occupational status and the family home possessions. The third model controls for the school environment including variables related to school location,

Table 4 OLS regression: dependent variable mean mathematics performance

$N = 138.415$	**Model 1**	**Model 2**	**Model 3**
(Constant)	544.894***	545.774***	545.146***
Italy: Bolzano	−38.155***	−36.862***	−53.992***
Slovakia	−46.397***	−24.708***	−14.570***
Parallel schools	−10.586***	−11.655***	−9.770***
German schools of Bolzano	47.022***	57.613***	60.706***
Hungarian schools of Slovakia	4.629*	*n.s*	*n.s*
Demographic and parental background			
Socio-economic & cultural status (ESCS)		41.716***	39.322***
Gender		−14.535***	−15.227***
Grade		29.528***	32.724***
School environment			
School location			−.763**
School size			.065***
Private school			6.183***
Teacher–student ratio			−3.631***
Proportion of qualified teachers			25.414***
Computer ratio			34.321***
df	5	8	14
R	.259***	.517***	.533***
R^2	.067***	.267***	.284***
R^2 change	–	.200***	.017***

Levels of significance indicated by *** $p = 0.000$; ** $p = 0.010$; * $p = 0.050$; ns = non-significant
Reference group: Finland

school size, private school, teacher–student ratio, proportion of qualified teachers and the proportion of available computers in schools.

The results of the regression show that all the countries have generally lower levels of mathematics performance in comparison with Finland. Slovakia has the lowest mean score, 46 points smaller than Finland (constant). The parallel school effect demonstrates the difference in maths achievement between the two Finnish school systems (the reference country) indicating that Swedish-speaking pupils score 10 points less in mathematics than their Finnish-speaking peers. The difference is rather small in the case of Slovakia, while Bolzano shows the largest discrepancy in this respect (37 points). After controlling for the socio-economic background of students (model 2), the minority school effect in Slovakia becomes insignificant, while the gap between the German and Italian schools in Bolzano increases sharply indicating that the composition of the two groups must be rather different. The effect of grade is clearly significant, while being female has a negative influence on one's maths achievement. Finally, adding school-related characteristics in the last model (model 3) doesn't add much to the explanation of the educational achievement (R^2 change = 1.7%), although having qualified teachers in sufficient numbers and well-equipped schools may positively influence the outcome. All things considered, the regression model explains almost 30% of the variance in mathematics achievement.

Discussion

Going back to our research question, we haven't found considerable discrepancies in relation to the scholastic achievement of pupils in the parallel schools, although the findings provide somewhat mixed results across the countries: while the scholastic achievement of Germans is higher than Italians, Swedish speakers perform somewhat lower than Finnish, while there is no significant difference between Hungarian and Slovak school students' achievement.

Although the "effects" of institutional completeness don't seem to work in the same way across the studied countries, it is interesting to see that the educational "gaps" between the autochthonous and the "native" groups are much less wide than generally is the case between immigrant and native pupils documented in earlier research on PISA data (Where immigrant students succeed 2003).

This study is one of the first attempts of comparison of autochthonous groups' educational performance across Europe. Based on this, one cannot uniformly confirm the hypotheses on the high level of institutional completeness ensuring the educational integration of autochthonous groups. Bearing in mind the different historic background and the many specific features of the parallel schools systems, clearly, more research is needed in the future, where comparisons between the scholastic achievements of autochthonous pupils attending the majority school system to those enrolled in the minority system could be of further interest.

Appendix

Table 5 Case numbers (unweighted)

	Students		Schools
	N	%	N
Slovakia	7.346		281
Slovak	6.920	94.2%	262
Hungarian	426	5.8%	19
Finland	5.796		197
Finnish	4.604	79.4%	147
Swedish	1.192	20.6%	50
Italy: Bolzano	1.264		43
Italian	253	20%	9
German	1.011	80%	34
Total	15.922	n.a.	571

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Part III
Education in Europe and Asia: Analogies and Differences

The Intergenerational Transmission of Income and Education: A Comparison of Japan and France

Arnaud Lefranc, Fumiaki Ojima, and Takashi Yoshida

Introduction

Inspired by the seminal work of Conlisk (1974), Atkinson (1981) and Becker and Tomes (1979, 1986), a recent series of studies have examined the extent of income mobility across generations in developed economies. They have revealed that in some countries a large fraction, of up to one half, of economic advantage or disadvantage is transmitted from one generation to the next, within families. There are, however, two important limitations with existing empirical studies. First, available evidence have mostly concentrated on North America and Western Europe. While they have revealed sizeable differences across countries in the extent of income mobility, very little is known of other parts of the world, in particular on Asian countries.[1] Second, beyond the measurement of the degree of intergenerational association, there is still considerable uncertainty regarding the structural determinants of intergenerational income mobility. In particular, the extent to which differences in the intergenerational mobility process, observed across countries and over time, are driven by such key ingredients as labour market institutions, wage inequality and educational policy is still unclear. This study provides an analysis of the extent of intergenerational mobility in earnings and education in Japan, a country so far absent from empirical evaluations. Furthermore, in order to provide a point of comparison for our results on Japan, and to discuss factors affecting the extent of intergenerational mobility, we undertake a comparison with intergenerational mobility in France.

Several reasons make the study of intergenerational earnings mobility in Japan particularly interesting and relevant. One of them is that there is considerable uncertainty regarding whether Japan exhibits high or low intergenerational mobility in comparison to other countries. On the basis of class mobility, Ishida, Goldthorpe and

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[1] Lillard and Kilburn (1995) and Grawe (2004) are two noteworthy exceptions who address the issue of intergenerational earnings mobility in Malaysia, Nepal and Pakistan.

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Erikson (1991) conclude that Japan does not significantly deviate from the "core" fluidity model shared by most industrialized societies. However, Ishida (1993) indicates that mobility is indeed lower in Japan than in Britain and the United States and suggests that this may reflect the crucial influence of educational strategies. At the same time, the Japanese society is often seen as an equal society. This seems in particular the case on the labour market where earnings differentials remain compressed (Gottschalk & Smeeding, 2000). This combination of relatively low social mobility and limited cross-sectional income inequality leads to ambiguous predictions regarding the extent of intergenerational earnings mobility: on the one hand, existing sociological evidence point to a low degree of mobility in education and occupational status; on the other hand, the occupational hierarchy will be mapped into a rather compressed earnings structure which may lead to a small degree of differentiation in human capital accumulation strategies and, overall, to a low degree of earnings mobility. This makes a strong case for reconsidering Japanese intergenerational mobility in a comparative perspective. In so doing, one of our objective is to shed light on the old but unsettled debate on Japanese "exceptionalism".

In this respect, focusing on the transmission of income – rather than occupation, social status or education – provides more than a useful complement to the standard sociological studies of intergenerational mobility. There are two main reasons for studying income mobility. First, income is a crucial determinant of individual well-being and just primarily an aspect of individual socio-economic status – as taken into account in social prestige scores – but more fundamentally. Hence the analysis of its transmission across generations is of paramount importance from a welfare perspective. Second, the comparison over-time and across countries of the extent of social and educational mobility is often difficult, because of the lack of comparability of social and educational classifications and the need to account for structural mobility. In comparison, the quantitative nature of income makes the analysis of intergenerational income mobility more simple and comparisons across countries and over time much easier.

Assessing whether a specific country displays high or low mobility in the absolute is often very difficult. This is why we develop a comparative assessment of intergenerational mobility in Japan and France. Several features of France's socio-economic setting make this country an interesting case for comparison. As far as its labour market is concerned, France is largely viewed as a heavily regulated labour market, in which minimum wage and collective bargaining result in a much more compressed wage structure than observed in most developed economies, and where firing costs translate into low rates of job mobility over the career. These two features makes the French labour market close to the Japanese situation. Things are less clear cut when it comes to the educational system. On the one hand, the French education system is strongly hierarchical, in particular for higher education, coming close, in this respect, to the Japanese case. On the other hand, the degree of private monetary investment in children's education seems much less pronounced in France, where secondary and tertiary education is close to completely free of tuition fees. Hence at first sight, comparing France and Japan, in terms of their degree of intergenerational earnings mobility, seems an interesting way to assess the contribution of the educational system to the transmission of economic inequality.

Another argument for comparing Japan and France lies in the type of data available in both countries. As discussed in several papers (Jenkins, 1987; Grawe, 2006), the measurement of intergenerational mobility is very sensitive to specification issues and seemingly minor changes in the sample used or the estimated model can lead to large variations in the estimation results. Hence, to conduct a meaningful international comparison of intergenerational mobility requires that the same specification be estimated in the different countries. We pay great attention to this aspect in our comparison of Japan and France. In each country, our analysis relies on a several waves of a survey designed to study social mobility (the SSM survey in Japan and the FQP survey in France) and conducted at regular intervals since around 1960 (1955 for Japan and 1964 for France). One should emphasize that the type of information collected is very similar in each country. Furthermore, since none of these surveys collects direct information on parental income, our estimation for each country relies on the two-sample instrumental variable method of Björklund and Jäntti (1997).

Overall, Japan appears as a rather mobile society. Two main findings emerge from our analysis. First, intergenerational earnings mobility in Japan appears rather high, compared to what is usually found in Western developed countries. We find an intergenerational earnings elasticity of about 0.3 for Japan against around 0.5 for France. The value we find for Japan is slightly higher than the one found for Scandinavian countries and comparable to Canadian estimates. It is lower than in continental Europe and all the more so than in the United States and United Kingdom. Second, the higher intergenerational earnings mobility found in Japan is associated with both a relatively low return to education on the labour market and a high educational mobility. For instance, the intergenerational regression coefficient for education amounts in Japan to around 0.3, which is much lower than the value we find for France and, more generally, in many developed countries.

The rest of the chapter is organized as follows. We first discuss a standard model of intergenerational earnings transmission and analyze the relationship between earnings mobility, labour market inequality and educational mobility. Next, we present the econometric model and describe the data used in the empirical analysis. Lastly, we discuss our main results and conclude.

Theoretical Model

To illustrate the main structural determinants of intergenerational income mobility and to shed light on the interpretation of the commonly estimated intergenerational elasticity, we developed a simplified theoretical model, borrowed from Solon (2004). This model considers a simplified family model in which, at each period two generations coexist: one parent (generation t-1) and one child (generation t).

The parent is endowed with human capital, earns income, consumes and invests in the child's human capital.

Let Y_{t-1} denote the parent's income, C_{t-1} the parent's consumption and I_{t-1} the parent's investment in the parent's child's human capital. The budget constraint for generation $t-1$ is given by

$$C_{t-1} + I_{t-1} = Y_{t-1} \tag{1}$$

Following Solon, assume that the technology that translates parental investment in child's human capital is given by

$$H_t = \theta \log (I_{t-1}) + e_t \tag{2}$$

where H denotes human capital. This equation emphasizes two determinants of human capital accumulation. The first one consists in parental financial investment, I_{t-1}. This determinant should be understood in a broad sense, as including everything that money can buy, i.e. all parental influences that are directly determined by parental monetary resources. Direct education expenditures, such as tuition fees, are of course the most obvious component of I_{t-1}. But parents can also influence their child's accumulation of human capital through, for instance, the choice of residential location. In fact, residential location is likely to influence human capital accumulation through, for instance, the composition of the peer groups or in cases where the allocation of pupils to schools is based on residential area. To the extent that location decisions are constrained by family income, this determinant is also captured by I_{t-1}. As discussed, for instance, in Becker and Tomes (1986) and Mulligan (1997), the reason why parental financial investment matters is that human capital accumulation cannot easily be financed from borrowing in the presence of imperfect capital markets. Two comments must be added regarding the functional form adopted here. The parameter θ is an index of the productivity of parental financial investment for human capital accumulation. The logarithmic specification implies that parental investments have a decreasing marginal effect on child's human capital.

The second determinant of human capital accumulation are non-financial determinants, denoted by e_t. This variable captures the combined influences of nature, nurture, social and cultural origin outside the causal impact of parental financial investment. Of course, such influences are likely to be transmitted within families and so will be correlated across generations. Following Becker and Tomes (1979), assume that e_t follows a first-order autoregressive process of the form:

$$e_t = \delta + \lambda e_{t-1} + \nu_t \tag{3}$$

In this equation, ν is a random term independent of $e_{t\text{-}1}$. This equation amounts to saying that a fraction λ of parental non-monetary determinants of human capital are passed on to the next generation. Consequently, even in the absence of financial investment by the parents, human capital endowments will be correlated across generations, for reasons abundantly discussed in the social and educational mobility literature.

Lastly, individual income is determined by the amount of human capital using the following function

$$\log Y_t = \mu + pH_t \tag{4}$$

where p denotes the returns to human capital.

To discuss parental investment, assume that the parent chooses consumption and investment so as to maximize the following Cobb–Douglas utility function:

$$U = C_{t-1}^{1-\alpha} Y_t^{\alpha} \tag{5}$$

subject to the constraints of equations (1), (2), (3) and (4). In the utility function, the coefficient α represents the degree of "altruism" of the parents or equivalently the weight of child's welfare in the parent's utility function.

Solving the above program, Solon shows that the optimal financial investment in the child's human capital is given by

$$I_{t-1} = \frac{\alpha\theta p}{1-\alpha(1-\theta)p} Y_{t-1} \tag{6}$$

Hence parental financial investment is increasing in parental income, parental altruism, the returns to human capital and the efficiency of human capital investments.

Substituting for optimal investment in equations (2) and (4), Solon also shows that the relationship between the income of consecutive generations is given by

$$\log Y_t = \mu + \theta p \log\left[\frac{\alpha\theta p}{1-\alpha(1-\theta)p}\right] + \theta p \log Y_{t-1} + pe_t \tag{7}$$

A similar equation applies to the relationship between the human capital endowment of successive generations.

Two sources of intergenerational correlation in income are embedded in equation (7). The obvious one is captured by the coefficient $\theta\, p$ on $\log Y_{t-1}$. It corresponds to the "financial channel" already discussed. One should note that since the investment in children's human capital rises with the returns to human capital, the effect of parental income on child's income is also an increasing function of both p and θ. The second source of intergenerational transmission arises from the term pe_t. Since the endowment in human capital is correlated across generations, independent of financial decisions, so will income.

Finally, it should be noted that the linear regression of $\log Y_t$ on $\log Y_{t-1}$ suggested by equation (7) will *not* allow identification of any of the structural parameters of the model. In particular, the estimated coefficient on parent's income will differ from the structural term θp and will not measure the causal effect of parental income on child's income. The reason is that the endowment in human capital e_t is not usually observable and will be part of the error term in the equation. However, this component of the error term is correlated with parent's income. Hence, the estimated coefficient on parent's income will capture both the financial channel and all other sources of intergenerational correlation in earnings. More precisely, as shown in Solon, in the steady state of the intergenerational income transmission process, the estimated coefficient, which we will refer to as β, will be given by:

$$\beta = \frac{\theta p + \lambda}{1 + \theta p \lambda}$$

Econometric Model

As is common in the literature on intergenerational earnings mobility, our objective is to estimate the standard log-linear regression model in permanent income:

$$Y_i = \beta_0 + \beta X_i + e_i \tag{8}$$

where, with a slight change in notations, Y_i denotes the logarithm of the child's permanent income in family i and X_i the logarithm of his or her father's permanent income. β represents the intergenerational elasticity in earnings (IGE), i.e. the percent variation in child's income associated with a one percent change in father's income.

Estimating equation (8) imposes very stringent data requirements since it requires that permanent income (i.e. the full sequence of earnings over the entire working career) of both children and fathers be observed. Such requirements will of course rarely be met in existing data sets. In our case, available data is much more limited. For children we only observe current earnings. In the case of their fathers, we only have information on their education and occupation.

Despite not having direct information on father's income, it is still possible to estimate the IGE, using an imputation procedure commonly referred to as two-sample instrumental variables (TSIV), and first applied in intergenerational earnings mobility studies in Björklund and Jäntti (1997). However the fact that we only observe current income, and not permanent income, implies that we pay special attention to the possible life-cycle biases that may arise in the estimation of the IGE, as discussed in a recent paper by Grawe (2006).

Two Samples Instrumental Variables Estimation

The basic principles behind two samples instrumental variables is as follows. Equation (8) cannot be directly estimated since we do not observe father's income. However we observe a set of father's socio-demographic characteristics. These characteristics can be used to form a prediction of father's income. And one can show that substituting this predicted income for father's actual income X_i in the estimation still allows to correctly estimate the IGE. In this procedure, the prediction of father's income relies on an auxiliary sample, representative of the fathers' population, and in which we observe both income and the same socio-demographic characteristics that are available in the main sample, i.e. the one containing information on children and their fathers' characteristics.

Let Z_i denote a set of socio-demographic characteristics (e.g. education) of the father of a family indexed by i, that is part of a sample of families I. Assume that father's income, X_i can be written as:

$$X_i = Z_i \gamma + \upsilon_i \tag{9}$$

where υ_i is an error term independent of Z_i. X_i is not observed in sample I. Yet, if there exists a sample J from the same population as I, it can be used to provide an estimate $\hat{\gamma}$ of γ, derived from the estimation of:

$$X_j = Z_j \gamma + \upsilon_j + u_j \tag{10}$$

for family j in the sample J. Equation (10) uses current earnings X_j to assess the impact of the variables Z_j on permanent earnings X_j. u_j is a time-varying residual.

From the estimation of equation (10), one can form a prediction of father's earnings in sample I. This prediction can in turn be used to estimate β: equations (8), (9) and (10) imply

$$Y_i = \beta_0 + \beta(Z_i \hat{\gamma}) + \upsilon_i \tag{11}$$

where the residual υ_i is given by $\upsilon_i = e_i + u_i + \beta \upsilon_i + \beta(Z_i(\gamma - \hat{\gamma}))$ and is independent of other regressors.

Our estimates of the IGE are based on the estimation of equations (10) and (11) on separate samples, described in the following section.

This estimation procedure appears as a special case of the split sample instrumental variables estimator introduced in Angrist and Krueger (1995) and Arellano and Meghir (1992). As shown in these papers, it is asymptotically equivalent to the standard instrumental variables procedure if samples I and J are drawn from the same population.

At this point one should emphasize that not having direct information on father's earnings represents a minor limitation. The argument unfolds as follows. Assume we had a direct measure of fathers' yearly income for a single year. As discussed in Solon (1992; 1999), the existence of transitory earnings components in yearly income would have introduced the well-known error-in-variables attenuation bias in the estimation of the IGE, had we estimated equation (8) based on this direct measure of father's earnings. To circumvent this bias, we would have been led to rely on instrumental variables estimation as used, for instance, in Dearden, Machin and Reed (1997). But the procedure we implement is exactly equivalent to standard IV estimation.[2]

[2] For more details on the properties of IV estimates for the estimation of the IGE, see Solon (1992) and Björklund and Jäntti (1997).

The specification of the first-step estimation, used to predict father's income, is presented in the appendix. In short, in the first-step, yearly income is regressed on a set of education dummies interacted with birth cohort – which allows for the possibility of change over time in the returns to education. The specification also includes a control for age and allows for separate age-earnings profile by level of education.[3]

Life-Cycle Biases

The most important limitation of the data used in this chapter – and in fact of almost all data sets used in the analysis of intergenerational earnings mobility[4] – is that it does not allow to observe permanent income but only conveys information on income earned over a short period. In our case, we only observe yearly earnings.

When estimating equation (8) using yearly income, it is crucial, especially in comparative work, to pay great attention to the life-cycle biases that can arise in the estimation of the IGE. This point has been emphasized recently in Grawe (2006). The main result of Grawe's paper is that the IGE rises with the age at which children's yearly earnings are observed. This is due to the fact that the growth rate of earnings, over the life-cycle, is positively correlated with the level of permanent earnings. Hence, early in the life-cycle inequality in yearly earnings understate inequalities in permanent earnings. So, using early career earnings make children appear more equal than they really are and leads to underestimate the intergenerational transmission of inequality. Or equivalently, to overestimate mobility. On the contrary, yearly earnings inequality late in the life-cycle is typically larger than permanent earnings inequality. Using late career earnings for children will consequently lead to underestimate mobility. A reversed reasoning implies that the estimated IGE falls with the age at which father's yearly earnings are observed.

For this reason, it is important that in both countries, we observe children and fathers at the same age. However, this is not enough. First, if the slope of age–earnings profiles differ in France and Japan, the life-cycle bias will differ between the two countries and estimates will not be comparable. Second, even if age–earnings profile are similar across countries, estimating model (8) using yearly earnings may come far from providing a good estimate of the permanent income IGE. The rule of thumb suggested by Grawe is to restrict the sample to children and fathers aged about 40. This corresponds roughly to the middle of the career and earnings differentials at the age of 40 can be considered representative of permanent earnings differentials. If we are willing to assume that this is true for both Japan and France, then estimates of intergenerational mobility at the age of 40 are directly comparable.

Instead of restricting our sample to individuals aged 40 years, we take into account life-cycle effects in the estimation of the IGE by including an interaction

[3] We use a fourth-order polynomial in age and drop non-significant higher order terms.

[4] One of the very rare exceptions is Mazumder (2001).

term between individual age and father's earnings, as done in Lee and Solon (2006). The equation is then given by

$$Y_i = \beta_0 + \beta\hat{X}_i + \Sigma_{j=1}^{4}\gamma_j(age_i - 40)^j + \Sigma_{j=1}^{4}\delta_j\hat{X}_i \times (age_i - 40)^j + e_i \qquad (12)$$

where Y_i denotes child's log yearly earnings, $\hat{X}_i = Z_i\hat{\gamma}$ denotes father's predicted log earnings, *age* denotes child's age. The fourth-order interaction between age and predicted income takes into consideration the impact of children's age on the IGE. In this equation β measures the IGE at the age of 40 (at this age, all the interaction terms are zero).

Of course, life-cycle effects also need to be adequately dealt with in the prediction of fathers' earnings. In the estimation of (12), we use a prediction of fathers' earnings at the age of 40. This implies that β comes close to measure the IGE in permanent income. More details on the estimation of the first-step equation are provided in the appendix.

Data

Japan: The SSM Surveys

Our Japanese data come from the Social Stratification and Mobility (SSM) surveys. The SSM survey has been the primary data source for studies of social and educational mobility in Japan (Ishida, 1993; Ojima, 1998; Imada, 2000). The first wave of the survey was conducted in 1955 by the Japanese Sociological Society. Since then, similar surveys were conducted at intervals of ten years by independent organizations.

The earliest waves (1955, 1965 and 1975) focused only on males. A female sample was collected since the 1985 survey. The questionnaire of the last wave of the survey (2005) has also been used for similar surveys in Korea and Taiwan. In this chapter, we make use of all available waves of the SSM surveys.

The SSM samples are designed to provide a national representative sample of the population between 20 and 70 years old. Across the different waves, the size of the male sample varies between 2,000 and 3,000 individuals. The questionnaire focuses on the description of social status, educational attainment, social origin, class identification and the perception of inequality.

The two most important variables in our analysis are income and educational attainment. The income variable available in the SSM surveys is individual primary income, which includes both labour and asset income before any tax or transfer. For most individuals of working age and who actually work, the primary component of pre-fisc income is labour earnings. Income is available in all waves of the survey in bracketed form. The bounds and number of brackets vary across waves. In the regressions, we deal with these brackets using two different routes. The first one amounts to assign the mid-value of the bracket and uses standard linear regression techniques; the second is to explicitly take into account the discrete nature of our income information and use interval regression.

The education classification used in the surveys varies across waves and cohort, reflecting the changes in the Japanese educational system that occurred over the last century. For older cohorts, the classification distinguishes between five educational levels: elementary school (6 years of formal schooling), upper elementary (8 years), middle school (11 years), college (14 years) and university (17 years). For more recent cohorts, the five educational levels are junior high school (9 years), high school (12 years), junior college (14 years), university (16 years) and graduate school (18 years). Given the sample size and to assure cross-year consistency of the education classification, we used a reduced classification that distinguishes between three educational levels: lower secondary education (or lower), upper secondary education and tertiary education. This corresponds, for instance, to the classification used in Kondo (2000).

For each individual, the survey also reports his/her father's education and occupation. These items are reported *ex post* by the survey respondents.

France: The FQP Surveys

Our French data are taken from the Formation–Qualification–Profession (FQP – Education–Training–Occupation) surveys conducted by the French National Statistical Agency (INSEE). We use all six waves of the survey (1964, 1970, 1977, 1985, 1993 and 2003). Each wave offers a representative sample of the French population of working age.[5] The number of individuals surveyed varies across waves: 25,000 individuals in 1964, 38,000 in 1970, 1977, 1985 and 2003 and 19,000 in 1993.

This survey has been the primary data source for studies of social and intergenerational mobility in France, as well as a wide range of labour market issues. It contains detailed information on education, labour market outcomes (industry, occupation, number of months worked full- and part-time and annual earnings in the previous year). It also provides data on social origin (including both parents' occupation and education).

The income variable in the survey is total labour earnings in the previous year. This information is not available for self-employed workers. It does not include other sources of income such as asset income or transfers. In 1964, annual earnings are recorded in interval form, using nine intervals. Hence, all estimation results reported for wave 1964 are based on interval regression.

For both children and parents, a detailed (10 levels) classification of educational attainment is available that distinguishes between general and vocational education. The classification, however, changed several times over the six waves and

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[5] More precisely, for all waves except the last two, the survey is based on a stratified sample of the French population. Adjusting for weights has only a minor impact on the estimates.

was recoded in a time-consistent way. The classification used in this chapter distinguishes between the following six levels of education: higher education degree, upper secondary education degree, lower secondary education general degree, lower secondary education vocational degree, primary education degree, no degree.

Samples Restrictions and Matching

The analysis in this paper is confined to the study of intergenerational mobility between fathers and sons. There are two reasons to this. The first is that females were only sampled in the SSM data starting in 1985. This clearly prevents an analysis of the impact of mothers' socio-economic status on child's achievement, although it would still be possible to examine the extent of intergenerational mobility between fathers and daughters. One difficulty, though, is that the sample of women who participate in the labour force and earn labour income is not a representative sample of the female population. Solving such self-selection problems, would require to explicitly model the interplay between labour force participation, employment and earnings. For this reason, we concentrate on the male sample and leave the analysis of intergenerational mobility between father and daughter to future research.

In the main samples used in this chapter to estimate both the first- and the second-step equation, we exclude self-employed and those without positive earnings in the year preceding the survey. This restriction is imposed to assure the comparability of the populations studied in both countries, since in France, we do not observe earnings for self-employed workers. Given the prevalence of self-employment in the father's cohorts, in both countries, it is however crucial to assess the incidence of this sample restriction. We discuss this point below and show that this incidence is, as much as we can tell, limited.

The sample used in the estimation of the first-step equation draws on most available survey waves, for both countries: 1955, 1965, 1975, 1985 and 1995 in Japan; 1964, 1970, 1977, 1985, 1993 and 2003 in France. In the Japanese case, the sample is restricted to individuals aged 25–54 years old. The main reason for excluding individuals older than 55, is that this used to be the common retirement age in private companies in Japan, in the fathers' cohorts. In France, the estimation is based on individuals aged 25–60 years. The only reason for considering a wider age range is that the oldest wave available in France is 1964, against 1955 of Japan. Hence, it is necessary to include older workers in the analysis to estimate earnings differentials among older cohorts.

Second-step estimations are based on the three most recent waves in both countries (1985, 1995 and 2005 for Japan; 1985, 1993, 2003 for France). For reasons already discussed, the sample is restricted to individuals aged between 30 and 50 years old, i.e. close to the middle of their working career. For each individual in the second-step sample, we form a prediction of his father's earnings using estimates of the first-step equation. The prediction is based on reported father's education, as well as father's cohort. In most cases, individuals in the second-step sample report their father's birth year. In this case, we use the relevant cohort-specific returns to education to predict father's income. When information on father's birth year is not available, the matching procedure used is the following: Based on individual birth year and available information, we compute the distribution of father's birth cohort. The prediction of father's income is then the weighted average of cohort-specific income for the father's education level, where the weights are given by the distribution of father's birth cohort.

Results

First-Step Estimation

We first discuss the results of the first-step equation used in the prediction of father's earnings. Figure 1 presents the evolution over time of educational attainment in both countries, by birth cohort. In Japan, at the beginning of the century, the educational attainment of the vast majority of the male population (more than 60%) is lower secondary education or less. In fact, a significant fraction of this group only received elementary education. The rest of the population is shared evenly among the two other educational levels (upper secondary education and tertiary education). Throughout the twentieth century, three main periods need to be distinguished. The first period starts at the beginning of the century and ends in the early 1930s. It witnesses a fall in the share of the population with a lower secondary education or lower and a rise in the share of individuals with an upper secondary education. In the meantime, the share of individuals with a tertiary education remains constant. The second period corresponds to the period of fast economic development that occurred after World War II, i.e. cohorts born between the mid-1930s and 1960. This period sees an acceleration of the fall in the share of the population with a lower secondary education, a continuation of the rise of upper secondary education and a take-off in the share of the population with access to university. The third period corresponds to cohorts born in the 1960s and after. During this period, the distribution of education remains roughly constant: about 40% of the population access university; a little less then 60% reach upper secondary education and a very small percentage of the population has lower secondary education or less.

The evolution of the educational distribution in France is in many respects similar to Japan, although the share of each education category differ, both initial and in the final period. Panel B of Fig. 1 provides the composition by education using an aggregated classification similar to the one used in Japan; panel C provides the detailed composition. Among cohorts born at the beginning of the century, more than 70% of the population has a primary education degree or lower. And about 80% of the population has a level of education equal to or lower than lower secondary education. Again, the beginning of the century is a period of rise in access to education and this rise accelerates around the middle of the century. However, while trends are somewhat similar, educational attainment is, throughout the period, markedly lower in France than in Japan. For instance, at the end of our period, the

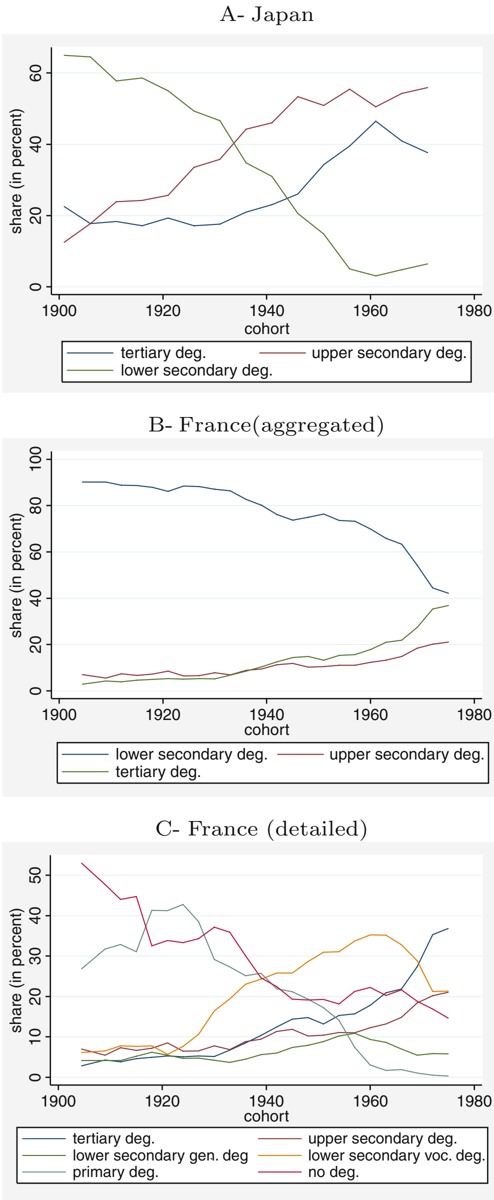

Fig. 1 Distribution of education by birth cohort

overall educational attainment in France remains lower than in Japan: only about 35% of the population obtain a higher education degree and 20% reach the level of upper secondary education.

Figure 2 presents the evolution over time of the earnings structure, by level of education. The earnings differentials reported here are predicted earnings

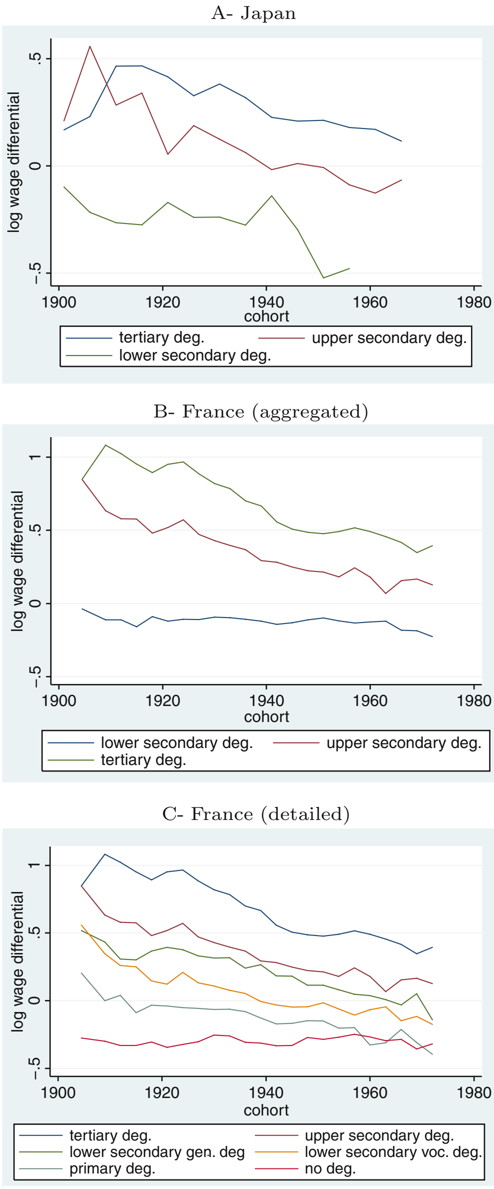

Fig. 2 Returns to education by birth cohort

differentials at age 40, based on the first-step regression. The experience of both countries in this respect strongly differ. Earnings differentials by level of education in Japan appear roughly constant over the entire period. Only in the case of the earliest cohorts, do earnings differentials seem more compressed than for most other cohorts.[6] However, it is worth emphasizing that for all cohorts, Wald tests confirm the hypothesis that earnings differentials are constant. This echoes the results in Kanomata (1998) indicating that earnings inequality has remained fairly stable in Japan in the second part of the century.

On the contrary, France experiences a marked decline in the returns to education. The largest fall occurs between cohorts born at the beginning of the century and early baby-boomers born around 1940. Two main factors account for this fall in returns to education. The first one is the massive wage compression that occurred at the end of the 1960s (in particular in 1968, after the one-third rise in the minimum wage) and in the early 1970s. The second one is the competitive wage adjustment that followed the massive rise in the supply of highly educated workers, as discussed in Goux and Maurin (2000).

Besides these discrepant evolutions, one should also stress that the Japanese earnings structure appears very compressed throughout the period. On the contrary, earnings differentials are much stronger, in France, at the beginning of the period. In particular, one should underscore here that the scale used on the vertical axis differ between panels A and B. However, as a result of the fall in returns to education that occurred throughout the century, the returns to education in France, *at the end of the period*, appear more comparable to Japanese levels.

Earnings Mobility

We now turn to the analysis of intergenerational earnings mobility. Table 1 presents the estimated IGE for earnings, when regressing sons' earnings on fathers' earnings predicted from the previous section's estimates.

The estimated value for Japan is 0.25 which represents a low value of the IGE and indicates a rather strong intergenerational mobility. Since this coefficient is an elasticity, the interpretation of this value is that, on average, only one-fourth of the previous generation's economic advantage or disadvantage survive to the next generation. By contrast, the value of the IGE in France is twice as high and close to 0.5. If we go beyond the bilateral comparison undertaken here, the value of the IGE for Japan still appears rather low by international standards. Using the methodology implemented in this paper, Björklund and Jäntti (1997) estimated an IGE for earnings of 0.52 for the United-States and 0.28 for Sweden. Dearden, Machin, and Reed (1997) report an estimate for Britain based on a procedure similar to ours of 0.57 for sons. Evidence available for other countries and surveyed in Solon (2002) suggest a rather high degree of intergenerational mobility in Finland (Österbacka, 2001) and Canada (Corak and heisz, 1999) (β around 0.2 or lower) and an intermediate degree of mobility for Germany ($\beta = 0.34$). In the light of available evidence,

[6] For the last two cohorts, we do not report the estimated earnings for the lowest group of education, given the very small number of observations in this category.

Table 1 Intergenerational earnings elasticity

	A- Japan, linear regression on interval midpoints		B- France, linear regression	
log(father's Income)	0.251	0.224	0.462	0.473
	(4.63)	(2.86)	(35.3)	(24.54)
log(father's Income) × (age-40)		0.009		0.007
		(0.01)		(3.38)
log(father's Income) × $(\text{age-40})^2$		0.001		0.000
		(0.48)		(−0.64)
n	987	987	13,487	13,487
R^2	0.185	0.186	0.170	0.171

Notes: Dependant variable is the logarithm of son's annual earnings; T statistics in parenthesis. For Japan, earnings are reported in brackets. For France, the exact value is reported. Interval regression is estimated by maximum likelihood under the assumption that earnings are log-normally distributed.

it is clear that Japan stands out as a rather mobile country, from the point of view of the intergenerational transmission of income.

Estimates in Table 1 also emphasize the importance of an adequate treatment of life-cycle biases when drawing international comparisons. Based on a younger age group, Lefranc and Trannoy (2005) report a value of the IGE for France around 0.4. Here, using a sample of individuals closer to their mid-career and adding an interaction term between father's income and son's age significantly raises the value of the IGE. On the contrary, in Japan, controlling for this interaction term tends to decrease the estimated IGE: this may be explained by the fact that individuals in the Japanese sample tend to be, on an average, above the reference age of 40, at which we evaluate the IGE in the second specification reported in the table. This tends to increase the intergenerational earnings mobility gap between the two countries. We now address the contribution of educational mobility to this gap.

Educational Mobility

The theoretical model underlines several factors that may contribute to this gap in intergenerational earnings mobility. First, intergenerational earnings mobility may be lower because of a high correlation across generations in the level of human capital. At the same time, for a given degree of educational mobility, earnings mobility will also appear lower if the returns to education are higher.[7]

Table 2 evaluates the extent of intergenerational mobility in education in Japan and France. Two sets of coefficient are reported. The first coefficient is the raw correlation coefficient between son's and father's education. The second coefficient is the coefficient on father's education in the regression of son's education and is

[7] More precisely, this will only hold conditional on the degree of inequality in parent's earnings.

Table 2 Intergenerational educational mobility

Intergenerational correlation coefficient for years of education	Intergenerational regression coefficient for years of education
A- Japan	
0.4079	0.2878
	(11.74)
B- France	
0.4856	0.4856
	(72.38)

Notes: For both countries and both generations, the number of years of education is the number of formal years of schooling completed by both father and son; the regression coefficient reported is for the regression of son's years of education on father's years of education and cohort dummies; T statistics in parenthesis.

regressed on cohort dummies and father's education. Hence, this last coefficient measures the intra-cohort educational mobility. Note that in both cases, the number of years of education is not directly reported and we use the number of formal years of education completed.

Again Japan stands out as a rather mobile country. The regression coefficient for years of education is comparable to the value of the IGE for earnings, around 0.3. Again, this value is markedly lower than the one found in France using the same method and sample restrictions. In France country, the value of the intergenerational regression coefficient for education is close to 0.5. Hence the analysis of educational mobility entirely confirms the results obtained for earnings.

Lastly, one should emphasize that educational mobility also appears quite high when compared to other countries. For instance, Couch and Dunn (1997) report a value of the intergenerational regression coefficient for years of education of 0.41 for the United States. The value they report for Germany is however slightly lower than what we find in Japan here: 0.24.

Sensitivity Analysis

As previously discussed in Section "Data", one of the limitations of the results discussed so far is that they are only based on a sample from which self-employed sons and the sons of self-employed fathers were excluded. This limitation is first imposed by the lack of reliability of labour earnings data for self-employed workers as well as the fact that, for France, labour earnings of self-employed workers are in most cases not observed. As Table 3 documents, excluding self-employed children leaves aside a still relatively small fraction of the total relevant population. On the other hand, excluding individuals whose father was self-employed ignores a sizable share of the population (between 45 and 25%).

Table 3 Intergenerational mobility in employment status

Intergenerational mobility in employment status			
A- Japan			
	Son's employment status		
Father's employment status			
	Wage earner	*Self-employed*	*Total*
Wage earner	**987**	**137**	**1,124**
	87.81%	12.19%	
	55.79%	*26.65%*	
Self employed	**782**	**377**	**1,159**
	67.47%	32.53%	
	44.21%	*73.35%*	
Total	1,769	514	2,283
B- France			
	Son's employment status		
Father's employment status			
	Wage earner	*Self-employed*	*Total*
Wage earner	**14,175**	**4,720**	**18,895**
	75.02%	24.98%	
	92.01%	*73.38%*	
Self employed	**1,231**	**1,712**	**2,943**
	41.83%	58.17%	
	7.99%	*26.62%*	
Total	15,406	6,432	21,838

Notes: Numbers in bold are frequencies; normal case are row percentages and italics are column percentages.

To assess the impact of excluding self-employed fathers, we perform the following sensitivity analysis. First, educational mobility is reassessed by estimating the correlation and regression coefficient on the sample where the restrictions on father's employment status is removed. Second, we re-estimate earnings mobility on the total sample of non-self-employed sons, regardless of their father's employment status. Since for self-employed fathers earnings are not observed reliably (if at all), we predict father's earnings for this category, based on the same first-step equation as in the previous section, i.e. estimated on the sample of non-self-employed fathers.

Results are presented in Table 4 for earnings and Table 5 for educational mobility. Including the children of self-employed workers has very little impact on estimated coefficient. The larger change is in the estimated value of the intergenerational elasticity for earnings that rises slightly in Japan, from 0.25 to 0.31. But given the precision of both estimates, the difference is not significant. In all other cases, the coefficients stay almost exactly the same.

Overall, excluding the children of self-employed workers from our sample does not affect our main conclusion. The sensitivity analysis suggests that intergenerational earnings mobility may be slightly higher than estimated in the previous section, around 0.3. But the main message remains. As far as the intergenerational transmission of income is concerned, Japan appears as a highly mobile

Table 4 Intergenerational earnings elasticity – sensitivity analysis

	A – Japan, linear regression on interval midpoints		B – France, linear regression	
log(father's Income)	0.312	0.311	0.475	0.483
	(7.60)	(2.86)	(41.3)	(28.56)
log(father's Income)		–0.002		0.008
× (age-40)		(–0.34)		(4.44)
log(father's Income)		0.000		0.000
× $(\text{age-40})^2$		(0.01)		(–0.58)
n	1,769	1,769	17,960	17,960
R^2	0.209	0.209	0.174	0.175

Notes: Dependant variable is the logarithm of son's annual earnings; T statistics in parenthesis. For Japan, earnings are reported in brackets. For France, the exact value is reported. Interval regression is estimated by maximum likelihood under the assumption that earnings are log-normally distributed.

Table 5 Intergenerational educational mobility – sensitivity analysis

Intergenerational correlation coefficient for years of education	Intergenerational regression coefficient for years of education
A-Japan	
0.4066	0.2895
	(18.71)
B-France	
0.4742	0.4839
	(82.54)

Notes: For both countries and both generations, the number of years of education is the number of formal years of schooling completed by both father and son; the regression coefficient reported is for the regression of son's years of education on father's years of education and cohort dummies; T statistics in parenthesis.

country, much more so than countries such as the United States, the United Kingdom or continental Europe.

Discussion and Conclusion

In this paper, we have compared the extent of intergenerational earnings mobility in two industrialized societies: Japan and France. On the one hand, the labour markets of these two countries share many features in common, in particular a high level of job protection, a large degree of on-the-job training and job-specific human capital, as well as a rather compressed wage structure. On the other hand, among other things, these two countries strongly differ in terms of the organization of their educational systems. This is particularly true of higher education.

In Japan, access to higher education is often very expensive and selective, forcing the family to consciously elaborate complex educational strategies and to undertake significant financial investments to support them. The extent of family investment in education in Japan has been abundantly documented. For instance families cover between 71 and 86% of the annual expenditures of university students (Kondo, 2000, p. 6). Furthermore, besides tuition fees, parents often invest significant amounts in "shadow education" (Stevenson and Baker, 1992), such as cram schools and private tutoring. On the contrary, the French higher education system is, at least at face value, free and open. Of course, higher education in France is organized around a clear hierarchy, at the top of which come the elite schools (*grandes écoles*) while universities represent the least prestigious form higher education. However, it is claimed that where students end up in this hierarchical system is only based on individual merit. Which of the two countries display the greatest level of intergenerational mobility, both in terms of income and education?

The answer to this question is, indeed, surprising. As our estimates reveal, the degree of intergenerational income mobility is much higher in Japan. Furthermore, this higher mobility in terms of income is underpinned by a lower intergenerational correlation in educational attainment.

Several factors are likely to account for the higher degree of income and educational mobility observed in Japan. The first explanation emphasizes the characteristics of the educational system in both countries. As already discussed, both countries display a marked hierarchy among higher education institutions. But the nature of this hierarchy and the allocation procedure into higher education differ greatly. The Japanese system is best understood as a continuum of higher educational institutions of differing quality (Ono, 2007). On the opposite, the most salient feature of the French system is the opposition between elite graduate schools (*grandes écoles*) on the one hand and universities on the other. This duality is more pronounced than the differences that exist among *grandes écoles* or universities. And attending *grandes écoles* or universities have very different effects on labour market (and social) outcomes. As a result of these differences, we would expect individual outcomes to be more polarized in France than in Japan.

This is reinforced by the allocation procedure at work in both countries for access into higher education. In Japan, the type and quality of college or university students have access to is mostly determined by the results to a national exam that students take at the end of high school.[8] In France, all students take a national test at the end of high school (*baccalauréat*). But the results to this test are not the primary determinants of the track students will follow in the dual higher-education system.

[8] More precisely, this is the case for those born after 1960 and who applied to national (or public) universities. Most of applicants to private university take an entrance exam that is specific for each university. And the national university has its own exam. So applicants for the national university should take exams twice. In any case, allocation in the Japanese higher education system is mostly based on examination results.

In fact, access to *grandes écoles* is determined as the result of a national entrance competition taken 2 years after the end of high school. But before taking this competition, students have to attend special preparatory classes for at least 2 years. These special classes are for the most part free of tuition fees, but access to them is decided before the results of the national competition are known. Furthermore, access largely reflects students' aspirations, teachers' recommendations and the school district of origin. In this respect we would expect family and social background to have a greater influence on student's tertiary education attainment in France than in Japan where scholastic results to a national contest plays a larger role. This corresponds to a higher value of λ in the theoretical model.

The second explanation for the differences in the extent of earnings and educational mobility between France and Japan lies in the low returns to education in the latter country. Under these circumstances, investing in one's children's human capital may not be the most profitable investment for the parents. If so, lower parental investment will lead to lower inequalities in human capital endowments and lower earnings inequality, hence more mobility.

Two stylized facts seem to contradict this simple interpretation. First, despite low returns to education, Japanese parents still devote a considerable share of their wealth to their children's education. Second, while the returns to education in Japan are low by international standards, they are, at least at the end of the period, comparable to the ones observed in France.

The answer to these two counter arguments emphasize the role of earnings inequality among the parents. In the steady-state, the consequence of low returns to education is not only that investment in human capital will be little profitable. It is also that other things being equal, earnings difference will be small. In this case, parents may well invest a large share of their income in their children's education; in the end, if the distribution of income is compressed, so will be the distribution of human capital in the next generation. This is confirmed by the analysis of "shadow education" undertaken in Stevenson and Baker (1992), who emphasize the following three aspects of private investment in education in Japan. First, family financial investment is high on average. Second, such investment is efficient at improving educational attainment. But third, financial investment and the use of shadow education seem to vary little with characteristics of the family background such as parental education or family income.

A similar argument may also help understand why intergenerational earnings and educational mobility in France is so low, relative to Japan, despite current low returns to education. In fact, what matters is not only the current returns but also their past value. The former define the incentives for investing in children's human capital. The latter determine the degree of inequality of income among parents, i.e. in the source of investment. Today's French adults live in a relatively equal world, but they are the children of a much less equal world, that of post- World War II France. On the other hand, earnings inequality in Japan have been rather limited throughout the twentieth century, which leaves less room for a strong impact of parental financial investment in their children on intergenerational mobility.

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Appendix: First-Step Equation

To predict father's income, we rely on a first-step equation in which yearly income is regressed on a set of education dummies interacted with birth cohort. Hence, we allow for the possibility of change over time in the returns to education. It is then possible to use father's education and birth cohort, as reported by the child, to form a prediction of his father's earnings.

In the first-step equation, we do not use father's occupation, although this information is available in our data sets. Using reported father's occupation to predict father's income raises some difficulties, given our objective, discussed in the Section "Econometric Model" to predict father's income at age 40. Occupation typically varies over the course of a career and children report the occupation of their father at a specific point in time. For instance, occupation when the child was aged 17, may or may not correspond to occupation when the father was 40. If not, then it is difficult to use reported occupation at age 17 to assess father's earnings at age 40. There are further difficulties that differ between the French and Japanese surveys. In France, individuals are asked to report their father's occupation at the time they finished going to school: this is problematic because those who finish school later will report the occupation of their father at a later stage of the father's career. This would lead to spurious correlation between father's occupation and child's education. In Japan, the situation is different. In some cases, individuals are asked to report their father's occupation without any indication regarding the period, in the father's career. So it is unclear what occupation is precisely reported. Yet, it is likely that younger cohorts (whose parents are still active) will report current occupation of their father while older cohort will report end of career occupation. Again, there is a distortion that may affect our results. Lastly, as documented in Lefranc and Trannoy (2005), using education as the only instrument or using both education and occupation has a very limited impact on the estimated IGE.

The specification used in the first-step equation is the following:

$$X_{ict} = \alpha_t + \Sigma_{j=1}^{n_e} \beta_{0j}^{c} Ed_{ij} + \Sigma_{j=1}^{n_e} Ed_{ij} (\Sigma_{k=1}^{4} \beta_{kj} (\text{age}_i - 40)^k) + \nu_t$$

where X_{ict} denotes the earnings of the individual i, taken from the sample of fathers, who belongs to the cohort c, at date t; α_t is a time effect, common to all cohorts (it may for instance capture inflation, overall income growth, ...); Ed_{ij} is a dummy variable that takes the value 1 if individual i has the level of education j; age_i is the age of individual i at time t.

This equation assumes that the returns to education at the age of 40 differ across cohorts: for instance, in some cohorts, the premium attached to higher education can be bigger than in other cohorts. In fact, there are no reasons to expect that the coefficients β_{0j}^{c} will remain unchanged across cohorts. It also assumes that the effect of age on earnings varies according to the level of education. We expect that the effect is bigger for more educated people.

How to predict from the above equation the earnings at the age of 40? Note the relationship between age, time and cohort: $age = t - c$. So age 40 corresponds to $t = c + 40$. By construction, the terms $(\text{age}_i - 40)^k$ will be zero at age 40. So for an individual of cohort c, the predicted earnings at age 40 is simply given by:

$$X_{icc+40} = \alpha_{c+40} + \Sigma_{j=1}^{n_e} \beta_{0j}^{c} Ed_{ij}$$

The problem is that for many cohorts, we may not have a snapshot of their father's earnings exactly at age 40. And consequently, we will not be able to estimate α_{c+40}, although we do estimate the values of β_{0j}^{c}. But this is of little consequence, since this term is common to all individuals of that cohort, independent of their level of education.

To be more specific, let $\{Ed_{ij}^{\text{father}}\}_{i=1\ldots n_e}$ denote a set of dummy variables characterizing the education of the father of individual i. Let c denote the cohort of father of individual i. The predicted father's income for individual i takes the form:

$$X_i = \alpha_{c+40} + \Sigma_{j=1}^{n_e} \beta_{0j}^{c} Ed_{ij}^{\text{father}}$$

The standard IGE equation is:

$$\begin{aligned}
& Y_i = \beta + \gamma_0 X_i + \varepsilon_i \\
\Leftrightarrow\ & Y_i = \beta + \gamma_0(\alpha_{c+40} + \Sigma_{j=1}^{n_e} \beta_{0j}^{c} Ed_{ij}^{\text{father}}) + \varepsilon_i \\
\Leftrightarrow\ & Y_i = (\beta + \gamma_0 \alpha_{c+40}) + \gamma_0(\Sigma_{j=1}^{n_e} \beta_{0j}^{c} Ed_{ij}^{\text{father}}) + \varepsilon_i
\end{aligned}$$

So controlling for the cohort of birth of the father (for instance, using a set of dummy variables for each cohort or a polynomial function) in the second-step equation is enough to capture the term $\beta + \gamma_0 \alpha_{c+40}$. So we can just regress child's earnings on father's cohort and the terms $\Sigma_{j=1}^{n_e} \beta_{0j}^{c} Ed_{ij}^{\text{father}}$ that we are able to estimate. Given child's age, we only exploit variation in earnings among fathers of the same birth cohort but with different educational level. We do not rely on differences in father's age, as a source of wage variation.

In our case, we want to estimate the IGE controlling for life-cycle effects. For simplicity, let us drop higher-order terms in age. The equation we wish to estimate is:

$$\begin{aligned}
& Y_i = \beta + \gamma_0 X_i + \gamma_1 X_i \times (\text{age}_i - 40) + \varepsilon_i \\
\Leftrightarrow\ & Y_i = \beta + (\alpha_{c+40} + \Sigma_{j=1}^{n_e} \beta_{0j}^{c} Ed_{ij}^{\text{father}})(\gamma_0 + \gamma_1(\text{age}_i - 40)) + \varepsilon_i \\
\Leftrightarrow\ & Y_i = (\beta + \gamma_0 \alpha_{c+40} + \gamma_1 \alpha_{c+40}(\text{age}_i - 40)) \\
& \quad + (\Sigma_{j=1}^{n_e} \beta_{0j}^{c} Ed_{ij}^{\text{father}})(\gamma_0 + \gamma_1(\text{age}_i - 40)) + \varepsilon_i
\end{aligned}$$

Now to take care of the first parenthesis on the right-hand side, we need to account for the cohort of birth of the father (because of $\gamma_0\alpha_{c+40}$) and the age of the individual (because of $\gamma_1\alpha_{c+40}(\text{age}_i - 40)$). This can be done using dummies for father's birth cohort and a polynomial for individual age. To simplify things, if we assume that α_t is a smooth function of time, we can simply put a polynomial in the cohort of the father. Of course, we should put an interaction between father's cohort and child's age.

Lastly, it is important to realize that if we don't know, for each individual, the birth cohort of his/her father, we will treat all children of a given age as having fathers of the same birth cohort (in fact, a mix of different likely cohorts). In this case, it is enough to control for child's age.

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Japanese and Korean High Schools and Students in Comparative Perspective

Hyunjoon Park

Background

Japan and South Korea (hereafter Korea), along with other East Asian countries such as Hong Kong and Taiwan, have received serious attention from American educational researchers and policy makers with their students' considerably high levels of academic achievement (Stevenson & Stigler, 1992; US Department of Education, 1987). The extraordinary performance of Japanese and Korean students has been documented in various comparative studies of achievement. In the Third International Mathematics and Science Study (TIMSS 95), for instance, 4th- and 8th graders from Japan and Korea, along with those from Hong Kong and Singapore, markedly outperformed their peers in other nations in both math and science. In 1999, TIMSS was repeated for 8th graders in 38 countries and again it was the five East Asian countries (including Taiwan, which did not participate in TIMSS 95) that occupied the top positions. In 2000–2001, the Organization for Economic Cooperation and Development (OECD) administered a new international survey, the PISA (Program for International Student Assessment), of literacy skills in reading, mathematics, and science among 15-year-old students. Among students from more than 40 countries in PISA, Korean students, along with Japanese and Hong Kong students, showed the highest mean scores in mathematical and scientific literacy.

The outstanding performance of East Asian students, along with relatively poor performance of American students, has led to two extreme reactions from American educational policy makers and researchers. On the one hand, a group of people have considered the relatively poorer achievement of American students as evidence of weakness of American education and thus have argued significant reforms of American education, following East Asian model of education. But as Baker and LeTendre (2005) show, such argument for American education reform is often not based on systematic examinations of international data but draws a hasty conclusion only on the basis of simple comparisons of countries' average scores.

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On the other hand, the opposite reaction to the considerably higher performance of East Asian education has simply disregarded the fact, arguing that the results from international surveys of student achievement do not show real capacity of educational system. Emphasizing creativity as a key aspect of capacity of educational systems, this perspective is critical to the higher average performance of East Asian countries as simply reflecting drill, memorization, and standardized testing that suppress students' creativity and questioning (Hanushek, 2002). It is assumed that American education should be better in encouraging creativity and innovative thinking among students, which are more important than mere rote learning and memorization widely practiced in East Asia, despite American students' lower performance in international tests of academic achievement. It is worth reciting the remarks by Bracey who represents this perspective from Hanushek (2002: 17):

> We should think more than twice before we tinker too much with an educational system that encourages questioning. We won't benefit from one that idolizes high test scores. It could put our very competitiveness as a nation at risk.

Is it fair to criticize East Asian education as drill, rote learning, and memorization and consider American education as encouraging creativity and innovation? In fact, the lack of creativity, the emphasis on rote learning and memorization, and heavy reliance on standardized testing have long been the most common criticisms on Japanese and Korean education not only from American educators but also from Asian educators themselves (Stevenson, 1991). Despite ample evidence against such typical view on Japanese (especially elementary) education (Stevenson & Stigler, 1992), the common critical view on East Asian education still remains strong in literature. This may be in part due to Western audience's attention to Japanese and Korean high school students who have to spend long hours of study to prepare for university entrance exams.

In reality, however, surprisingly we have very limited knowledge on Japanese and Korean high schools and their students. Most research on student's academic achievement and school differentiation in this aspect of educational outcomes was conducted at the elementary or middle school levels. For instance, TIMSS, which has been widely used by comparative education researchers to compare academic achievement of students and their schools across many countries, surveyed only students in elementary schools (3rd–4th graders) and middle schools (7th–8th graders) for Japan and Korea. Therefore, our knowledge on distributions of student performance within and between schools in Japan and Korea is limited primarily to elementary and middle school levels.

The exclusive focus on elementary and middle school students by previous literature is important to bear in mind because high school education in Japan and Korea is quite distinctive from elementary and middle school education. There is no between-school tracking through elementary to middle schools until students go to different types of high schools after graduation from middle schools (usually after 9th grade). Apparently, the degree of school differences should be greater at the high school level than at elementary or middle school levels. The knowledge on elementary and middle schools cannot be simply generalized to high schools given significant changes in structural features of high school education.

An important consequence for the lack of research on academic achievement of high school students in Japan and Korea is the neglect of literature on significant differences between Japanese and Korean education. Driven by similarly extraordinary performance of Japanese and Korean elementary and middle school students, Western literature tends to treat Japanese and Korean education as the same one. This treatment is more or less fair given the considerably similar features of elementary and middle school education between two countries. But, by doing so, literature does not appreciate important differences between Japan and Korea at the high school level. As will be described in more detail in the later section of Academic vs. Vocational schools, two countries have distinctive selection processes of students into high schools, which should result in significant differences between the two countries in the levels of school differentiation.

Of course, a great deal of studies have examined the transition of students from middle school to high school in Japan and Korea and explored the determinants of attending specific types of high schools and the consequences of attending such schools for opportunities of post-secondary education (Stevenson & Baker, 1992; LeTendre, 1996; Ono, 2001; Kim & Phang, 2005). However, the focus of those studies was exclusively on educational *attainment* as an outcome of education. As researchers recognize, data on academic *achievement* of high school students, which is another important aspect of educational outcomes distinct from educational attainment, are rare in Japan and Korea (Kariya & Rosenbaum, 1999). Despite the cumulated knowledge on the processes through which Japanese and Korean students proceed from middle schools through high schools to colleges, we know little about how their academic skills and knowledge are distributed within and between schools.

Given the surprising lack of knowledge on educational achievement of Japanese and Korean high schools and their students, this chapter aims to offer a closer look at educational performance of Japanese and Korean high school students and their distributions within and between schools. Although descriptive in nature, this chapter offers empirical evidence against some stereotyped criticisms on Japanese and Korean education and provides detailed descriptions of distribution of student performance within and between schools especially in comparisons to other Western countries.

Rote Learning, Memorization, and Lack of Creativity?

Japanese and Korean education has been commonly criticized as rote learning, memorization, and lack of creativity:

> Exclusive reliance on standardized testing for educational assessment also forces administrators and teachers to emphasize rote learning and memorization, which ultimately inhibits creativity (Kim, 2005: 342).
>
> . . .the students' need to acquire a large amount of information for the examinations is believed to reduce students' creativity. Indeed, the most common criticism made by Asians of their school is that the schools are not preparing students to think creatively (Stevenson, 1991: 115–116).

However, this widespread stereotyped criticism on Japanese and Korean education has never been empirically tested because data that contain measures of student's creativity across a nation are rare. Although not still perfect to test this argument, we now have better data than academic achievement data to validate the argument to some extent. In 2003, PISA assessed 15-year-old students' problem-solving skills in addition to reading, mathematics, and science literacy skills. With problem-solving skills, PISA aimed to test "each student's ability to understand a problem situation, identify relevant information or constraints, represent possible alternatives, or solution paths, select a solution strategy, solve the problem, check or reflect on the solution, and communicate the solution and reasoning behind it" (OECD, 2004: 46). In short, the assessment of problem-solving skills was designed to measure student's capability to solve problems in real-life situations by applying their accumulated knowledge and skills beyond a specific area of school curriculum. Although problem solving may not still indicate student's creativity, it is student's capacity to "move among different, but sometimes related, representations and to exhibit a certain degree of flexibility in the ways in which they access, manage, evaluate, and reflect on information" (OECD, 2004: 27). As such, problem-solving skills represent student's capacity, which is not acquired simply by rote learning, memorization, and repetition of school subjects. Therefore, by comparing the overall levels of problem-solving skills of Japanese and Korean students to those of Western students, we can assess the criticism on Japanese and Korean education better than we could by examining data on academic achievement such as mathematics and science test scores.

Table 1 presents mean scores and standard deviations for five selected countries including Japan and Korea. PISA measured proficiency in problem solving in a scale that has a mean score of 500 points and a standard deviation of 100 points across OECD students. Therefore, the average performance level of Japanese (547) and Korean (550) students (also Finnish students) is about 50 points (i.e., half standard deviation) higher than the OECD mean performance level. Indeed, Korea shows the highest mean score among all 40 countries in PISA, which is not statistically different from the mean scores of Japan and Finland. Students in the United States show the mean performance level below the OECD mean, while German students are located between top performers in Finland, Japan, and Korea and poor performers in the United States.

Table 1 National mean performance on the problem-solving scale

	Mean	Standard deviation
Finland	548	82
Germany	513	95
Japan	547	105
Korea	550	86
United States	477	98
OECD average	500	100

The comparatively higher level of problem-solving skills among Japanese and Korean students is not consistent with the common criticism that East Asian education exclusively relies on rote learning and memorization and East Asian students' higher performance in various international comparisons of academic achievement results from repetition and numerous experiences of taking test. Among students from 40 countries, Japanese and Korean 15-year-old students show the highest level of capacity of interconnecting information and applying the cumulated knowledge to solve real-situation problems. Again, this result may not prove that Japanese and Korean students are creative. But it is certainly inconsistent with the stereotyped image of Japanese and Korean students who practice drill, rote learning, and memorization.

Making Talented Students Mediocre?

Another related criticism on Japanese and Korean education is that their standardized education, which does not allow diverse teaching methods and within-school ability grouping, does not support further development of talented students. It is argued that talented students in standardized education in Japan and Korea do not have opportunities of advanced learning but have to suffer from uniform curriculum and pace of instruction designed for average students (Stevenson, 1991).

This criticism leads us to expect that top performers in Japan and Korea should not exceed or even should do worse than top performers in other countries. In other words, highly standardized education in Japan and Korea should increase their overall mean performance but suppress further development of talented students. In fact, emphasizing 'quality' education, Korean government has recently pursued reforms of secondary education, of which variation in education according to ability, and special education for 'gifted' students are major components (Ministry of Education and Human Resources Development, 2004). The assumption is that the long-standing standardized system should not meet diverse needs among students with different levels of ability. The government is particularly concerned about the relative lack of talented students who can be important human resources for economic growth of country.

As the case for other countries as well, however, the demand for educational reforms is not based upon serious examinations of strength and weakness of current system. To what extent is it true that standardized educational system in Korea suffers from the lack of talented students? How do top performers in Korea fare to top performers in other countries? Given that the PISA data were collected in 2003, Korean government's reform for diverse education, which primarily began in early 2000 but has not been substantially implemented yet, should not have significantly affected the result for PISA. We can consider the result in PISA as reflecting mostly the long-standing tradition of standardized education in Korea.

In order to assess the claim that top students in Japan and Korea are not as advanced as top students in other countries, it is necessary to examine the distributions of problem-solving skills acros countries only among students at the top end of distribution. Figure 1 presents students' scores at the top 10 percentile within each country. Comparisons among top students across five countries indicate that top students in Japan and Korea outperform top students in Germany and the United States in problem solving. Specifically, students at the top 10 percentile (i.e., 90 percentile) in the US distribution score 599 points, while students at the top 10 percentile in the Korean distribution score 652 points. Given that the one standard deviation of scores on the problem-soving scale is 100 points, the difference of 53 points between Korean students and American students at the top 10 percentile is striking. Students at the top 10 percentile in Korea score higher than students at the top 10 percentile in Germany (628). Japanese students (667 points) at the top 10 percentile score even higher than Korean students at the 10 percentile. In short, Fig. 1 reveals that Japan and Korea show higher levels of performance, than Germany and the United States, in problem solving not only among average students (as seen in Table 1 for average scores) but also among those at the top end of distribution.

Although not directly relevant for testing the argument that Japanese and Korean educational systems make talented student mediocre, it is worthwhile to briefly mention competencies of problem solving among low-achieving students as well. As described above, the upper part of the distribution shows slightly higher performance of Japanese high-performing students than Korean high-performing students. However, the lower part of the distribution shows the opposite case: Korean low-performing students do better in problem solving than Japanese low-performing students (the score at the bottom 10 percentile is 415 points in Japan and 443 points in Korea). The relatively poor performance of Japanese low-perfoming students is evident, especially when compared to Finnish students. Although Japanese students at the top 10 percentile even outperfom Finnish students at the top 10 percentile, Japanese students at the bottom 10 percentile score 35 points lower than their Finnish counterparts. The relatively large gap in performance between high-performing and low-perfoming students in Japan is reflected in the relatively large standard deviation (105 points) of the problem-solving score as already seen in Table 1 (larger than 98 points in the United States). Comparably standard deviations in Finland and Korea are only 82 and 86 points, respectively.

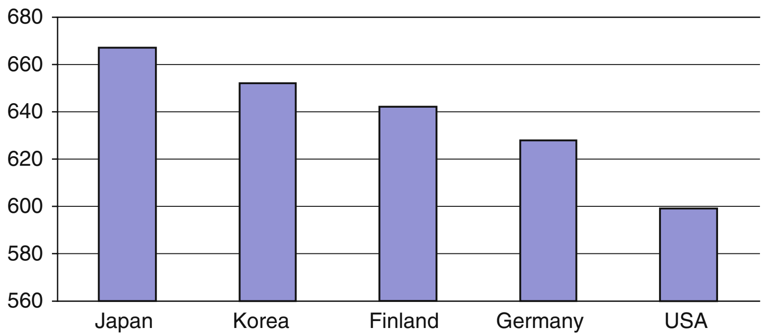

Fig. 1 Cumulative distributions of students' problem-solving skills by country

Effects of Family Socioeconomic Status

In order to assess the extent to which family socioeconomic status (SES) is related to student's problem-solving skills, I conducted the Ordinary Least Squares (OLS) regression analysis for each country, separately. In the model, student's score on the problem-solving scale is predicted by a measure of family SES, the Index of Economic, Social, and Cultural Status available in the PISA 2003 dataset (OECD, 2004). The index was created by a Principle Component Analysis using the following variables: (1) parental occupation measured by socioeconomic index of occupational status (Ganzeboom, De Graaf, & Treiman, 1992); (2) parental education as measured by years of schooling completed; (3) number of books at home; and (4) home possessions of educational resources (e.g., a desk, a computer, or educational software) and cultural resources (e.g., classical literature, books of poetry, or works of arts). As such, this index of economic, social, and cultural status taps the overall level of family SES. The index was scaled to have a mean of 0 and a standard deviation of 1 across OECD students. Higher values of the index indicate levels of family SES higher than the OECD average.

Figure 2 presents the relationship between family SES and the score on the problem-solving scale in each country. The bar for each country stretches from the bottom 10 percentile in the distribution of family SES to the top 10 percentile. For instance, a student at the bottom 10 percentile in the distribution of family SES in Germany has the value of –0.97, whereas a student at the top 10 percentile has the value of 1.50. The longer the bar, the larger the difference in family SES between the top and the bottom 10 percentiles. The length of the bar is relatively short in Japan and Finland, while it is relatively long in Germany and the United States. Korea is located between.

The slope of the bar indicates the extent to which family SES affects student's problem-solving skills: the steeper the slope, the stronger the effect of family SES. Although there is evidence of non-linear relationship between family SES and the

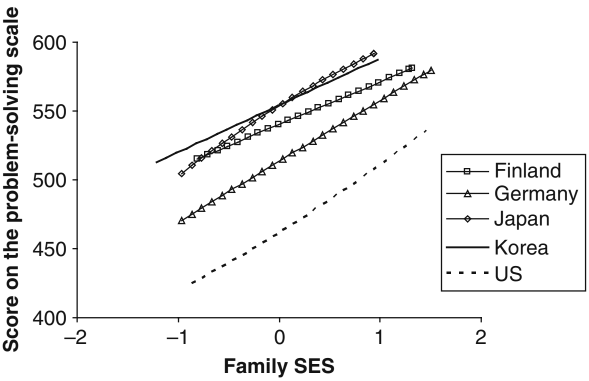

Fig. 2 Slopes of family SES by country

score in Japan and the United States,[1] the pattern does not differ substantially even if the linear relationship is assumed. Two groups of countries are distinguished. Finland and Korea show relatively less steep slopes of family SES, whereas Germany, Japan, and the United States show relatively steeper slopes. Again, it is interesting to see a significant difference in the degree of family SES effect between Japan and Korea.

Finally, the figure also clearly shows the higher levels of performance among Japanese and Korean students. Japanese and Korean students whose family SES level is the OECD average (i.e., the value 0) score about 550 points, while German and American students with the same level of family SES score 510 points and 460 points, respectively.

Within-School and Between-School Effects

The overall effect of family SES on students' problem-solving skills is a combination of within-school and between-school effects (Willms, 1986). A within-school effect is the average within-school relationship between individual students' achievement and their family SES net of any school membership effects, while a between-school effect indicates the extent to which the average achievement for the schools is associated with the socioeconomic level of the schools, which is the aggregate of family SES of individual students who attend the school (Bryk & Raudenbush, 1992). The decomposition is important because the two aspects of inequality have different policy implications (Willms, 2004). If the within-school effect of family SES is more apparent than the between-school effect, it indicates larger inequalities among students within schools and thus requires educational practices or programs that are particularly geared to improving educational performance of students from lower SES background within schools. If the between-school effect is stronger than the within-school effect, in contrast, it suggests significant differences in mean achievement between schools composed with students predominantly from higher SES families and from lower SES families. A primary source of the pattern may be school segregation along the line of student's socioeconomic background, which requires policy makers to reconsider the ways in which their educational systems sort students into different schools and how students' socioeconomic background influences this process (Willms, 2004).

To address the issue, I used two-level hierarchical linear modeling technique, which allows the decomposition of total variation in student performance into within-school and between-school variation as well as separates within-school and between-school effects within a country. Panel A in Table 2 presents the result of the null model that includes no independent variables at any levels. The null model provides basic information on the extent to which total variation is decomposed into

[1] The statistical tests showed that the squared term of "family SES" was statistically significant in Japan and the United States, while it was not significant for the other three countries. The sign of the squared term was negative in Japan, while it was positive in the United States.

Table 2 Results of two-level hierarchical linear model on problem-solving skills

	Korea	Japan	Finland	Germany	United States
Panel A					
Between-school variation	2,823.8	5,230.0	354.5	4,593.5	2,597.1
Within-school variation	4,609.0	5,843.0	6,628.7	3,953.6	6,790.5
% of between-school variation among total variation	38	47	5	54	28
Panel B (effects of family SES)					
Between-school effect	88.925	144.674	31.8	102.044	84.599
Within-school effect	9.12	6.604	30.705	15.437	31.972
Overall effect	34.091	46.522	30.859	44.187	46.288
Panel C (index of school segregation by SES)					
	0.31	0.29	0.14	0.33	0.27

within-school and between-school variation. Thirty-eight percent of total variation in student performance in Korea is between schools, while the corresponding percentage in Japan is 47%. Although the relative proportions of variation between schools in Korea and Japan are smaller than the proportion in Germany (54%), they are larger than the percentage in the United States (28%). Comparisons to Finland (5%) highlight considerable levels of school differences in mean achievement in Japan and Korea.

Panel B in Table 2 presents within-school and between-school effects of family SES, along with the overall effect seen in Fig. 2.[2] The between-school effect, which indicates the relationship between school's mean score and school's average SES (calculated from individual student's family SES attending the same school), is strongest in Japan. In other words, the difference in school's mean scores among schools with different socioeconomic levels is much substantial in Japan than in any other countries analyzed. Although it is weaker than in Germany, the between-school effect in Korea is also considerably strong, being similar to the effect in the United States and much stronger than the effect in Finland.

The large between-school effects in Japan and Korea are mirrored in the relatively small effect within schools. The pattern of the relatively larger between-school effect than within-school effect is commonly found in educational systems where students are segregated into different schools, along the line of family SES, because of residential segregation (Willms, 2004). The pattern is also found in highly differentiated school systems where students are sorted into different types of schools

[2] Specifically, the model includes the index of ESCS as a measure of family SES in student-level equation predicting individual students' score on the problem-solving scale. In school-level equation, the school's mean SES, which is the average family SES among students attending the same school, predicts school's mean achievement. The overall effect is the estimate from the OLS regression without taking into account the nested structure of data.

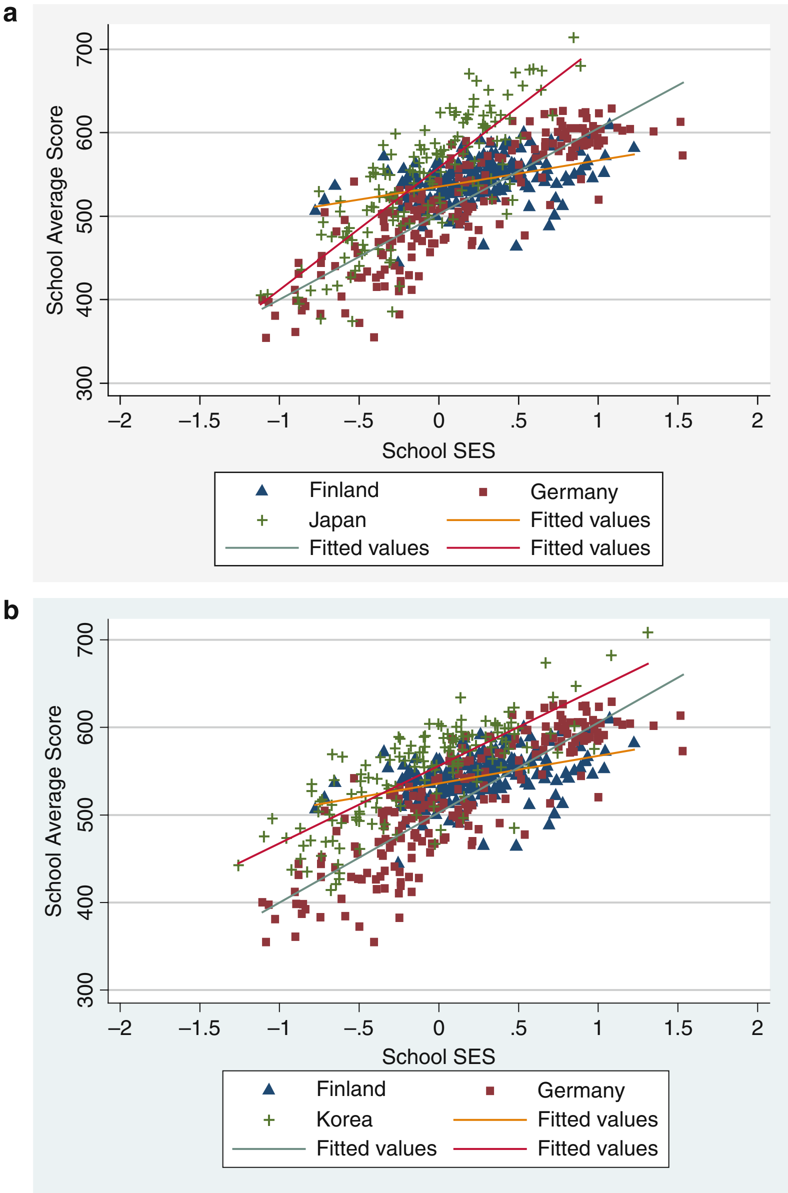

Fig. 3 **a**, **b** Relationship between School SES and school mean performance

that vary significantly in terms of their curriculum, prospect for post-secondary education, and educational credentials awarded. Studies of educational inequality in highly differentiated educational systems such as Germany and other continental European countries show that family SES affects the placement of students into a particular type of schools even after controlling for ability (Buchmann & Park, 2005; Schnepf, 2002). In highly differentiated systems, students from high SES families are more likely to attend high-status schools and students from low SES families are more likely to attend low-status schools. Along with variation in curriculum and academic orientation, students' opportunities for learning diverge between high-status and low-status schools, resulting in substantial differences in mean achievement among schools varying in their average SES.

Panel C in Table 2 presents an index of the degree of between-school SES segregation.[3] Showing the proportion of variation in SES that is between schools, the index can take values from 0 to 1 (Willms, 2004). Larger values of the index indicate the higher degree of school segregation by SES. Germany (0.33) shows the greatest level of school SES segregation among the five countries, followed by Korea (0.31), Japan (0.29), and the United States (0.27). Finland (0.14) shows the smallest level of school SES segregation.

The relatively strong between-school effect in Japan is clearly shown in the scatter plot of school mean score against school mean SES. In Fig. 3a, the relationship between school mean score and school mean SES is depicted for Finland, Germany, and Japan and in Fig. 3b for Finland, Germany, and Korea. First of all, the weak relationship between school mean score and school mean SES in Finland is remarkable. Second, the relationship is steeper in Japan than in Germany, while the relationship in Korea is slightly less steep than in Germany. Finally, comparisons between Japan and Germany in Fig. 3a and the comparisons between Korea and Germany in Fig. 3b reveal that poor schools in Japan show relatively poorer performance compared to similarly poor schools in Korea. A large number of poor schools (especially those with average SES below the OECD mean 0) in Japan show similar levels of school performance compared to similarly poor schools in Germany, while most poor schools in Korea exceed similarly poor schools in Germany.

Academic vs. Vocational Schools

The considerably large difference in average performance among schools in Japan reflects the hierarchical structure of high schools where students are selected into schools supposedly according to their academic achievement. Compared to Germany where students are sorted into four different types of secondary schools at age 10, Japanese students have to decide whether to go to general (academic) high schools or vocational high schools after middle school graduation (after 9th grade). Although the major distinction in educational career is between general and vocational high schools (except for a very small number of technical colleges and high schools), general high schools themselves are clearly differentiated in ranking,

[3]The index is calculated as follows: the overall effect of family SES (OLS estimate) = η^2(Between-school effect) + (1–η^2)(within-school effect), where η^2 is the index of school segregation by SES (Willms, 2004: 13).

which is determined primarily by the extent to which schools succeed in placing their graduates into prestigious universities (Ono, 2001).

Although student's academic achievement is supposedly a major criterion for high school selection, various studies have shown how family background also affects high school decision among 9th graders. LeTendre (1996) shows how school teachers guide their students' decision on the type of high schools on the basis of not only students' academic performance but also their family background. Ono (2001) provides empirical evidence that the effects of family background on the ranking of high schools students attended persisted even after controlling for their GPA in 9th grade. These previous studies suggest that high schools in Japan are highly differentiated not only in the overall academic performance of their students but also in socioeconomic intake of their students.

Similar to Japanese high schools, Korean high schools are also differentiated into academic and vocational high schools. Upon graduation from middle school, students proceed to either academic high school or vocational high school, mostly depending on their grades and needs. Vocational high schools offer occupational training for students who enter job markets after graduation, whereas academic high schools are directed to prepare students for post-secondary education. Therefore, there are significant differences between the two types of schools in many aspects, including curriculum, academic pressure, and eventually access to opportunities for tertiary education. Vocational high schools are perceived as less prestigious than academic high schools. As of 2003, the proportion of students attending vocational high schools among total high school students was about 30%.

However, the Korean educational system is fundamentally different from the Japanese system in the extent to which academic high schools themselves are stratified. Compared to highly stratified academic schools in Japan, differentiation among academic high schools in Korea is much less apparent. This is because of the "Equalization Policy" (*P'yongjunhwa Chngch'aek*), which is probably the most significant and thus the most controversial policy in Korean education (Kim, 2003; Lee, 2004). Since implemented in Seoul (the capital of Korea) and major Metropolitan areas in 1974, the equalization policy has abolished school-specific entrance examinations, which determined students' admission to high school. The policy was originally intended to reduce differences among high schools and relieve intense competitions for top high schools. Under the equalization policy, students have been randomly assigned to academic high schools within their school district by a lottery. Before 1998, students who attained at least the minimum score on the national entrance exam were eligible for the random assignment. After even abolishing entirely the national entrance examination for high school in 1998 in four big cities including Seoul, the equalization policy in major areas has relied on middle school activities records for high school admission. Importantly, this equalization policy is applied to both public and private schools. In other words, in Korea, private schools as well as public schools do not select students on the basis of their own criteria but have to be subjected to the random assignment.

Despite the Equalization Policy, however, differentiation among high schools can be still substantial. Note that the equalization policy has been applied to academic high schools only. Applicants for vocational schools still choose their schools. Given that 70% of middle school graduates go to academic high schools and college degrees significantly affect individuals' life chance, many of vocational high school students, who are more likely to come from poorer families on average than their counterparts in academic high schools, have poor academic performance. Therefore, a significant difference in the students' overall performance and also in socioeconomic intake of students is expected between academic and vocational high schools.

However, the considerably steep slope of school mean SES in Fig. 3b is rather unexpected given that according to the Equalization Policy, students have been randomly assigned into an academic high school within residential school district. In order to better assess sources of the substantial between-school effect in Korea, I present another scatter plot showing the relationship between school mean score and school mean SES with academic and vocational high schools separated (Fig. 4). For comparison, I present the same scatter plot for Japan as well (Fig. 5).

Comparing the scatter plots for Japan and Korea reveals some interesting differences between the two countries. First, as already seen in Fig. 3a, b, the slope of school mean SES is much steeper in Japan than in Korea. Second, differentiation between academic and vocational high schools in both school mean performance and school mean SES is more dramatic in Korea than in Japan. In Korea, vocational high schools are low-performing and poor schools, occupying the leftist bottom tail of the scatter plot. Although vocational high schools in Japan are also in general low-performing and poor schools, the degree of differentiation between academic and

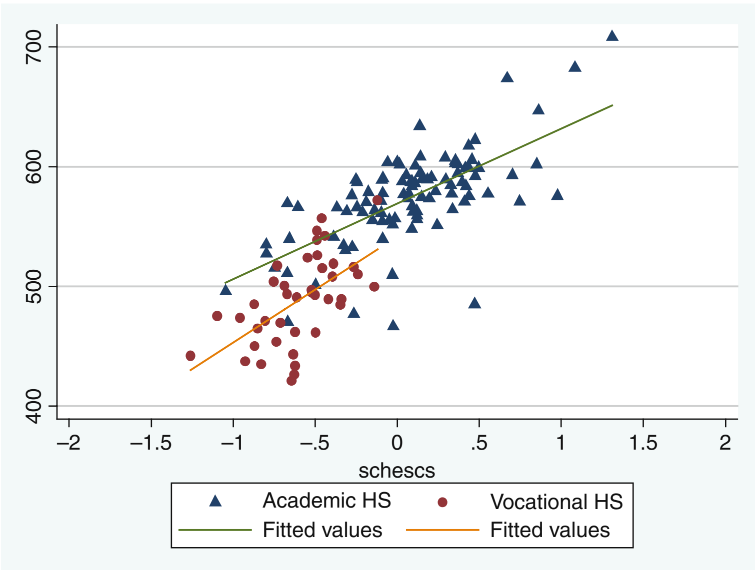

Fig. 4 Academic vs. vocational high schools in Korea

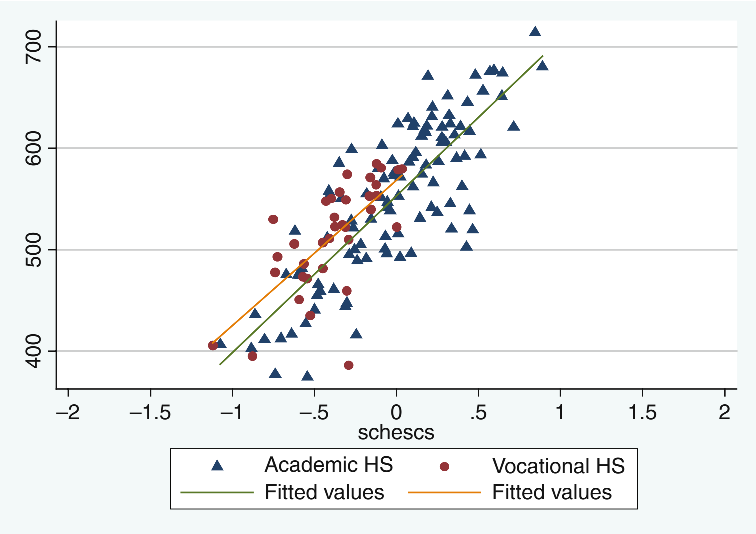

Fig. 5 Academic vs. vocational high schools in Japan

vocational schools in Japan is not as significant as in Korea. In Japan, at the lower level of school mean SES, many vocational schools have higher levels of mean performance than do academic schools. In short, vocational high schools in Korea are distinctively disadvantaged in mean performance and socioeconomic intake of students compared to academic high schools. In Japan, vocational high schools are not necessarily the lowest-performing schools. In fact, by looking at the effect of GPA in 9th grade on the ranking of high school attended, Ono (2001) already showed that the effect of GPA was stronger for attending vocational high schools than for attending the lowest-ranking schools. In other words, in Japan vocational high schools are "more attractive than the lowest-ranking high school(s)."

Finally, examining the relationship between school mean performance and school mean SES separately between academic and vocational high schools in Korea shows that the slope is somewhat steeper among vocational high schools than among academic high schools. But more importantly, the slope is still considerably steep among academic high schools. In other words, despite the implementation of Equalization Policy, school differentiation among academic high schools is substantial in Korea. One reason of the substantial level of school differentiation may be related to residential segregation. The random assignment of students into an academic high school occurs within school districts on the basis of residence. Therefore, depending on the degree of residential segregation along the line of family SES, students can attend high schools that significantly vary in school mean performance and socioeconomic intake of students. In fact, Korean public debates and news media have long focused on school differences between school districts, especially between school district no. 8, which consists of students, whose parents are highly educated and have high-ranking job, and others.

Public vs. Private Schools

Another major aspect of school differentiation is distinction between private and public schools. Although private (especially Catholic) schools in the United States generally show higher mean performance compared to their public counterparts (Bryk, Lee, & Holland, 1993), the relative advantage of private schools over public schools may not be generalized into other societies. In Japan, public schools have long been better than private schools (Kariya & Rosenbaum, 1999). However, Kariya and Rosenbaum (1999) also show recent changes in educational environments of private schools. The unintended consequences of policies for reducing stratification of public schools are improvement of achievement outcomes and popularity among private schools. Kariya and Rosenbaum (1999: 213) argue that “today it is easily observed that the old tradition of inferior private high schools is no longer true. Many private high schools are quite good.” However, their analysis was conducted at the level of prefecture but not at the school level. Specifically, they looked at the number of students admitted to elite universities from private high schools in specific prefectures. What they found was that prefectures that had implemented policies for reducing stratification among public high schools had larger numbers of students from private schools who entered elite universities than prefectures that had not implemented such policies. From this analysis, it is difficult to draw a conclusion on how private schools fare to public schools in terms of their overall performance. As the authors themselves recognized, moreover, data on school achievement outcomes are rare in Japan, which forced the author to use the number of students admitted to elite universities, instead.

With PISA data, it is now possible to compare the average levels of performance between public and private schools across nation. Table 3 presents the percentages and number of public and private high schools in Japan and Korea separately for academic and vocational high schools.[4] Among 143 Japanese schools that participated in PISA, 106 schools (74%) are public schools, while 37 were private schools. In other words, the majority of Japanese high schools are public schools. Figure 6 shows the relationship between school mean performance and school mean SES separately for public and private schools. Evident from the figures is that at the same level of school mean SES, public schools tend to be better than private schools.

Moving to Panel B in Table 3, overall there are more private high schools than public high schools in Korea. However, the pattern is different between academic and vocational high schools. Private schools account for 62% of academic high schools, while they account for 42% of vocational high schools. The comparison to Japan highlights the substantial proportion of private schools in Korean education.

The Equalization Policy is applied to both public and private schools in Korea. In other words, private schools in Korea have no choice of students. Because

[4] In the Japanese PISA data set, there is one technical college, while in the Korean data set there are 11 middle schools. Those schools were excluded.

Table 3 Percentage and number of public and private high schools

		Public	Private	Total
Panel A. Japan				
Academic high school	%	70.1	29.9	100
	N	75	32	107
Vocational high school	%	86.1	13.9	100
	N	31	5	36
Total	*%*	*74.1*	*25.9*	*100*
	N	*106*	*37*	*143*
Panel B. Korea				
Academic high school	%	38.1	61.9	100
	N	37	60	97
Vocational high school	%	58.5	41.5	100
	N	24	17	41
Total	*%*	*44.2*	*55.8*	*100*
	N	*61*	*77*	*138*

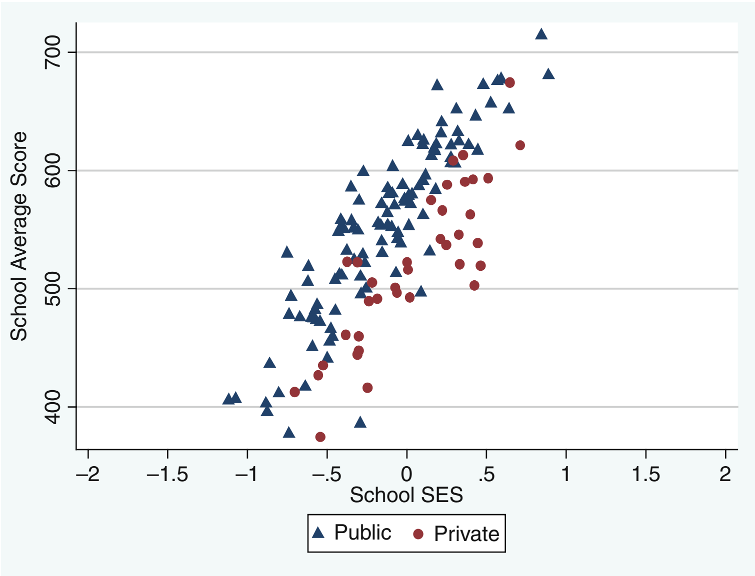

Fig. 6 Public vs. private high schools in Japan

government provides financial support to private schools to make tuition similar between public and private schools, parents of students who are assigned to private schools do not differ in educational costs from parents of students who are assigned to public schools. In fact, the distinction between public and private schools in Korea has a different meaning as the distinction in other countries because of the Equalization Policy that does not allow private schools to choose students at their will. In the standardized Korean education context, the distinction between public

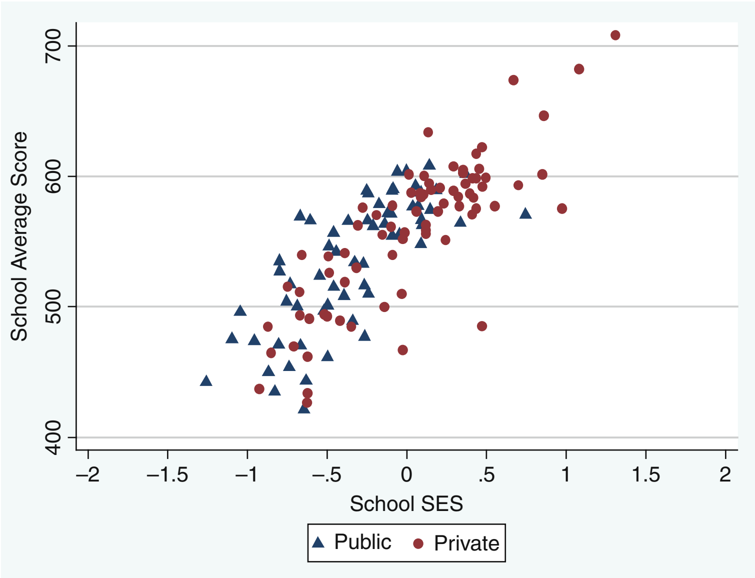

Fig. 7 Public vs. private high schools in Korea

and private schools is not substantial.[5] This context leads to an expectation that differences in both school mean performance and school mean SES between public and private schools should be negligible.

Figure 7 is in general consistent with the expectation. Overall, the differences between public and private schools are not apparent. However, there are a couple of private schools outstanding in their higher mean SES and higher mean performance. In fact, there is no public school whose mean SES is greater than 1, while there are a few of such private schools. It is difficult to identify what those private schools with mean SES greater than 1 are given that school identifiers are not available in PISA. In 2002, Korean government allowed six private schools to be entirely "independent" in selecting their students and determining tuitions. In reaction to growing demand for diverse secondary education, Korean government decided to have these experimental cases of so-called Independent Private Schools to assess the possibility of expanding this kind of schools in near future (2005). Studies show the overall higher levels of family SES among students attending those private schools than students attending public schools (2005). Again, because PISA did not collect information on "Independent Private Schools," it is impossible to determine whether those private schools that show considerably high levels of mean performance and mean SES are "Independent Private Schools."

[5] The fundamental distinction between public and private schools is who the owner of school is. Private schools are owned by individuals and they do have rights to select teachers, although not students. Teachers in public schools should move to a different school in every 5 years within providence, while teachers in private schools usually stay in the same school for a long time period.

Conclusion

A closer look at Japanese and Korean high schools and their students reveals that the stereotyped criticism on Japanese and Korean education does not stand against empirical evidence. I do not argue that rote learning, memorization, and standardized testing are not major aspects of Japanese and Korean education. They are certainly found in Japanese and Korean education. But what the closer look shows is that the extraordinary performance of Japanese and Korean students is not simply the result of such stereotyped educational practices. It is not desirable for American education simply to try to implement some features of East Asian education. But it is also not desirable for American education to ignore the high performance of East Asian education with stereotyped misconception. More systematic research is needed to assess strength and weakness of high school education in Japan and Korea in comparative perspective.

Another important finding of this study is the significant level of school differentiation in mean performance among Japanese and Korean high schools. This is in sharp contrast to the considerably small between-school (between-classroom) variation found in TIMSS among 13-year-olds (Koretz, McCaffrey, & Sullivan, 2001). The difference reflects the significant change in structural features of high school and middle school education in Japan and Korea. It is important to recognize that most previous literature on educational achievement in Japan and Korea was on the basis of elementary or middle schools and their students. Along with the availability of PISA data that surveyed high school students, it is now feasible to examine Japanese and Korean high school students' educational performance in more detail.

Interestingly, the result of this study highlights some important differences between Japan and Korea. Japan shows much larger variation in student's problem-solving skills than Korea, which is primarily driven by greater variation between schools in Japan than in Korea. Reflecting the selection process, Japanese high schools are more stratified than Korean high schools. The two educational systems differ not only in the overall degree of differentiation but also in the ways in which academic vs. vocational high schools and public vs. private schools affect student's performance. Previous literature has not paid serious attention to differences between Japanese and Korean education, along with its exclusive focus on elementary and middle school education. More balanced research will extend our understanding of differences between Japanese and Korean education as well as similarities between the two.

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Family Background, School System and Academic Achievement in Germany and in Japan

Fumiaki Ojima and Susanne von Below

Introduction

Educational attainment is deeply influenced by family background in modern society (Shavit & Blossfeld, 1993). To a varying degree academic achievement has played an important role in this attainment process. Because students from an advantaged social background show better academic performance than those from disadvantaged, the influence of academic achievement on educational attainment is clear. Boudon saw this process as a primary effect of class background in his classic work (Boudon, 1974). The purpose of this research is to carry out a comparative analysis of the influence of family background on academic achievement in Germany and in Japan. Using PISA 2003 data, we focus on how the educational achievement process varies in different social and institutional contexts.

Germany and Japan share some common results in PISA outcomes. First, a variance in student's performance is large in Germany and also in Japan. PISA test scores are standardized with 500 averages and with 100 as a standard deviation based on students' test results of the OECD member countries. In most countries, standard deviation of test score is less than 100, whereas that in Japan and in Germany exceeds 100. Low within-school variation and high between-school variation in test performance are another common aspect of two countries. Germany and Japan have a highly stratified secondary school system, which results in low-within and high-between school variations.

But PISA results in Japan are different from those in Germany on other aspects. The most prominent difference between two countries is the test score itself. Whereas the average test score of the German students is a little bit higher than the OECD average, the average test score of Japanese students is among the highest scoring countries of all OECD members. In addition, the two countries are quite different in the relationship between family background and students' test performance.

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The regression analysis of math test scores on the family socio-economic status shows that "Germany and Japan have a similar slope with one unit of difference on the socio-economic scale corresponding to 47 and 46 score points, respectively. However it also indicates, in Japan, there are many exceptions to this general trend so that the relationship explains 12% of the performance variation, while in Germany student performance follows the levels predicted by socio-economic background more closely, with 23% of the performance variation explained by socio-economic background (OECD, 2004a, p. 181)".

PISA Shock on Germany guided a lot of research to investigate the factors that influence German students' test performance. In such research, the disadvantaged family position of immigrant students and the structure of German educational system (retention and early start tracking) are seen as factors that produce students' poor outcomes and its strong relationship with family background in Germany. Especially, the traditional three-tier school tracking system starting after 4th grade is an institutional factor which most researches have focused on (Ammermüller, 2004, 2005; Jürges and Schneider, 2007; Michaelowa & Bourdon, 2006; Hanushek & Wößmann, 2006). Here, we discuss this problem from a comparative perspective.

In a comparison between Germany and Japan, we must consider the problem of out-of-school studies including shadow education (Stevenson & Baker, 1992; Bray, 1999; Baker, Akiba, Letrendre, & Weiseman, 2001). For the countries in East Asia, such as Japan, South Korea, China, and Taiwan, entrance examination plays a crucial role in the admission process to higher education. In these societies many students use out-of-school education and spend much time on it for exam preparation. A pervasion of out-of-school education alters the relationship between family background and academic achievement because the strategy of parents for their children's education varies based on such educational circumstances.

In this chapter, we analyze the influence of family background and the school system which produce these differences between Germany and Japan. In addition, we focus on the intra-family factors that create the relationship between family background and students' performance, especially on the difference between mother's roles in the two countries.

German and Japanese Education System

School systems in Germany and in Japan are quite different after 4th grade. Japanese students learn for 6 years at primary school and 3 years at junior high school, both of which teach students in a comprehensive setting. Most German students choose to go to a different type of secondary school after 4th grade, at age 10. The school experience of German students varies even in early teens. We will begin by introducing the secondary school system in the two countries.

German secondary schools are classified into three kinds; Gymnasium (grammar school), Realschule (intermediate school), and Hauptschule (general school). German students learn at Grundschule (primary school) and proceed to one of these kinds of school. Most of the students who receive Abitur, which is a qualification for universities, graduate from Gymnasium. Realschule provides opportunities for higher education, other than universities, and preparation for white-collar jobs. Compared to Gymnasium and Realschule, Hauptschule graduates have quite limited opportunities to access to higher education and to white-collar jobs. In addition to these types of schools, Germany has a comprehensive secondary school, Gesamtschule. Although some of comprehensive schools provide Abitur for students, they occupy a very small portion of secondary school students who receive Abitur. Its influence is very limited (Schnepf, 2002, 2003).

This tripartite tracking system in Germany is considered an important institutional factor influencing intergenerational transmission of social inequality (Von Below, 2002). The effects of social origins on secondary school choice are very strong. Compared with parent's occupation and family income, parents' education is a more effective predictor of children's school choice (Schnepf, 2002; Schneider, 2008). This choice, in turn, affects future educational and occupational attainment. In addition, children's earning differentiation in later life, in part, stems from the relationship between parent's background and their secondary school choice (Dustmann, 2004). Secondary school placement is decided based on primary school teacher's recommendation on grounds of student's ability, but parent's preference influences this placement irrespective of student's ability. As a result, German secondary school tracks are highly stratified according to students' academic achievement and to their background.

In contrast to German secondary school system, all Japanese upper secondary schools, or senior high schools, provide an opportunity to enter higher education. Their diploma qualifies for admission to all higher education institutions. Senior high schools are divided into two major tracks institutionally; general academic track (Futsu-ka) and vocational track (Senmon-gakka). Though students who graduate from any type of high school are qualified to advance to higher education, students graduated from general academic tracks have an advantage to access to higher education over those graduated from vocational tracks. At present, more than 70% of students choose the general academic track. Japanese high schools are stratified based on their graduates' advancement to higher education, especially based on graduate's placement to the prestigious universities. Highly ranked schools select students with high academic performance through the use of their entrance examination and of their junior high school records. In this way, Japanese high schools are also highly stratified as to students' academic ability.

To clarify each school's position in the high school stratification system, we classify general academic high schools into three ordered categories according to their higher education advancement ratio. Because we do not have any information about higher education advancement rate of each high school in the PISA sample, schools are classified based on students' educational expectations, rather from the graduate's advancement rate in each school. Table 1 shows features of each category. We named high schools with the highest students' educational expectations as General-A. Over 80% of students in General-A schools expect to complete universities. Schools with intermediate students' expectation are classified as General-B. Eighty percent or

Table 1 Classification of Japanese general high school

	Students' educational expectation
General-A	University > 80% and all students' expectation is junior college or professional training school and above
General-B	University + junior college > 80% including "High School" expectation level students.
General-C	General course which are not classified as General-A and General-B

more students in General-B schools expect to complete at least junior college. The remaining high schools are classified into General-C. Not only students who want to apply for universities or junior colleges, or professional training schools (Senshu Gakko), but also students who get a job immediately after graduation are enrolled in this type of high school. Students attending General-C schools have a huge variety of career aspirations. In this analysis, Japanese high schools are classified into three types of general academic track high schools and one type of vocational high school.[1]

Basic Structure of Tripartite Relationships – SES, School and Math Performance

First, we focus on math performance and on family background of students from each school type. Figure 1a indicates school's average of students' math test scores and of their socio-economic background (ESCS, the index of socio-economic and cultural status, developed by OECD PISA project) in Germany. Schools are categorized into four groups (Gymnasium, Realschule, Hauptschule, and Gesamtschule) and are indicated by different shape of dots. Schools' math performance average and their socio-economic background score are highly correlated ($r = 0.830$). This figure shows clear differences between four types of school. Gymnasium shares top status in math scores and in socio-economic background. Realschule follows Gymnasium and Hauptschule follows Realschule. Gesamtschule is scattered around grand mean of each score. In Japan, we can find the same relationships as in Germany. A correlation between schools math performance and their average socio-economic background is 0.816. General-A schools occupy the top status on math performances and also on socio-economic background. General-B schools follow General-A. Socio-economic background positions of General-C schools and of vocational high schools do not differ. But, average math scores of vocational high schools are a little bit higher than those of General-C schools as a whole.

If we focus on the variation of each school type, we can recognize differences between the two countries. As indicated in Fig. 1a, b, math test scores' variation of

[1] Rohlen's monograph on Japanese senior high school system describes its features well (Rohlen, 1983).

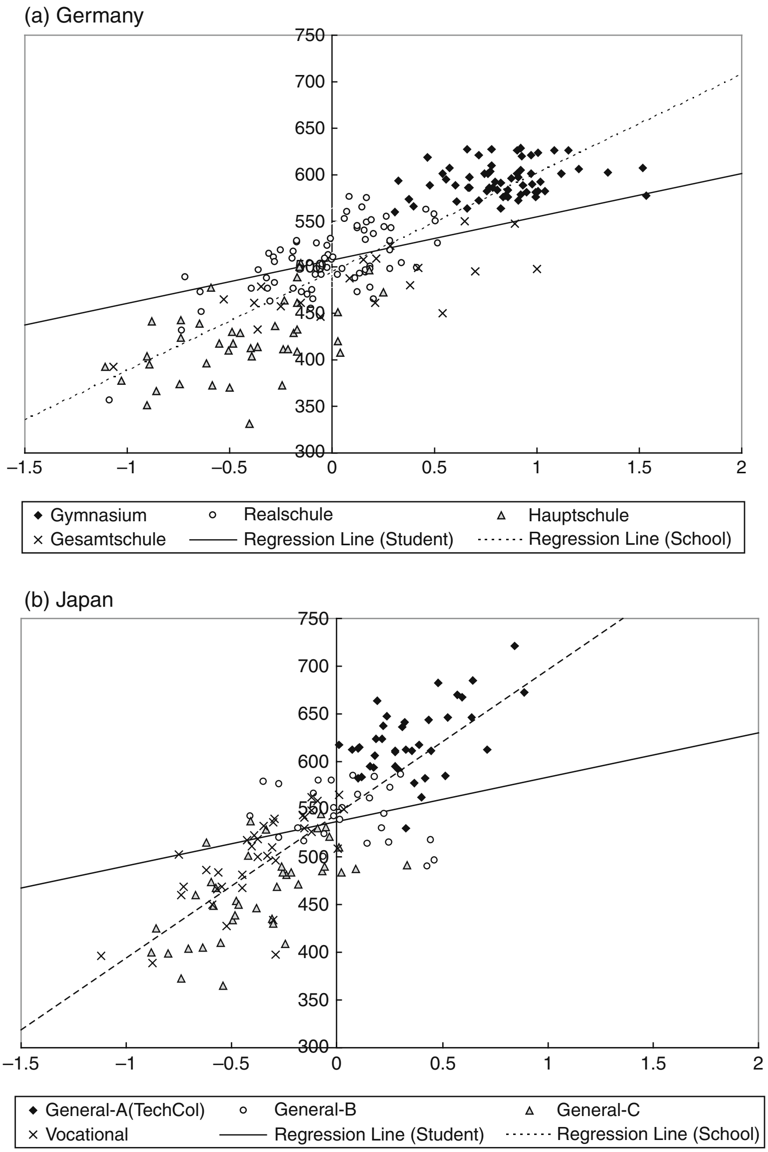

Fig. 1 Socio-economic status and math score: School mean

the top ranked schools in Japan is greater than that in Germany. Standard deviation of school average math test scores in Gymnasium is 18.4 compared to 37.6 in General-A schools. Top ranked schools in Germany show the same degree of math performance, whereas top ranked schools in Japan have a big variety of math score averages.[2] The variation between school average test scores in other categories are similar in two countries. Standard deviation of school averages range between 37.8 and 42.9 in Germany and between 29.7 and 47.5 in Japan. The difference in top ranked schools illustrates the different features of educational environments in the respective countries, as we will discuss later.

Two regression lines are drawn in each figure. The solid line is a regression equation line based on individual students. A dashed line indicates that based on school averages. Germany and Japan have a similar slope based on individual students as PISA has already reported. But, the slope of regression lines based on Japanese schools is steeper than that based on German schools; its gradient is 151 and 106, respectively. This result shows that Japanese high schools are highly stratified along the students' academic ability.

Preceding the detailed analysis, we should understand the basic structure of relationships between socio-economic background and school status relating to students' math performance. Figure 2 shows a path diagram illustrating the relationship between socio-economic status and math scores. School type is measured by average student's math test scores of each type of school.[3]

This figure clarifies the features of these structures in two countries. We can observe strong relationships between socio-economic status and school type, and between school type and students' math performance. The path coefficient between

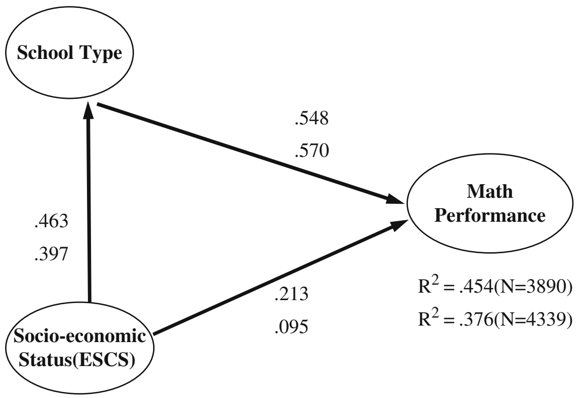

Fig. 2 Basic relationship between socio-economic status (ESCS) and students' math performance.
Note: (1) Standardized regression coefficient
(2) upper row = Germany/lower row = Japan
(3) school type is measured by the mean of students' math test scores
(4) ESCS = the index of socio-economic and cultural status
(5) All coefficients are significant at 0.001 level.

[2] Standard deviation of school average socio-economic status (ESCS) is not so different between General-A (0.21) and Gymnasium (0.25).

[3] In this chapter, all estimates of the coefficients and of standard errors are calculated by the WesVar5.1 (OECD, 2004b; Westat, 2007).

socio-economic status and school type is stronger in Germany than in Japan. The coefficient from school type to students' math performance is slightly weaker in Germany than in Japan. As a result, the degree to which socio-economic background relates to students' performance via school type in Germany is as much as that in Japan, 0.254 and 0.226, respectively. Second, a direct path from socio-economic status to math performance in Germany is twice as much as that in Japan. Even after controlling by school type average, students' socio-economic background still has considerable effect on math performance in Germany.[4] The indirect relationship between socio-economic status and students' math performance according to school type is slightly stronger in Germany than in Japan. The direct path from socio-economic status leads to a difference in total linkage between family background and student's academic performance.[5] In the next section we explore factors related to this process.

School System and Family Background

Based on cross-country comparisons of variations in educational outcomes of primary and secondary schools, Hanushek & Wößmann (2006) showed that the early tracking system increases educational inequality. It means that early tracking countries increase the variance of test scores from primary school to secondary school. Germany is a typical country in that it has this feature. Although the variation of test scores in Germany at 4th grade (at 10 years old) is lower than the international average, at age 15 it is highest between 18 countries. If this increase is related to family social background, early tracking contributes to the reproduction of social inequality.[6]

Socio-economic status and student's math performance is strongly correlated in Germany. Germany is included in the top five countries in which students' performance variation is attributable to their background variables. On the contrary, Japan is ranked at near the bottom in its correlation (OECD, 2004a). Based on our analysis, the effect of socio-economic status on academic performance (in math) depending on school type is not necessarily stronger in Germany than it is in Japan. This shows the strength of this relationship in Germany does not result from school characteristics such as these measured by the average math performance of students. To investigate other possible factors, we introduce three variables in addition to socio-economic status and school type. Grade, mother's current job status, and

[4] If we use each school average instead of school type average, a direct path from socio-economic background in Japan is almost zero. However, in Germany, it is still statistically significant and has some predictive power (0.147).

[5] We cannot deny the possibility that this direct path may derive from indirect path which is not measured by this model.

[6] Strakova (2007) points out that Czech's tracked education system strengthens the relationship between socio-economic status and students' academic performance in comparison to Nordic countries and Canada.

out-of-school study hours are incorporated to the regression model to investigate these functions in the academic achievement process.

Repeating the same grade is rarely seen in Japanese secondary schools. All Japanese students in PISA 2003 samples are in the 10th grade. But German students' grade varies between 7 and 11. Many German students below 10th grade experienced repeating a grade. Eighty-one percent of 7th grade students have repeated the same grade. Seventy-two percent of 8th grade students and 7.2% of 9 grade students also have repeated at least a year. We estimated the effect of grade on math performance and testify its function to mediate between socio-economic status and students' performance. Grade measured by the deviation from 10th grade is added to the base line model first.

Women's participation in the labor force has increased in many countries. At the same time, women's family role in child-raising is still given greater importance than men's. Does the mother have a role in promoting child's academic performance? To test this, we add the mother's job status to our model. If mother has an influence on child's math performance in family life, we can expect significant effect from mother's current job status. Those mothers who can spend much time with the family should be expected to have more influence on her children than those who have work commitments. The mother's job status is divided into three categories, full-time worker, part-time worker, and no occupation. In the regression model, we analyze the effect of part-timer dummy and that of no-occupation dummy on her child's math performance.

Study hours outside school offer another possibility to mediate family background with math performance, especially in a society which has a highly developed shadow education system (Stevenson & Baker, 1992; Bray, 1999; Baker et al., 2001). Outside school study including shadow education improves student's academic performance. Based on the results from 11th grade Japanese high school student surveys conducted in 1979 and in 1997, Kariya (2000) found that after-school study hours are affected by socio-economic status and that its effect has increased over the 18 years. Hours of homework, those of out-of-school study and those of other study are summed up measure study hours outside school.[7] We investigate this problem in the final section.

Tables 2 and 3 show five regression models for this series of analysis. Model 1 is a baseline model that uses only gender and socio-economic background as explanatory variables. Three school dummy variables are added to Model 2. Model 3 includes grade as an explanatory variable. Model 4 includes mother's job status dummy variables in addition to Model 3, and interactions between mother's job status and socio-economic status are added in Model 5.

The first two models represent the basis of our analysis. Based on these models, we can outline some features of academic achievement in both countries. With

[7] We did not include study hours of tutors because it correlates negatively with math test scores in most countries, even in Japan. Parents whose child shows poor academic performs are inclined to use a private tutoring.

Table 2 Regression analysis of predicting student's math performance (Germany)

	Model 1				Model 2			
	Coefficient estimate	Standard error	Standardized coefficient		Coefficient estimate	Standard error	Standardized coefficient	
Intercept	501.809	3.177		***	418.438	6.962		***
Gender (Male = 1, Female = 0)	15.417	3.437	0.082	***	29.545	2.733	0.156	***
Socio-economic status (ESCS)	45.171	1.692	0.467	***	20.114	1.802	0.208	***
Gymnasium					146.612	7.984	0.732	***
Realschule					78.408	8.419	0.397	***
Gesamtschule					48.433	9.637	0.155	***
Hauptschule <Ref.>								
Grade –10								
Mother part-time								
Mother no occupation								
Mother full-time <Ref.>								
Mother part-time × SES (ESCS)								
Mother no occupation × SES (ESCS)								
R^2	0.224				0.476			
R^2 increase					0.252			

Table 2 (continued)

	Model 3				Model 4				Model 5			
	Coefficient estimate	Standard error	Standardized coefficient		Coefficient estimate	Standard error	Standardized coefficient		Coefficient estimate	Standard error	Standardized coefficient	
Intercept	465.681	7.488		***	459.042	7.360		***	460.022	7.375		***
Gender (Male = 1, Female = 0)	32.012	2.507	0.169	***	32.076	2.484	0.170	***	32.037	2.464	0.169	***
Socio-economic status (ESCS)	16.718	1.684	0.173	***	16.750	1.705	0.173	***	13.985	2.339	0.145	***
Gymnasium	129.205	7.546	0.645	***	129.476	7.429	0.647	***	129.392	7.439	0.646	***
Realschule	66.069	7.940	0.335	***	66.432	7.891	0.337	***	66.253	7.929	0.336	***
Gesamtschule	33.461	9.367	0.107	***	34.087	9.398	0.109	***	34.061	9.404	0.109	***
Hauptschule <Ref.>												
Grade –10	40.053	2.391	0.274	***	40.036	2.397	0.274	***	40.059	2.393	0.274	***
Mother part-time					11.439	3.198	0.059	***	10.637	3.270	0.055	***
Mother no occupation					6.445	3.662	0.030	+	5.495	3.665	0.026	
Mother full-time <Ref.>												
Mother part-time × SES (ESCS)									2.615	2.954	0.017	
Mother no occupation × SES (ESCS)									5.311	3.444	0.032	
R^2	0.543				0.546				0.547			
R^2 increase	0.067				0.003				0.001			

Note: Students who respond to Father's and Mother's current situation: Q05 and Q06.
*** $P < 0.001$ ** $P < 0.01$ * $P < 0.05$+ $P < 0.10$, $N = 3{,}885$

Table 3 Regression analysis of predicting student's math performance (Japan)

	Model 1				Model 2			
	Coefficient estimate	Standard error	Standardized coefficient		Coefficient estimate	Standard error	Standardized coefficient	
Intercept	533.751	3.520		***	466.528	8.140		***
Gender (Male = 1, Female = 0)	12.893	4.921	0.065	**	12.897	3.876	0.065	***
Socio-economic status (ESCS)	44.458	4.190	0.323	***	13.584	2.573	0.099	***
General-A					144.154	9.071	0.665	***
General-B					73.210	9.720	0.301	***
Vocational					33.620	9.587	0.145	***
General-C <Ref.>								
Grade –10								
Mother part-time								
Mother no occupation								
Mother full-time <Ref.>								
Mother part-time × SES (ESCS)								
Mother no occupation × SES (ESCS)								
R^2	0.107				0.381			
R^2 increase					0.274			

Table 3 (continued)

	Model 3				Model 4				Model 5			
	Coefficient estimate	Standard error	Standardized coefficient		Coefficient estimate	Standard error	Standardized coefficient		Coefficient estimate	Standard error	Standardized coefficient	
Intercept	466.528	8.10		***	462.594	8.321		***	462.594	8.314		***
Gender (Male = 1, Female = 0)	12.897	3.876	0.065	***	12.929	3.859	0.065	***	12.908	3.852	0.065	***
Socio-economic status (ESCS)	13.584	2.573	0.099	***	14.197	2.626	0.103	***	13.797	3.377	0.1	***
General-A	144.154	9.071	0.665	***	143.688	9.091	0.663	***	143.720	9.085	0.663	***
General-B	73.210	9.720	0.301	***	72.966	9.680	0.300	***	73.030	9.673	0.301	***
Vocational	33.620	9.587	0.145	***	33.412	9.563	0.144	***	33.479	9.549	0.145	***
General-C <Ref.>												
Grade –10	–	–	–		–	–	–		–	–	–	
Mother part-time					7.065	3.819	0.065	+	6.700	3.812	0.033	+
Mother no occupation					5.108	4.124	0.103		5.055	4.139	0.023	
Mother full-time <Ref.>												
Mother part-time × SES (ESCS)									–1.760	4.657	–0.008	
Mother no occupation × SES (ESCS)									3.419	4.815	0.014	
R^2	0.381				0.382				0.383			
R^2 increase	0.000				0.001				0.001			

Note: Students who respond to Father's and Mother's current situation: Q05 and Q06.
*** $P < 0.001$ ** $P < 0.01$ * $P < 0.05$ + $P < 0.10$; $N = 4{,}339$

regard to socio-economic status, the regression coefficients of both countries are almost equal, but its relationship is different as we have noted. Male students show better performance in both countries. Gender difference is greater in Germany than in Japan. After controlling by three school dummies, boys show 14 points increase in Germany in contrast to no increase in Japan. In consequence, boys in Germany achieve nearly 30 points over girls in the same type of schools.[8]

Figure 1a, b indicated the student's math achievement is quite different between each school type. The results of model 2 show school type distinction clearly. In Germany, Gymnasium students achieve 147 points over Hauptschule students. In Japan, General-A school students score 144 points higher than General-C school students. Other types of school rank between the two extremes. As we recognized by the path diagrams in Fig. 2, socio-economic status still has significant effect on math performance in both countries even after controlling for school type dummies. This model also confirms that SES's direct effect is stronger in Germany than Japan.

In the following section, we will investigate the effect of grade, mother's role in the family, and out-of-school study on students' academic achievement.

Grade

We analyze grade only with German students, because all Japanese students in PISA are in the tenth grade. Let us focus on Model 3. Compared with Model 2, R^2 increases 0.067 and the coefficient of grade indicates 40. One grade promotion results in a sizable increase in math test scores. Not only type of school, but also grade in the same school type still makes students' math performance differ significantly. As an average test score increase with student's grade in every school type, grade's influence exerts on student's performance independent of school types. In addition, the coefficients of other variables except for gender go down. The coefficients of three school dummies are reduced between 12 and 17 points, and that of socio-economic status decreases more than 3 points. This shows school type effect is partly derived from the difference of grade composition in each school type. The decrease of socio-economic status implies another function of grade. Grade plays an intermediate role between socio-economic status and math performance.

To test this relationship, we have regressed student's grade on gender, socio-economic background, and school type dummies (Table 4). Socio-economic status has significant effect on student's grade, and it is still significant even after controlling by school type variables. This result indicates that grade as well as school type mediates SES influence on math performance. Such an intermediate function in part

[8] Although male superiority is found in all school types in Germany, we can find such superiority only in the highly ranked schools in Japan. This finding is interesting, but it is not our present concern.

Table 4 Regression analysis of predicting student's grade (deviation from 10) (Germany)

	Model 1				Model 2			
	Coefficient estimate	Standard error	Standardized coefficient		Coefficient estimate	Standard error	Standardized coefficient	
Intercept	–0.882	0.018		***	–1.180	0.037		***
Gender (Male = 1, Female = 0)	–0.101	0.024	–0.078	***	–0.062	0.023	–0.048	**
Socio-economic status (ESCS)	0.151	0.009	0.229	***	0.085	0.012	0.128	***
Gymnasium					0.435	0.045	0.318	***
Realschule					0.308	0.039	0.229	***
Gesamtschule					0.374	0.041	0.175	***
Hauptschule <Ref.>								
R^2	0.059				0.108			
R^2 increase					0.049			

Note: Students who respond to Father's and Mother's current situation: Q05 and Q06.
*** $P < 0.001$ ** $P < 0.01$ * $P < 0.05$ + $P < 0.10$; $N = 3{,}858$

contributes to the direct path from socio-economic background to math performance shown in Fig. 2. In this sense, the retention system in Germany contributes to inequality of educational opportunity.

Mother's Job Status

Nowadays many mothers work outside the house. Does a mother's job status have any influence on a child's academic work? Germany and Japan shows a similar distribution. One-third of mothers are working full-time. Nearly 40% work part-time, and rest of them are looking for job or have no occupation.

In the analysis, we use part-time dummy and no-occupation dummy (including no occupation and looking for job). Full-timer is their reference category. Model 4 in Table 2 shows the result of mother's job status on students' math test scores in Germany. Inclusion of mother's job status dummies added 0.003 points to R^2. If a student's mother works as a part-timer, their math test score increases by 11 points compared to those who have full-time working mother. If a student's mother has no occupation, such a student gets 6 points more. This result suggests that mother who stays at home for a longer time has a positive influence on child's academic activities in Germany. In addition, the interactions of mother's job status with socio-economic status in model 5 are positive, which are not statistically significant. This implies such mother's influence is more effective in high socio-economic status families.

If a student's mother is part-timer or has no occupation, she has a positive influence on a student's academic performance in Japan (Table 3). But, their effects are not as large as those in Germany. An increase of R^2 between Model 3 and Model 4 is only 0.001. It is true that mother's job status affects her child's math performance in Japan, but it is more important in Germany than in Japan.

Study Hours Outside Schools

Students study not only in schools, but also at home. In some societies, they spend much time of study in other private educational institutions in addition to school. It is worth analyzing study outside school because it has the possibility to mediate between family background and students' academic performance. PISA's 2003 student questionnaire includes questions about study hours per week inside and outside school. Out of these questions, we utilize the answers to three questions on the numbers of study hours outside of school engaged in (1) homework, (2) out-of-school classes, and (3) other study. The total hours of these three kinds of extra-curricular study are used for this analysis.

In Germany, the average number of homework hours per week is 6.27, that of out-of-school classes is 0.13, and that of other study is 1.35. Japanese students spend 3.78, 0.56, and 1.96 h/week, respectively. Total average study hours outside school that students spend in a week are longer in Germany than in Japan.

Table 5 Regression analysis of predicting student's math performance (study outside of school)

	Germany				Japan			
	Coefficient estimate	Standard error	Standardized coefficient		Coefficient estimate	Standard error	Standardized coefficient	
Intercept	470.082	7.520		***	463.733	8.967		***
Gender (Male = 1, Female= 0)	27.335	3.223	0.156	***	15.124	4.122	0.078	***
Socio-Economic Status (ESCS)	14.770	1.783	0.163	***	11.603	2.763	0.085	***
Gymnasium/General-A	124.454	7.548	0.692	***	126.013	9.548	0.604	***
Realschule/General-B	64.071	7.305	0.351	***	67.215	9.880	0.286	***
Gesamtschule/vocational	37.929	10.499	0.124	***	32.722	10.023	0.145	***
Hauptschule/General-C <Ref.>								
Grade –10	34.359	2.478	0.245	***	–	–	–	
Mother part-time	13.202	3.168	0.074	***	4.188	4.037	0.021	
Mother no occupation	8.225	3.886	0.041	*	4.199	4.370	0.019	
Mother full-time <Ref.>								
Outside school study (hours/week)	–0.602	0.223	–0.040	***	1.765	0.306	0.136	***
R^2	0.500				0.388			
N	2,840				3,608			

Note: Students who respond to Father's and Mother's current situation: Q05 and Q06.
*** $P < 0.001$ ** $P < 0.01$ * $P < 0.05$ + $P < 0.10$

Table 6 Regression analysis of predicting student's outside school study hours (Germany)

	Model 1				Model 2			
	Coefficient estimate	Standard error	Standardized coefficient		Coefficient estimate	Standard error	Standardized coefficient	
Intercept	8.538	0.247		***	8.046	0.423		***
Gender (Male=1, Female=0)	–2.050	0.228	–0.179	***	–1.911	0.234	–0.166	***
Socio-economic status(ESCS)	0.388	0.124	0.065	**	0.145	0.128	0.024	
Mother part-time	–0.019	0.261	–0.002		–0.036	0.254	–0.003	
Mother no occupation	0.081	0.258	0.006		0.070	0.255	0.005	
Mother full-time <Ref.>								
Gymnasium					1.195	0.469	0.101	*
Realschule					0.268	0.427	0.022	
Gesamtschule					–0.543	0.635	–0.027	
Hauptschule <Ref.>								
R^2	0.037				0.045			

Note: Students who respond to Father's and Mother's current situation: Q05 and Q06.
*** $P < 0.001$ ** $P < 0.01$ * $P < 0.05$ + $P < 0.10$; $N = 2{,}841$

Table 7 Regression analysis of predicting student's outside school study hours (Japan)

	Model 1				Model 2			
	Coefficient estimate	Standard error	Standardized coefficient		Coefficient estimate	Standard error	Standardized coefficient	
Intercept	6.395	0.425		***	3.851	0.393		***
Gender (Male=1, Female=0)	–0.848	0.412	–0.057	*	–0.932	0.321	–0.062	**
Socio-economic status (ESCS)	2.658	0.308	0.253	***	0.887	0.239	0.084	***
Mother part-time	0.229	0.326	0.015		–0.091	0.256	–0.006	
Mother no occupation	1.446	0.339	0.086	***	0.889	0.292	0.053	**
Mother full-time <Ref.>								
General-A					7.448	0.852	0.462	***
General-B					2.313	0.691	0.127	**
Vocational					0.199	0.353	0.011	
General-C <Ref.>								
R^2	0.075				0.230			

Note: Students who respond to Father's and Mother's current situation: Q05 and Q06.
*** $P < 0.001$ ** $P < 0.01$ * $P < 0.05$ + $P < 0.10$; $N = 3{,}608$

We add total hours of study outside school to Model 4 of both countries (Tables 2 and 3). The results are summarized in Table 5. This table shows clear difference between two countries. The coefficient of study outside of school is negative in Germany. Conversely, in Japan, it is positive and is much larger than that in Germany. Tables 6 and 7 show factors that predict the length of outside school study. The first model includes only family background variables. Three school type dummies are added to the first model.

In Germany, female students study 2 h more than male students outside schools. Students from higher socio-economic status family study more. If school type dummies are introduced to the equation, socio-economic status no longer has an effect on outside school study hours. Socio-economic status and mother's job status have stronger effects on study outside school in Japan than those in Germany. One standard deviation of socio-economic status increases students' study 2.6 h/week, and students who have mother without occupation study 1.4 h more per week than those whose mothers work full-time. Even after controlling by school type variables, socio-economic status and mother's job status are still statistically significant.

Tables 6 and 7 show another aspect of the two countries which differ. School type effects on outside school study are much stronger in Japan than in Germany. In Germany, Gymnasium students study longest outside school in four types of schools. After controlling by family background and gender, Gymnasium students study 1.2 h longer than Hauptschule students do per week. In Japan, a General-A school student studies more than one hour more everyday (more 7.4 h/week) compared to General-C high school student. Whereas we can find the difference of study hours between school types in three aspects in Japan, we can do that only in homework hours in Germany.[9] Such a difference and an opposite direction of

Table 8 Outside school study hours and mother's status (partial correlation)

		Homework	Tutor	Out-of-school	Other study
Germany	Mother's education (years of schooling)	–			–
	Mother part-time				
	Mother no occupation				
Japan	Mother's education (years of schooling)		+	+	
	Mother part-time			–	
	Mother no occupation	+	+	+	+

Notes: Students who respond to Father's and Mother's currently situation: Q05 and Q06. Parental occupational status, home possessions and three school dummy variables are controlled. The character '+' indicates positive partial correlation coefficients which are significant at 0.05 level. The character '–' indicates negative ones which are also significant at 0.05 level.

[9] Gymnasium students study nearly 2 h longer than Hauptschule students at homework. In Japan, General-A school students study 5 h longer than General-C school students at homework. In addition, General-A school students study an hour longer in out-of-school classes and spend 2 h longer in other study than General-C school students.

outside school study effects on math performance reflect the different features of outside-school studies in the two countries.

In Japan, study at outside schools improves academic performance. Because the entrance examination plays an important role in admission to high schools and universities in Japan, many students prepare for this exam not only in their schools, but also in outside schools. In this context, students' studies outside schools enhance their academic performance, especially in highly ranked schools. On the contrary, in Germany, outside school studies have a negative effect on academic performance. This feature is clearest at Gymnasium. This means outside school study in Germany has remedial or supplementary functions. Low variation of school average test performance of Gymnasium, which is presented in Fig. 1a, is in part attributable to such functions of outside school studies as remedying low academic performance.

Let us shift our focus to the relationship between outside school study hours and mother's status. Table 8 shows the partial correlations between mother's status variables and four outside-school study variables controlled by socio-economic status variables and school type. In this table statistically significant coefficients are indicated positive signs and negative signs. In Germany, only mother's education correlates with hours of homework and with hours of other study negatively. But, except for mother's part-time position with out-of-school hours, mother's education and mother's "no occupation status" positively correlated with outside-school study hours in Japan. Mothers without occupation, most of them housewives, have a positive effect on all aspects of outside school study. In other words, mothers staying at home control their children's academic activities outside schools. In addition, highly educated mothers give unstinting financial support to their children via paying for private tutors and for tutoring at cram schools.

These results show how the mother's role differs between two countries. In Germany, the mother directly influences her child's academic performance at home, whereas the Japanese mother influences academic performance through her control over the child's outside school study activities. The mother's role in the family is thus dependent on difference in the educational systems, including shadow educational systems, in the two countries.

Summary and Discussion

In this chapter, we explored why the strength of family background influence on student's academic achievement is so different in Germany and in Japan. We attempted to clarify the factors which produce the difference in the relationship between family background and student's performance. For this purpose, we drew attention to the institutional intermediates which make this difference. First, we focused on secondary school system of Germany and of Japan. Second, we focused on outside school learning and the mother's role as important factors that connect family background with student's performance.

As far as school position is measured by school (or school type) average test scores, schools' intermediate function to connect socio-economic status and academic performance is not so different between two countries. However, the direct path from socio-economic status to math performance is stronger in Germany than in Japan. One possible explanation is that the retention system mediates between socio-economic status and students' performance. In Germany, grade is explained by socio-economic status and math performance is explained by grade even if controlled by gender and school types. This implies that the retention system works as another intermediate device that connects socio-economic status and academic achievement.

In Germany, the mother influences the child's academic achievement directly. German mothers stay at home and teach their children in a face-to-face environment. The positive interaction effect of socio-economic status with mother's job status on math performance shows socio-economic status has additional effect if mother stays at home longer, though they are not statistically significant. This implies that the mother, probably the educated mother, exerts a positive influence on her child. Such an educational practice at home may be reflected in this result. Japanese educated mothers may teach their children at home like German mother. In addition, her important educational practice is effectively controlling or coordinating outside school study, including shadow education. The mother's presence at home has an influence on in-the-home studies. Mother's education and presence at the home also affect the use of shadow education. Overall, mothers play an important role in improving academic performance of children in both countries. As shown in this analysis, the mother's educational practices depend on the social and educational environments of each society.

In the final section, we discuss the difference between basic educational features in the two countries. We have already pointed out the huge variation between students' test scores in Germany and in Japan, and that the correlation between socio-economic status and students' math performance is much stronger in Germany than in Japan. Why is it that such similarity and dissimilarity appears between these two countries?

For the strong relationship between socio-economic status and students' academic achievement, much research has pointed out that early stage selection has an influence on this relationship. In addition, based on a comparison of the any given country's variation, Hanushek and Wößmann (2006) indicated that early start tracking contributes to widen students' academic achievement gap. In this view point, Germany and European countries with similar educational system are typical cases for this type of explanation. Japan is not suitable for this explanation. Whereas late start tracking dampens the correlation between SES and students' achievement in Japan, it should not widen students' achievement gap. But, Japanese students' variation is large enough to be at top ranks in the PISA participant countries, and widening process appears in comparison of TIMSS data.[10] These findings need different explanation from Hanushek and Wößmann's.

How can we explain the Japanese exception? In the earlier section, we discussed the entrance examination and function of out-of-school studies. Japanese universities and Japanese high schools are stratified in descending order of difficulty on entrance examination. In this context, students who have high academic abilities and educational aspirations study more and more. This condition widens a gap of students' test performances. On the other hand, this competition decreases the correlation between socio-economic status and students' test performance, because theoretically students' academic ability and their academic preference become independent from their parents' characteristics as they grow. The Japanese educational environment thus presents a particular set of consequences arising from the educational outcomes of students' academic performance.

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[10] The TIMSS survey results indicate that not only countries with early tracking systems, but also countries which have university entrance examination systems widen the variation of students' achievements.

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Features of Educational Systems as Factors in the Creation of Unequal Educational Outcomes

Jaap Dronkers

Introduction

This chapter provides a review of the most important processes that influence inequality in and around education, describing current research in this area to the best of my ability.[1] Cross-national comparisons play an important role in those parts of this chapter, which discusses system effects. This review is based on my own interpretation of the "state of the art" in empirical research on education and inequality. The aim of this chapter is to give perspective to the importance of meso- and macro-features of educational systems in the creation of unequal educational outcomes.

Processes that Contribute to Educational Inequality

The factors and processes that influence the development of education inequality can be categorised into seven key concepts: *ability, social background, segregation between schools and neighbourhoods, teaching conditions in schools, public and hidden differentiation, the relationship between the highest level of education and the labour market* and *the relationship between education and other social sectors*. These concepts are discussed in order of their contribution to educational inequality; the most important concepts are discussed first, followed by those that are less important.

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[1] This chapter expands on a lecture given on 11 November 2006 at the Friedrich-Ebert-Stiftung in Berlin for the "Scholars for European Social Democracy" conference on education, which was based on my own views concerning the "state of the art" in empirical research on education and inequality.

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Ability

Differences in ability (broadly speaking, differences in intelligence and personality) develop during the first years of life. Differences in intelligence and personality are the result of the continuous interaction between biologically based (but not, yet, fixed) individual potential and environmental stimuli (initially from the biological parents, but later from other significant people as well). The first years of life are extremely important. After this time, most differences have become set in fixed reaction patterns and repertoires, or they are stored in neurological patterns and "hardware". By intelligence, I mean cognitive intelligence, within which a number of components can be identified (e.g. verbal intelligence, spatial intelligence).[2] By personality, I mean the five factors that are prominent in personality theory: neuroticism, extraversion, agreeableness, conscientiousness and openness to experiences.

Differences in intelligence and personality are already apparent in a child's first year, but these differences are not, yet, very stable. Because people tend to react more quickly to potentially active children, these children receive more stimuli in return, thus, developing even further and faster. The interaction between individual and environment means that small differences between newborns can grow to become substantial and fixed differences within just a few years. Although scientists have, yet, to reach consensus concerning the stage at which differences in ability become fixed, it is clear that the last major determination takes place during puberty, whilst a significant amount of differentiation in ability has already taken place before primary school.

School is, therefore, often the place in which differences in ability (which were formed in the family) first manifest themselves publicly, but it is not where they are created. Because the primary school environment is often analogous to that of the family, the interaction between individual potential and environmental stimuli is more likely to be strengthened in school than it is to be neutralised. This does not mean, however, that differences in the social background (as expressed in parental educational level and occupation) are the same as these early differences in ability. Social background and ability are related because children receive a mixture of biologically based (but not, yet, fixed) potential from their parents at birth. In general, parents with higher levels of education and more respected occupations are more capable and, therefore, better able to transmit potential to their children[3] through their genes[4] and the environment they can create. On average, these higher educated

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[2] All fashionable variants of intelligence and creativity have serious drawbacks; some cannot be measured reliably, others bear a striking resemblance to cognitive intelligence, and yet others are affected by one of the factors of the personality model.

[3] Homogamy (see section "Relationship Between Inequality in Education and in Other Social Sectors") in the educational level of partners contributes further to the transmission of this biologically based potential ability.

[4] The exact genes have yet to be identified, although it is clear that many different genes are involved in differences in intelligence.

parents are also better able to provide a stimulating environment for their children, who therefore tend to develop further, even if these children have less potential. These observations, however, refer to averages, chances and regularities, and not to any unchangeable law. Some highly educated parents with highly respected jobs may find their ambitions and careers more important than raising their children, thereby failing to provide them with the right environment. Similarly, lowly educated parents may do all they can do help their children advance in society through education.

The relationships between parental ability, a stimulating environment and early ability in children are therefore positive but not deterministic. Education became increasingly open to capable students from the lower strata during the twentieth century.[5] In the early twentieth century, lack of financial and social support prevented most capable students from the lower strata from continuing their education; at the end of the twentieth century, however, almost all capable students from the lower strata were able to enter higher education. For this reason, at present (at the beginning of the twenty-first century) the number of capable, but lowly educated parents has dropped (except amongst immigrants from non-industrialised countries).[6]

Ability is positively valued and rewarded in education and society. This is not unusual, as it contributes to greater productivity, both for the individual and society as a whole. In education, this means that intelligent students, regardless of their social backgrounds, have a greater chance of achieving high levels of education than do less-intelligent students from comparable environments. This also applies to the labour market; intelligent people are more likely to achieve success (e.g. to have more highly valued jobs and higher income) than less-intelligent people from comparable environments and with similar education.[7] In short, greater ability contributes to success in both education and society, and this success can be attributed only in part to the social background. Moreover, the effect of ability, measured at the start of primary education,[8] on ultimate educational attainment (in sociology, this effect is known as the primary effect of the social background) is greater than the effects of the social background during the rest of the child's school career (i.e. the secondary effect of the social background). In practise, this means that the causes of differences in ability can be addressed very effectively in the first few years of life. The problem, however, is that direct intervention in intimate family life, whether by or on behalf of society, is regarded as morally irresponsible and unfeasible.

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[5] This was accomplished by removing major financial barriers and applying more universal performance criteria to selection decisions in education.

[6] This phenomenon accompanied the disappearance of lowly educated trade union leaders who climbed up through the trade unions.

[7] Intelligence and personality are of even greater importance to the success of women and migrants on the labour market because social limitations (e.g. the relative positions of men and women, discrimination, non-recognised diplomas or other migration-related transaction costs and cultural differences) limit their opportunities for exploiting their educational level on the labour market.

[8] Standardised measurements of ability are not reliable before the age of five.

The increased openness of education to students from the lower strata that resulted from the removal of financial barriers also had a side effect whereby it became necessary and possible for students of average ability from the higher strata to further their education. After all, they were threatened with social decline if they completed *relatively* insufficient education, in comparison with the increasing numbers of capable lower-stratum students. The cultural capital of parents (e.g. help with homework and papers) became an important resource for these students, both in finding loopholes in education and in the assessment of the non-material and material costs and benefits of educational choices. Because of this parental cultural capital, students with average ability from the higher strata are ultimately more likely to achieve a high level of education than are capable students from the lower strata. The clear and public assessment of personal achievement in education, therefore, gives students from the lower strata a chance to prove their abilities, thereby providing them with more opportunities. Such assessment is actually a risk for students of average ability from the higher strata. Without parental support, they are more likely to fall short; likewise, educational systems that have hidden selection mechanisms offer these students more opportunities to use their parental capital.

Social Background and Other Social Divisions

A child's chance of a successful educational career is influenced by the social background, which consists of two important dimensions (i.e. characteristics that are related, but not interchangeable): the occupational level of the parents (in most cases, the father) and the educational level of both parents. These characteristics can also be called parental financial and cultural capital. As the concept of capital suggests, this discussion does not refer to brief fluctuations in income and cultural participation, but to the long-term availability of resources. The influence of the social background on success is not limited to the school career; along with ability and educational attainment, it also plays a role in success on the labour market, particularly at the start.

The influence of the social background on success in education changed during the twentieth century. In particular, the occupation of a father (measured as the status or attractiveness of the occupation, as expressed in terms of educational requirements and financial rewards) now has less influence on the educational success of his children. The increased openness in education that followed the removal of financial barriers is one plausible explanation. Nonetheless, the educational level of parents continues to bear a major influence on the educational success of their children. This is partly so because parental educational attainment has become a better indicator of their actual ability. The number of lowly educated, but capable non-immigrant adults has decreased in response to the same increasing openness in education. Although this does apply to the educational level of fathers, it is even more pronounced with regard to the educational level of mothers.

Compared to parental occupation and education, other characteristics of the social background are less important in the educational careers of children. In comparison with the effects of parental educational attainment, parental occupation and children's early ability, temporary unemployment or short-term fluctuations in income bear hardly any influence on children's success at school. This is partly due to the success of most European continental welfare states, which are able to cushion the immediate effects of temporary unemployment and poverty, and partly because the chance of long-term unemployment and permanent poverty is directly related to the status of the previous occupation and educational level. Long-term unemployment and poverty during the time that children are in school are often caused by poor education or low parental ability, together with the associated limitations on the parents' ability to get their lives back on a more positive track by themselves. Such parents may, therefore, remain below the poverty line or find themselves permanently unemployed in response to certain events (e.g. divorce or widespread unemployment), thereby contributing to further negative effects on the educational success of their children.

Other less important background characteristics that influence the way children function in education include the ethnic origin of immigrants, religious contrasts,[9] the city–rural contrast and single motherhood, particularly if it is the result of a broken relationship with the biological father. Although these characteristics do play a part in increasing inequality of educational opportunity, their negative effects are less prominent than are those of parental occupation and educational attainment. In terms of successful education, students are better off with highly educated, but divorced parents than they are with lowly educated parents who still live together happily. It is important to note that the effects of these other social factors are more susceptible to change than are factors related to the social background. For example, the classic lack of educational opportunity in rural areas as compared to urban areas had all but disappeared by the end of the twentieth century in a number of European countries; educational opportunity has even improved in non-metropolitan areas. Since the mid-twentieth century, new inequalities in educational opportunity have emerged for the children of migrants and single mothers.

To achieve a better understanding of the significance of the social background for educational opportunities, one should interpret education as a career, which students follow with varying levels of success. An educational career consists of transitions between different types of education. Such transitions usually involve selection.[10] Unequal educational opportunities actually consist of unequal selection and unequal

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[9] Such contrasts include the contrast between a more secular, hedonistic lifestyle and a more religious lifestyle. With regard to inequality of educational opportunities, a more religious lifestyle is more of an advantage than it is a disadvantage, as such lifestyles are often accompanied by discipline and cultural capital that can be translated into educational success.

[10] These transitions include the transition from primary school to the first phase of secondary education, the transition from the initial phase of secondary education to one of the various types of secondary school.

choices during these transitions. Proven ability (as reflected in high marks) and the social background both play a role in each of these transitions. This role is larger if a selective transition[11] occurs at a younger age, when parental characteristics weigh more heavily than the student's wishes and possibilities; its importance decreases during later transitions. This explains why the social background is more important in educational systems that have early, irrevocable selection than it is in other educational systems with a first selection at an older age.

Finally, characteristics of the social background are more important than even the most important school characteristics (i.e. the segregation of pupils according to ability and social background) are in determining inequality of educational opportunity.

Segregation Between Schools and Areas

Reasons for Segregation

The extent of segregation between schools and areas is a third factor that influences inequality of educational opportunity. The term segregation is used here in its technical sense, and it refers to the extent to which the ability composition of particular schools or areas deviate (i.e. with regard to social background, ethnic origin, religion, family type or similar factors) from the average school or area within a given municipality. The causes of area segregation include variations in the price and quality of housing, variations in the quality of infrastructure (including schools) in the area, the extent to which use of the infrastructure is reserved for local residents (e.g. a postal code policy for schools means good schools are accessible only to local residents), local residents' preferences and disapprovals of certain other neighbours, discrimination against some potential residents by existing homeowners, variations in opportunities to move to another area.

Factors that contribute to school segregation include students who come from strongly divergent school catchments areas (often as a result of area segregation); differences in the quality of schools; differences in parent and student perceptions of the quality of schools; preferences for certain schoolmates; variations in costs (e.g. school fees, textbooks, fieldtrips, clothing standards) associated with attending certain schools; discrimination against some potential students by school administrators, teachers, classmates and parents; rules governing residential areas and school catchments areas and variations in the ability of some groups to avoid these rules. For example, parents with more money or contacts are better able to obtain a false address in a good area (e.g. by renting a room with a family member or colleague), so that their child can be admitted to the good school in that area. Well-educated parents are more capable of convincing a good school outside their area

[11] Selective transition refers to a transition that substantial numbers of pupils are unable to make successfully.

that their child needs a special programme (e.g. Russian), which is taught at that school, thereby securing admission.[12]

This summary of the causes of area and school segregation shows that the two forms of segregation are not identical. School segregation is usually more common than area segregation is, even in countries in which, at least in theory, there is a fixed relationship between residential area and school catchments area in the form of an admissions policy based on postal code (e.g. France). The greater prevalence of school segregation is explained by the greater ability of the higher strata to evade the rules and regulations without penalty or rectification. In countries where there is more freedom concerning choice of school (e.g. the Netherlands), school segregation is much more pronounced than is segregation between the areas in which the schools are situated.

The extent to which school and area segregation differ is not just a consequence of the availability of free choice of school, which exaggerates differences between schools. At the same time, area segregation is reduced by free choice of school, as it eliminates one of the processes that increase area segregation (the extent to which schools of differing qualities are reserved for local residents) in the choice of residential area.

Two opposing processes of segregation are, thus, relevant here. A very strong link between residential area and school catchments area can either increase or reduce the value of housing in particular areas as a result of school quality[13] ; this increases area segregation and, indirectly, school segregation. The strong link between residential area and catchments area also hinders ambitious parents who are forced to live in poorer areas (e.g. immigrants) in choosing high-quality schools for their children, thereby limiting their ability to realise the intergenerational mobility they emigrated to achieve. A weak link between residential area and school catchments area nearly eliminates the effect of school quality on the value of housing in certain areas, thus reducing area segregation.

Increased freedom of choice for parents and students does increase school segregation, however, as higher strata are better equipped to make use of this freedom of choice. They have both more knowledge regarding the quality of schools and more resources to support their choice.[14] In some cases, segregation based on ethnic or

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[12] These two examples illustrate practice that is currently common in Paris, which is intended to allow children from the higher strata to better access schools despite the formal equality of admissions policies.

[13] Gabrielle Fack and Julien Grenet *Do Better Schools Raise Housing Prices? Evidence from Paris School Zoning*. Paper presented at the Summer school of the Marie Curie Research Training Network "The Economics of Education and Education Policy in Europe". Padova, Italy, 16–18 June 2006. http://www.jourdan.ens.fr/~fack/documents/Fack%20&%20Grenet%20[april%202007].pdf

[14] Even though parents from the lower strata may have sufficient information (at least as much as parents from the higher strata have) about a good school on the other side of town, they may lack the resources (e.g. money for public transport, car, flexible working hours, personnel) to ensure the safe transportation of their children to and from school everyday.

religious origin (Islamic schools) or sex (all-girl schools) can reduce educational inequalities.[15]

Five Consequences of School Segregation

School segregation and the composition of the student population influence inequality of educational opportunity in five ways. First, educational opportunities are affected by the curriculum level at which teachers can give lessons in schools with particular student populations. The level at which students assess their own performance relative to their classmates is a second factor. A third factor involves the amount of actual teaching time for teachers and actual learning time for students, which is reduced when time is spent on matters other than teaching or the need to repeat information that was not understood as a result of the cognitive, social, cultural, ethnic or religious composition of the student population. A fourth influence on inequality of educational opportunity is the total amount of financial, cultural and social resources that the parents of students from the specific populations can contribute to help the learning process run as smoothly as possible. A final way in which school segregation and the composition of the student population influence inequality of educational opportunity involves variations in the average quality of the teachers in particular schools.

Teachers have to consider the estimated average learning capability of their student population, if they want to be effective in their teaching.[16] If teachers overestimate these capabilities, few students will profit from their teaching; if they underestimate the average learning capability, the teaching level will be too low and many students will learn too little. Because teachers have to consider the estimated average learning capability of the student population, the level at which they teach also varies within the same type of education. In schools with student populations that are comprised primarily of students that teachers perceive to be very capable of learning, the education objectives and levels will be higher than they are at schools with student populations that are expected to be capable of little.[17]

Schools with different student populations therefore offer different actual curricula: this causes variation in their educational results (even when the starting level is equal), thus creating unequal educational opportunities. Countries whose educational systems have a national curriculum or standardised central examinations provide fewer opportunities for teachers to lower their actual teaching objectives

[15] One of the reasons why segregation based on ethnic or religious origin can reduce inequality of educational opportunity is analogous to the reason why girls are able perform better in mathematics and physical sciences in all-girl schools.

[16] A comparable argument can be made for adopting an individual approach in heterogeneous teaching, which offers the least capable students the option of an even lower level of instruction than is offered by the classical approach.

[17] This differentiation process, based on the teachers' estimation of the potentials of the students, happens also within strata. The various dimensions of social background is used by teachers to make this individual estimation of students' potential and, thus, of the level of offered curriculum.

and levels substantially. If teachers were to do this, it would be more obvious that they had lowered standards than similar adjustments would be in countries with no national curriculum or standardised central examinations. This is why students in countries or areas with a national curriculum or standardised central examinations achieve higher results. In schools with differing student populations, therefore, different levels of curricula are offered, causing variation in the results of particular schools, thereby contributing to inequality of educational opportunity.

Students compare their learning performance to some extent with that of their classmates. If the composition of the student population causes the results of their classmates to be low, it may be easier for some students to achieve relatively better assessments and, therefore, overestimate their own performance and be less challenged to improve them further. If the results of their classmates are high, some students are more likely to achieve relatively low assessments, thereby underestimating their own performance and being more challenged to improve. Whether these processes actually occur depends partly on the personalities of the students; relatively low achievements can discourage some students, and can encourage other students to put forth even greater effort. In most cases, however, the Roman proverb applies: “It is better to be the smallest amongst the eagles than to be the greatest amongst the sparrows”.[18] In schools with differing student populations, therefore, students are motivated in different ways to achieve higher results, causing variation in the results of particular schools (even when the starting levels are equal), thereby contributing to inequality of educational opportunity.

Above all, the effectiveness of education depends on the amount of time that is available for both teaching and learning. Learning and teaching time can be greatly diminished in schools where children have problems inside or outside the home that interrupt the teaching and learning process. The same applies to settings that involve major language barriers between the students and teachers or in which time is lost because of lowly prepared or disorganised educational reforms. In student populations with generally low learning ability, the same material must be taught several times before it starts to sink in, leaving little time for going deeper into the material. In such situations, there is less learning and teaching time than necessary. In contrast, in student populations with generally high levels of learning ability, it is necessary to explain the material only once; the student’s reactions automatically increase the depth of the instruction, for which there is also sufficient time. Students in strata with other capable students are, therefore, able to do better in school than are students of comparable ability in strata in which there are many less-capable students.[19] In fact, the learning and teaching time differs in these two situations, despite identical class schedules. Less-intelligent students, therefore, need more

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[18] A modern variant of this saying refers to the relative size of fish in small or large ponds.

[19] Although this may seem to argue for early selection, this is only the case if segregation is accepted as a fixed “natural phenomenon”. Moreover, early selection is associated with other inequalities, particularly the increased effect of the social background.

scheduled lesson time to achieve the same learning and teaching time as more intelligent pupils do. This underlines the importance of sufficient learning and teaching time, especially for the less capable students.

The total amount of financial, cultural and social resources the parents can raise to help the learning process run as smoothly as possible varies according to the composition of the student population. In countries in which the financing of schools depends mostly on local taxes (as in the United States), the consequences of school and area segregation on the number of resources available to schools, and therefore teaching conditions, are drastic. Even in countries with equal school funding, however, the non-financial resources vary across the various student populations. The quality of parental participation in school activities depends in part upon the availability of these parental resources, as does the extent to which the school is protected against politically motivated interventions, even for state or community schools.

The average quality of teachers at a school (e.g. educational level, subject knowledge, experience) is also unequally distributed over schools with varying student populations, even within the same type of education. Because the effective teaching time is longer for higher quality teachers, they are able to offer their students a wider range of learning materials. The positive correlation between the average teaching quality at a school and the composition of its student population develops as schools with many problem students find it much more difficult to attract and keep good teaching staff. Teaching at a school with a difficult student population is a Sisyphean task; at some point, teachers (particularly those of higher quality) are quite likely to give up, because they have more opportunities to move to schools with better student populations. In the long term, therefore, the quality of the teaching staff in schools with unfavourable student populations tends to be lower than it is in schools with more favourable student populations. A similar selection process takes place in the recruitment of teaching staff; schools with more favourable student populations are more attractive as workplaces and are, thus, able to select the best from a greater number of applicants of generally higher quality. In contrast, schools with unfavourable student populations receive fewer applications; because the teachers who do apply tend to be of lower quality, they also have less opportunity to choose the best applicants.[20]

Teaching Conditions

As already mentioned, the effectiveness of teaching depends on the available time, both in terms of the lessons given by teachers and material learnt by the students. This means that teaching conditions that affect these learning and teaching times influence educational opportunities. Students with weak social, cultural or cognitive

[20] Although variations in the student population are obviously not the only source of variation in the quality of teachers at a school, they are an important factor. Other factors include a poor reputation as an employer, sustained disputes over a school's direction.

backgrounds depend more than other students on the quality of the teaching. These students are less able to rely on the help of their parents or their environment in the learning process. They are not able to compensate at home for shortcomings at school.

Favourable Conditions

A large number of international studies that satisfy standard research requirements have identified the following teaching conditions as particularly effective[21] : the stimulation by teachers of good results in core subjects, the monitoring and evaluation of progress in learning, an orderly climate at school, homework and structured learning through cooperation, feedback, encouragement and incentives. These teaching conditions usually cannot be influenced by a government's educational policy. They are part of the direct teaching process and the school environment within which education and teaching takes place.

Various teaching methods (e.g. Montessori, Jena, Dalton, Anthroposophy, New Learning) try to increase the teaching and learning time, and their claimed success is based on this increase. Teaching time can be increased by extending the amount of contact time (although this tends to have decreasing returns) or by raising the effectiveness of teaching (primarily through better and more attractive teaching resources, including books, audiovisual material, computers). Learning time can also be increased by giving more homework (which also tends to have diminishing returns), by encouraging more self-study amongst students by increasing their motivation and by providing teaching materials that are more stimulating. This carries the risk, however, that the motivation will not last.

Increasing teaching time does not automatically result in more learning time, nor does decreasing teaching time automatically reduce learning time. Claims made by the supporters of certain teaching methods, including traditional teaching, may be labelled "effective" only when there is reliable scientific research that includes an appropriate correct control group. Attention should also be paid to the possible differentiating effects of these teaching methods for pupils from different strata, as some "softer" teaching methods assume sufficient ability and cultural capital that is not equally available in all strata.

Teaching conditions that are affected by educational policy, thus, bear at most an indirect influence on the effectiveness of the teaching and learning process. These conditions include class size or student–teacher ratio,[22] teaching staff salary levels, school size, teaching staff experience, the architectural quality of the school building. The fact that such relatively tangible teaching conditions play only an indirect role in most European countries is primarily due to the policy of equal government

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[21] I refer here to the work of Scheerens and Bosker (1997: 305).

[22] Examples include the student–staff ratio, which is between 15:1 and 35:1 in primary and secondary education. Between these values, the student–staff ratio has no systematic effect on the effectiveness of the teaching–learning process; above and below these extremes, it does.

financing of all schools of the same type. This means that the effects of the actual differences in material conditions are relatively slight and, to a certain extent, coincidental.[23] There are indications that teaching conditions such as many cancelled lessons due to the frequent absence or illness of teachers, the absence of qualified teachers, the use of outdated teaching material or demoralisation amongst the teaching staff, do have a direct negative influence on learning and teaching time, thereby worsening the school environment.

Unequal Division of Teaching Conditions

Positive teaching conditions and a good school environment are unequally distributed over schools and are related to the composition of the student population, even in countries in which schools are equally financed. Schools with many difficult students have less opportunity to become and remain effective. The learning and teaching time at such schools is continually under pressure because time is lost on student problems that are not related to learning. The risk then arises that the teaching staff will eventually give up the fight for quality in their teaching. The chances of this happening are greater when teachers have no political or religious values that help them continue and legitimise their struggle. One of the handicaps of state education in the fight against unequal educational opportunities is that such systems of political or religious values tend to become less prevalent, as they are in conflict with the non-discriminatory character of state-supported schools.[24] At the same time, it is an advantage for religiously inspired schools (e.g. Islamic schools), in which the teaching staff have a clearer set of values that helps them persist in their Sisyphean task.[25] Giving up the fight for the quality of their school can cause good teachers to move to other schools, which prevents their former schools from providing good teaching in certain subjects for a considerable length of time and makes it necessary for more lessons to be given by less qualified and experienced teachers. This can have a demoralising effect on the remaining teachers, causing further deterioration in the educational process and school environment. For this reason, the teaching conditions in schools with underperforming student populations are often worse than they are in schools with student populations that perform well. That is why improving teaching conditions at schools with difficult student populations is so important in the fight against inequality of educational opportunity; this is where the highest returns of a deliberate educational policy can be made.

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[23] This is not true in the United States, however, as the use of local taxes to fund primary and secondary education creates large, systematic differences in the material conditions of schools.

[24] From this perspective, the disappearance of both socialistically inspired teachers and Catholic teaching brothers is regrettable, as their political or religious views helped them to persist in their Sisyphean task.

[25] Too much emphasis on religion, however, can lead to the selection of less qualified teachers (who, nonetheless, adhere to the right religion) and the subsequent reduction of actual teaching time or a tendency to spending teaching time on the wrong subjects, thereby resulting in insufficient actual teaching and learning time.

Criteria and Morale

Schools with unfavourable teaching conditions are those that could profit most from clear criteria regarding the level to be achieved. Such criteria are included in national curricula and final examinations, which help schools to enforce their long-term teaching objectives. In the absence of such national standards, the struggle for quality and the pressure of comparative assessment can cause these criteria to be adjusted downward, without the parents and students who attend these schools (and who already have an information lag) knowing about it.[26]

High morale amongst teaching staff is another factor in the creation and maintenance of favourable teaching conditions. One of the best ways to maintain the morale of a team of professionals is to offer them as much freedom as possible in carrying out their jobs, obviously accompanied by equivalent financial conditions and public assessment of the learning achieved. They are best suited to match the form and content of their teaching to the potential and wishes of their students, rather than having to follow precise guidelines from the Ministry of Education, local government or head office of the group of schools to which the school belongs. This matching will vary from school to school, as well as from year to year.

This moderate variation, tempered by equal financial conditions and public assessment of the learning achieved, could generate moderate competition between schools for the students and teachers that are best suited to the school and achieve the best learning results. This competition between schools for students and teachers is not an invention of the neo-liberal 1990s; it has existed in the Netherlands since the 1960s, when religious recruitment for segregated education disappeared. This competition, together with central final examinations of secondary education and the common test at the end of primary education, is the best explanation for the relatively favourable scores of Dutch students in the cross-national PISA and TIMMS studies and the relatively low scores of students of the North German states in these studies, where there are no central final examinations of secondary education and little competition between schools.[27]

Public and Hidden Differentiation

One of the unavoidable functions of education in contemporary society is the selection and allocation of students according to the type of education that best suits their

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[26] Even if students do discover the consequences of the inferior school quality once they are in the labour market, it is usually too late and no longer possible to catch up. Furthermore, because selection is less universalistic (i.e. the same criteria apply to everyone) on the labour market than it is in education, students who are perceived as weak on the labour market fall even further behind than they did in education.

[27] This is in contrast to the higher TIMMS and PISA scores of students in the South German states of Bavaria and Baden-Wurttemberg, where a central final examination of secondary education exists.

developed abilities.[28] Since the 1960s, most OECD countries have debated about and experimented with delaying this selection in secondary education. Because many abhor such selection functions, the delay within secondary education can be seen as an attempt to eradicate it from the educational system. Leaving this socially inevitable selection to the labour market instead of the educational system, however, creates the chance that social inequality between students from different strata will become even greater than the inequality that exists within education. After all, selection is even less universalistic (meaning the same criteria apply to everyone) on the labour market than it is in education.

Early Selection for Different Types of Education

As already noted in section "Social Background and Other Social Divisions", the influence of the social background is greatest for selection that takes place at a young age. Parental characteristics weigh more heavily in these early transitions than do the wishes and prospects of the not-yet-independent pupil. This variation in the importance of the social background in transitions during the school career also explains why the influence of the social background is greater in educational systems with early selection than it is in other educational systems.

One of the consequences is that, in educational systems with hierarchical ordering of types of education (e.g. Germany and the Netherlands), the effects of the social background, and therefore the level of educational inequality, are greater than they are in educational systems that do not have such educational types (e.g. Finland and Sweden).[29] The effects of the social background are particularly prominent, as the non-material costs of various educational types are strongly dependent on the social background. In educational systems with vertical differentiation, the non-material costs of following higher educational types are particularly high for the lower strata, whilst the non-material costs of following lower types of education are higher for the higher strata.

These differences in cost for different strata are the product of differences between the life styles of students from lower strata and the social and cultural requirements of higher types of education and the social decline experienced by students from higher strata if they attend lower types of education. In educational systems with fewer hierarchical differences, there is less distance between the life styles of the students and the demands of education, and the social decline is less

[28] A macro-level aspect that is associated with the allocation function of education involves the number of students of each type and level that are required in society. This issue is of little importance in OECD countries, where regulation is left to the labour market and the individual risk of students. With regard to inequality of educational opportunity, it is important to note that students from the lower strata make different cost–benefit analyses of these risks in their education choices. It is, therefore, rational for them to choose safer education types and paths.

[29] It is possible, however, for other characteristics of the educational system (e.g. centralised final examinations) to neutralise the negative consequences of early selection that contribute to inequality of educational opportunity.

pronounced, thus, reducing the cost differences between strata. Because of the non-material costs of various types of education (rooted in social background) and the wider significance of the social background in educational choices and transitions, inequality of educational opportunity is likely to be greater within educational systems that involve early selection and/or many different hierarchically ordered types of education.

Another characteristic of this type of educational system is that schools that offer the lower types of education tend to have less favourable student populations. Because of these differences in the composition of student populations, the five mechanisms described in section "Segregation Between Schools and Areas" also manifest themselves in these different types of education. These mechanisms magnify the unequal initial differences in the choice of educational type, thereby enlarging inequality of educational opportunity.

Finally, for cases in which the differences between the various types of education have become so large that it is no longer possible to transfer from lower to higher types, choices that are made when students are young are irreversible, and the inequality in opportunity can no longer be reduced by a later upward transfer. The various types of education also differ with regard to a number of teaching conditions, particularly the cancellation of lessons due to the frequent absence or illness of teachers, a lack of qualified teachers, the use of outdated teaching material or demoralisation of the teaching staff (see section "Teaching Conditions"). The highest types of education also have the best teaching conditions, further increasing inequality of educational opportunity between students in different types of education.

Internal Differentiation

This does not mean that educational systems without early selection and/or without hierarchically ordered types of education do not have inequalities in the distribution of educational opportunities across comparable students from different strata.[30] Another, less obvious, way of carrying out student selection and allocation is differentiation within a school by *streaming* (grouping together students of roughly equal ability in a number of core subjects), *tracking* (grouping together students of roughly equal ability in a certain subject, but allowing the *tracks* to vary between subjects) and similar systems. Whether such internal differentiation takes place formally or informally makes little difference in the outcome. Internal differentiation enhances initial unequal differences in the allocation/choice of different *streams* or *tracks*, thus, also contributing to increasing inequality of educational opportunity.

The advantage of internal differentiation is that it allows for more internal transfer (in particular, transferring upward to a higher track or stream) than it does for transfer between the different types of education that are offered in different school buildings. Experience in internally differentiated schools has shown that, over time,

[30] I refer here to work about streaming and tracking in the United States by S. R. Lucas (1999).

transfers downward to lower tracks or streams are more common than are transfers upward to higher tracks or streams. This is because, in internally differentiated schools, downward transfers are less costly for students, as they do not require them to leave the school and their friends. In contrast, because of a tendency toward risk avoidance (by students, parents and teachers), upward transfers take place only if the chance of success in the higher track or stream is very high. It is also easier for teachers to transfer students to lower groups, because the students are able to remain at the school, and such transfers pose no threat to school funding. Finally, students in higher streams or tracks are under less pressure to achieve good marks, as alternatives in lower streams or tracks are readily available.

The greater chance of downward transfer within internally differentiated schools, thus, provides a mirror image of the lower chance of downward transfer between types of education, which is more costly and, therefore, more difficult for both student and school. The chance of transferring downward is also unevenly distributed according to social background, as the process of weighing the costs and benefits of downward transfer is linked to social stratum. Downward transfer is more costly for children from higher strata, as it places them in a lower social standing than their parents hold. In contrast, students from lower strata who transfer downward are still at a higher or equal level than their parents are, and they, therefore, do not experience social decline.

As stated previously, upward transfer is less common, but that does not imply that it is unrelated to social background. Upward transfer is more costly for children from lower strata, as it places then at a higher social level than their parents, possibly alienating them from each other. For students from higher strata, transferring upward brings students closer to the level of their parents; they, therefore, experience less social decline than they did in the lower stream. One possible advantage of internally differentiated schools is that the most important decisions regarding upward or downward transfer are taken when students are older; this lessens the impact of the social background on such decisions. The five mechanisms described in section "Segregation Between Schools and Areas" operate also between these streams or tracks, just as they do in the various types of education. The lower streams and tracks within these schools also contain less favourable student populations, and because of these population differences, the five mechanisms also occur between the various streams and tracks.

Finally, teaching conditions vary between tracks and streams in response to internal power relations between teachers within schools and parental pressure; the highest streams have the best teaching conditions, particularly with regard to cancelled lessons because of frequent absence or illness of teachers, the lack of qualified teachers, the use of outdated teaching material or demoralisation amongst the teaching staff (see section "Teaching Conditions"). Because of the differences between streams with regard to the mechanisms, student populations and teaching conditions, the unequal initial differences in choice of stream develop further, accompanied by an increase in the inequality of educational opportunity. This also applies in educational systems with internal differentiation between streams or tracks.

As an aside, I would like to point out that it is possible to delay the selection function in primary and secondary education until entrance examinations for the following educational transition, and to trust the selective working of a school's own entrance examinations or the close relationship between area and school segregation. In such cases, schools with very homogenous student populations do not need to differentiate any further internally; they only have to prepare their students for the following entrance examination. In such a situation, the quality of the school (with regard to preparation for the next external entrance examination) is of far greater importance than the formal diploma is to the further career of the student. Systems with strict entrance selection for special schools or types of education can be found in France (*classes préparatoires*), England (public schools), the United States (prep schools) and Germany and the Netherlands (*independent classical gymnasia*). Comparative study has shown the Dutch *gymnasia* to be more socially exclusive than either the French *classes préparatoires* or the English public schools.

Hierarchy of Disciplines

The informal hierarchy of disciplines and subjects is another form of hidden vertical differentiation in secondary and further education. In formal terms, there is no hierarchy; the status of different subjects within educational institutions and within national legislation is equal. In practise, however, this informal hierarchy functions as further vertical differentiation. The actual hierarchy can be found in differences in admissions criteria for different subjects, gender composition, required teacher qualification levels, salaries and other secondary employment conditions, student–teacher ratios, required student effort, opportunities for transferring to other courses and the labour-market chances of graduates. The most common form of horizontal differentiation in most European countries exists between vocational and general education, in both secondary and post-secondary education. Hierarchical differences also exist between subjects within vocational and general education (e.g. between electrical engineering and nursing, between mathematics and economics, between medicine or law and sociology or pedagogy).

It is important to note that no "natural" hierarchy exists between disciplines and subjects – not even between vocational and academic education. The differences in these hierarchies in the various European countries illustrate the absence of such a natural order. The hierarchy within the French system of higher education provides a clear illustration of this point; in this system, vocational education (*Les grandes écoles*) is hierarchically superior to the universities. In Germany, some students find it attractive to follow programmes in the apprentice system after they have completed their *Abitur* (final examinations); this obviously varies by business sector.

Horizontal differentiation contributes to inequalities in educational opportunities in two ways. The first effect involves the entrance criteria for various programmes of study and the necessary knowledge of this hidden hierarchy in education. Vocational programmes may be more accessible to the children of parents who have the same vocation (e.g. medical programmes for the children of doctors, graphic design programmes for the children of graphic designers), partially because of the *numerus clausus* admissions criteria (e.g. "affinity with ...") and partially because of prior knowledge regarding the vocational programme and the associated admissions process.

Second, students from the lower strata are more likely to prefer subjects and disciplines that offer the best prospects for particular types of employment. The more concrete and secure a programme is, the more likely it is that students from the lower strata will choose them. Because of their social background, children from the higher strata know more about the less concrete and less secure subjects; with parental support, they also find it easier to take risks. This preference is also logical; students from lower strata have fewer resources at their disposal to support them during a protracted search for employment after graduation, as their parents are less able to help them, both financially and with regard to information. Most students from the higher strata have parents who are able to provide these types of assistance. This horizontal differentiation, thus, creates differences in the costs and benefits of different areas of study, depending on the social background, thereby increasing inequality in educational opportunity. In general, this means that students of equal cognitive capacity from lower strata still prefer concrete vocational programmes to vague, academically oriented programmes.

Transfer

The influence of such differentiation in education (whether hidden or not) highlights the importance of retaining the ability to transfer to a higher stream or a different area of study or type of education to the reduction of inequalities in educational opportunity that are due to the social background. If an educational system offers more opportunities for upward transfer, students from lower strata have the opportunity to correct for earlier choices that were made because of their environment. Examples of increased opportunities for upward transfer include eliminating the necessity of repeating material, decreasing the distance between two successive educational programmes and the opportunity to return to school after gaining work experience.

In the Netherlands, the possibility of upward transfer within the various types of secondary education during the 1970s and 1980s gave students from the lower strata more chances to improve their educational opportunities. The possibility of upward transfer, however, was also used by students from the higher strata. Proportionately more of these students transferred upward than did students from the lower strata, although a larger percentage of students from the lower strata used these transfer opportunities (i.e. the "detour") to achieve higher educational levels. In contrast, a larger percentage of students from the higher strata took the direct route to achieving higher educational levels. In terms of ultimate educational attainment, students from the lower strata used the detour more often than did students from the higher strata. In the 1990s, Dutch social-democrat ministers of Education have largely removed all of the opportunities for upward transfer. These opportunities have been eliminated through lack of funding as well as through educational reform, particularly in the creation of a separate lowest level school type *preparatory secondary vocational education*.

These developments highlight an interesting difference between Dutch and German education. Whilst the German educational system contains almost no opportunities for upward transfer, there are still a few left in the Dutch system, most notably between *senior general secondary education* and *pre-university education* (the two highest school types). This could explain why there is greater inequality of educational opportunity in Germany than there is in the Netherlands, even though both countries have highly differentiated hierarchies of educational types.

There is, thus, no single dimension of differentiation between secondary and further education; there are several. The combination of these dimensions ultimately determines the precise extent of inequality in the educational opportunities of a given educational system. This is why unequal educational opportunities that are due to the social background are not only prominent in educational systems that involve a differentiated hierarchy of educational types (although the chance of such inequality is greater in this type of system). And this is why inequalities arising from the social background are not necessarily low in comprehensive schools.

According to an ancient Latin phrase, “We do not learn for school, but for life”. The labour market is an important sector in which these differences in knowledge and skills are “exchanged for” more or less attractive jobs, higher or lower incomes and so forth.

Relationship Between Highest Educational Level and Labour Market Opportunities

There is obviously a relationship between the final level of attained education and labour market opportunities. This relationship is not restricted to the chance of obtaining paid work and the length of time it takes to find a job; it is also associated with the quality of the work and the salary. There are several explanations for the relationship between education and the labour market. First, capabilities that are acquired in education (i.e. knowledge, skills and attitudes) are necessary in order to work successfully (human capital in the most restricted sense). Second, a diploma is an indicator of manifest productivity and ability to learn, both of which are necessary in order to acquire further, mostly company-related, capabilities during work (human capital in its broadest sense). Third, a diploma is an indicator of potential productivity and ability to learn, in comparison with those who have no diploma (credentialism). Although it is possible to show that these three reasons are all important in the relationship between education and the labour market, they cannot be used to ascribe specific values to various courses and occupations. This is problematic, as quality in education and labour market policies depends upon some measure of importance for each of these three explanations. It is even more difficult to measure the macro-level importance of the educational level of inhabitants of

OECD countries, not only for determining their macro-level productivity, but also for such issues as criminality and cultural participation. In fact, such a measurement is possible only on the basis of a considerable number of assumptions, as is all too common amongst neoclassical economists.[31]

The relation between attained educational level and achieved labour market position (as expressed in status, chance of unemployment, attractiveness of work, income and career possibilities) are roughly equal in most OECD countries. Slight national and inter-sectoral differences can be observed. Length and frequency of unemployment are very limited indicators of labour market position, because only a small part of the population ever becomes unemployed. Status and income are the most differentiated and comprehensive indicators in assessing the relationship between the attained educational level and labour market position.

Vocational Education

Cross-national differences in the strength of this relationship seem to depend mainly on the existence of vocational education within these societies. These differences, therefore, also affect the total level of inequality in educational opportunity in a country. Successful completion of a vocational education programme is usually associated with a stronger position on the labour market. Because the more favourable cost–benefit balance makes vocational education more attractive to students from the lower strata (see section "Public and Hidden Differentiation"), well-organised vocational education can be an attractive path for upward mobility, and it can contribute to greater inter-generational mobility. This is especially true when vocational education is more than simply a lower differentiation within secondary education, but rather an independent pillar in secondary and tertiary education, offering sufficient opportunities for upward transfer (even during a vocational career, through on-the-job training). In societies without well-organised vocational education (e.g. English-speaking countries and France), this upward path does not exist, and talented children from the lower strata usually follow general educational programmes, despite the less favourable cost–benefit balance for these students.

In general, vocational education regulates access to the "vocational market segment". This is a relatively protected sector of the labour market, in which vocational qualifications (learned during and guaranteed by the curriculum of vocational education) play the most important role in finding a job and in which general skills or company-specific knowledge are much less important. The advantage of a vocational market segment is that it is relatively easy to change employers, as long as there is sufficient demand for the specific vocational qualifications. This is also a

[31] In fact, they are assuming either that the invisible hand of Adam Smith works well in the long term or that instrumental variables provide valid measurements. Although such strong assumptions do generate significant macro-level effects for education, they can also be explained in terms of the assumptions used.

labour market problem for graduates of vocational education, however, as they are vulnerable to changes in technologies and production processes.

If changes in their vocational market segments or other circumstances force these graduates to look for employment outside of their market segments, they are forced into the general labour market segment, in which general skills are more important. Because of the usual restrictions in available teaching and learning time, they have had less chance to acquire these during their vocational education; it is, therefore, more difficult for them to find good jobs outside of their vocational market segments. For this reason, vocational training may ultimately offer students from the lower strata only limited chances for upward mobility, and it may, thus, contribute less to upward intergenerational mobility than was expected at the transition from education to the labour market.

The second reason that well-organised vocational education may contribute less to equality of chances in society lies in the fact that not everyone completes the training successfully (sometimes also by a lack of suitable apprenticeship places). Students who do not complete their vocational programmes successfully do not acquire sufficient vocational qualifications to gain access to the vocational market segment. Because of the way in which vocational education is organised, they do not have sufficient general skills either to do well on the general labour market segment. In countries with well-organised vocational education, such dropouts are the most vulnerable of all school-leavers, especially in the general labour market segment. Because students from the lower strata are more likely to belong to this group, even well-organised vocational education can contribute to increases in unequal educational opportunities.

The discussion above clearly shows the double-edged character of education, which creates a dilemma in the organisation of vocational education. If vocational education is unable to guarantee that it will sufficiently provide the required vocational capabilities (e.g. because similar diplomas are awarded at different quality levels, making it difficult for employers to distinguish amongst them), the strengthened position of vocational education graduates will disappear along with the opportunity for upward mobility.

If vocational education were to focus more on general capabilities (based on the reasoning that they are also important in the vocation and are required on the labour market), the stronger labour market position of vocational education graduates would also disappear, as it would no longer offer a clear advantage over general education. The opportunity for students from the lower strata to use vocational education as a ladder to climb socially would be reduced as well, even though the demand for specific vocational capabilities would still exist, despite technological changes in the production process.[32] Foreign workers, who do have these specific vocational capabilities, would then have better chances on the labour market of an OECD country ("the Polish plumber in France"), and often at competitive prices,

[32] The significance and extent of current economic and technological changes are often exaggerated in quasi-sociological policy analyses, whilst those of the past are underestimated.

even as more generally educated students who have followed vocational training have more difficulty finding work because they no longer have the perhaps "traditional" but yet necessary vocational capabilities. The key is, therefore, for vocational education to achieve a good balance between occupation-specific and more general training, as well as between regulating access to the vocational market and considering differences in students' competencies. Only when this balance has been found and maintained, well-organised vocational education can contribute to reducing the existence of unequal educational opportunities and increasing openness within society.

Market Sectors

The relationship between educational and labour market position also varies between labour market segments. As already outlined, the successful completion of the relevant vocational training[33] is a necessary condition in a vocational market segment. Vocation-oriented knowledge and skills are much more important with regard to entry and selection in this market sector than the social background is. Attained educational level and area of study remain important throughout the career in the vocational sector. Although education is not necessary for the general labour market segment, employers use attained educational level and area of study as indicators of desirable qualities (e.g. tidiness, diligence, intelligence and obedience), along with gender, age, ethnicity, nationality, employment history and other characteristics. Although the social background also plays a minor role in selection in the general labour market segment, it is irrelevant for entry. Attained educational level is of moderate significance on the general employment market, but it still plays a role when changing jobs.

In the corporate sector,[34] education is used primarily as an indicator of "trainability" within the company and the ability to fit into internal career schemes. Internal and external differentiation within education (whether hidden or not) also play a role in the selection process, in addition to attained educational level, as well as social background. In the corporate sector education functions primarily as a screening device to identify the most trainable candidates. Estimated capacities based on education, as well as social background are more important for entry into

[33] An educational programme need not be called a vocational training course in order to provide access to a specific vocational market (as with law programmes and the legal profession).

[34] Corporate market sectors are mainly found in the larger companies, where selected employees who are essential to the company receive permanent employment contract with primary and secondary employment conditions that exceed those that are available on the general market. At the same time, the transfer costs are increased for these employees, through legal restrictions and through company-specific qualifications, which are of less value outside the company. It is, therefore, possible for three market sectors to exist alongside one another within a large company. Classic examples of companies with a corporate market sectors in the Netherlands include Shell and Unilever. Corporate market sectors also exist in the government (e.g. the diplomatic service). Many smaller companies and institutions may also have corporate market sectors in order to be able to cope with strong fluctuations in production.

this labour market segment than knowledge and skills. Companies assess these estimated capacities by means of "entry-level jobs" (e.g. traineeships), most of which are below the normal level. Success in entry-level jobs is followed by a career or series of jobs within the company, in which educational level plays a progressively smaller role.

The first job after completing education is very important for a student's future career, but it is not the only determining factor. Educational level and area of study also influence further opportunities on the labour market, although their direct effect does decrease whilst the effect of the last job increases, except on the general labour market segment. This does not mean that education is less important in later employment, but that previous jobs are superior to education as an indicator of individual productivity, and serve as a stepping stone to the current job (especially on the corporate employment market). During (and especially at the beginning of) a career, there are still advantages to having been born in a higher stratum. These advantages, which are not derived from either capacity or education, can be explained in terms of greater social capital. This is manifested in access to more information regarding possible employment and the opportunity to influence decision makers, the increased parental resources that allow a longer search for suitable employment and the less favourable cost–benefit balance of accepting employment at a lower level than that of the parents (social decline).

Relationship Between Inequality in Education and in Other Social Sectors

In addition to the relationship between educational level and opportunities on the labour market, there are clear relationships between educational level and inequality in other social sectors as well. In this section, I discuss four sectors that are clearly related to educational level and are very relevant in the creation and development of unequal educational opportunities: the marriage market, divorce, migration and cultural participation.

Partners

Educational homogamy refers to the phenomenon that partners with similar levels of schooling have a much greater chance of marrying one another than do partners who do not. The greater the difference in schooling level, the more unlikely it is that partners will marry. In this context, it is not important whether partners marry formally or live together, as educational homogamy is roughly the same in both cases. Educational homogamy already existed prior to the rapid increase in the educational level of women during the twentieth century, but it was less obvious because of the large numbers of lowly educated women (who, nonetheless, varied widely in intelligence). Following the rapid increase in the educational level of women, educational homogamy became much more obvious, partially because their educational level now corresponded more with their capability, as had traditionally been the case for men. Educational homogamy remained high and stable, with slight increases during the end of the twentieth century.

The rapid increase in the educational level of women has masked another phenomenon: "the female marrying up". Marrying up means that, in cases of unequal educational levels between partners, the woman's level is more likely to be lower than the man's than vice versa. A similar pattern exists with height, age, nobility status and similar factors.[35] One of the consequences of this tendency to marry up is that very highly educated (or tall, old or titled) women are less likely to find partners than highly educated men are. On the other hand, very lowly educated (or short, young, etc.) men are less likely to find a partner than lowly educated women are.

There are two important reasons for educational homogamy. [36] First, the chance of a stable relationship developing is greater if both partners have relatively similar characteristics, as their preferences are more compatible. Second, the circumstances in which partners meet one another (e.g. circles of family and acquaintances, educational institutions, employment organisations, recreational time) are relatively homogenous with regard to social (and, therefore, educational) strata, increasing the likelihood that people with equal schooling will meet one another.

The importance of educational homogamy is primarily that partners help one another and that the amount of mutual support depends in part upon the amount of resources that individual partners have at their disposal. This mutual support, which is known as the "partner effect", is, therefore, an addition to the individual characteristics of the partners. Partners with a high level of education have a more powerful partner effect and are, therefore, able to offer one another more mutual support. Examples include finding good employment for the other partner, seeking good schools for their children, overcoming unavoidable problems in the lives of both partners (e.g. illness, economic setbacks).

The strength of the partner effect obviously does not depend only upon the educational level of both partners, but on their dedication to the relationship as well. Married couples tend to invest more in their relationships than do couples who are living together. Formal marriage is experienced as a stronger commitment than a partnership contract. Educational homogamy, therefore, increases intragenerational inequality in society, and it, therefore, leads indirectly to unequal educational opportunities for their children.

A second, more direct, way in which educational homogamy contributes to unequal educational opportunities involves the influence of the educational level of parents on the educational opportunities of children. In many cases, children who have highly educated mothers also have highly educated fathers, and children who have lowly educated fathers also have lowly educated mothers. The combination

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[35] It is possible that the tendency of women to "marrying up" has a biological component, which originated during human evolution.

[36] I refer here to the likelihood of educational homogamy; the exception to the rule is interesting, but does not refute the existence of educational homogamy.

of lowly and highly educated parents does not occur very often. This means that compensation of the low educational level of one parent by the high level of the other also occurs only infrequently. The Matthew principle is applicable in this context, "Everyone who has will be given more. He will have more than enough. And what about anyone who doesn't have? Even what he has will be taken away from him". In these two ways, educational homogamy makes a powerful contribution to unequal educational opportunities; the contribution of educational homogamy is actually much greater than is that of teaching conditions in schools.

Divorce

The end of a relationship between parents, whether or not they were married, has a negative influence on children, both on their educational opportunities and other welfare aspects (e.g. illness, mental stability and chance of criminality).[37] The divorce itself is not the only cause; part of the problem lies in the pre-divorce characteristics of the parents and their children (e.g. personality, ability to communicate and cooperate) and in the severity of the conflicts prior to the divorce. From the perspective of the children, however, divorce is often not the end of conflicts between parents; legal consequences often intensify them. Divorce also contributes to a decrease in educational opportunities for the children involved. This occurs because, as in the period following divorce, parents pay less attention to the education of their children (they are moving, starting again, forming new relationships) and because their authority over their children has been reduced (the parents have shown that they are unable to solve their own problems).

Because of these negative effects, divorce is not always the best solution to parental conflicts, particularly not from the perspective of and in the interests of the children. In societies in which divorce is rare, parents with plenty of resources (including education) are the most likely to divorce. In societies in which the process of ending of cohabitation relationships has become more common and democratic, parents with few resources (including education) are the most likely to divorce; as they have less help in keeping their relationship together during the difficult times that inevitably occur in every relationship. Moreover, such difficult times also occur more often amongst lower-stratum couples because of the greater economic and cognitive vulnerability that they experience. Because of the far-reaching democratisation of divorce in many OECD countries, divorce now contributes to the increase in unequal educational opportunities amongst children from both higher and lower strata.

[37] The end of the relationship between a child's parents has effects that extend beyond the short or medium term. Parental divorce doubles the chance that their children will also divorce, even controlling for differences in the age at which the children of divorced parents begin their first relationships and have their first children (two other factors that increase the likelihood of divorce).

Migration

Although migration from one region or continent to another is a characteristic of the human race, immigration in Europe has taken on a new dimension since the Second World War because of three developments. First, migration has increased in response to the growing interdependence between societies (European Union, globalisation), because of the increase in both worldwide mass media and cheap transport over longer distances. This means that an increasing number of European countries are confronted with immigration even though they are not prepared for it (e.g. with regard to their social security systems), in contrast to such traditional immigration countries as Australia, Canada and the United States. Second, the availability of mass media and transport has made the break between migrants and their countries of origin less absolute. This has diminished the necessity of integrating into the new society, both because of the option of returning (whether real or not) and the greater opportunities that immigrants have for creating their own social and cultural niche in the new society (including finding marriage partners from their lands of origin). Third, the global economic differences between poorer and richer societies have created streams of migration that can no longer be sufficiently held in check, due to the growing interdependence between poor and rich countries, cheap mass transport and the demand for cheap labour in rich countries.

Because of these three developments, immigration is becoming increasingly intertwined with existing inequality in European societies, and it is giving it a tint that is both European and ethnic. Most immigration to European countries consists of the migration of EU citizens between EU member states; such migration is usually due to the internationalisation of the upper segments of the labour market (vocational and corporate labour market segments) and an increase in transnational marriage. Although the European aspect of migration primarily involves the influx of highly educated immigrants (usually from other EU member states), the emergence of a cosmopolitan elite in the European countries is involved as well.

This development has increased the availability of internationally oriented education (e.g. English-language schools in non-English speaking countries, the International Baccalaureate, Erasmus exchange programmes, international courses in tertiary education). It has also generated new forms of differentiation within the national educational systems, as students and/or their parents need sufficient financial and cultural capital to be able to make use of this internationally oriented education, particularly because selection sometimes involves competition with students from other European countries. Because of their lack of these types of capital, students from the lower strata have fewer opportunities to take part in this internationally oriented education. The internationalisation of parts of European education systems can increase the educational inequality within European countries, ultimately increasing the social distance between different strata within society as well.

The ethnic aspect of immigration largely involves the influx of less educated immigrants from Africa, Asia and Latin America. Although a major part of the educational disadvantage of the children of immigrants from these parts of the world can be attributed to the low level of their parents' educational attainment, occupations and the amount of segregation in their schools and neighbourhoods, these factors do not explain the entire disadvantage. Furthermore, many second-generation immigrant students (i.e. those whose parents were born in Africa, Asia or Latin America, but who were born and raised in the country of destination) still have an educational disadvantage that cannot be explained by individual characteristics. Roughly speaking, second-generation immigrant students from East and Central Asia no longer have an educational disadvantage; in fact, they are more likely to have pulled ahead.

There is no obvious explanation for the magnitude of differences between migrant students from various parts of the world. Possible explanations include the migration history (e.g. negatively selected migrant workers as compared to positively selected immigrants from former colonies; political refugees as compared to economic refugees), the social and cultural distance between the country of origin and the destination country, and the culture and religion of the country of origin. Differences in the extent of discrimination against various immigrant groups apparently offer a less likely explanation. If this explanation were plausible, the Chinese would be amongst the immigrant groups that experienced the least discrimination in European society, which seems not very plausible. The cultural and religiously based reaction to actual discrimination (e.g. withdrawal and discouragement as compared to working harder and fighting back) is another possible explanation. The case of Chinese immigrants also suggests that differences in the extent of integration and assimilation are less likely to offer an explanation; Chinese immigrants are not included amongst the most integrated and assimilated immigrants in European society. Nonetheless, it is possible that certain religions help to determine the economic success of migrant followers in capitalist societies. For example, the values that are incorporated in a religion may encourage the success of its adherents. In this regard, Islamic values (e.g. strong sense of honour, subordinate position of women) could hinder success, whilst those of Confucianism (e.g. strong family ties, hard work) could promote success.[38]

The extent of the educational disadvantage experienced by ethnic immigrants from the same country of origin, but living in different countries in Europe apparently varies as well. Individual characteristics alone cannot explain this variation. In other words, European societies and their educational systems can differ in the extent of educational disadvantage that is experienced by the groups of the same ethnic origin. The educational disadvantage of ethnic immigrant students may have a different explanation than does that of the native lower strata. In addition,

[38] That potential of religion to hinder economic success in capitalist societies is not necessarily specific to Islam. Until the twentieth century, Catholicism was also less compatible with capitalism than were protestant denominations.

liberal welfare regimes (as in the United Kingdom) appear to provide better conditions for reducing the educational disadvantage of immigrant students than do Mediterranean[39] or conservative[40] welfare regimes.

Culture

Education increases the likelihood of participating in the more valued aspects of a society's culture, whether classic (e.g. visits to museums and concerts, reading books and newspapers) or "modern" (e.g. pop concerts, internet access, ability to follow the foreign media). Participation increases the cultural capital of those involved, as well as that of partners and children (through joint participation and transfer of experience). The access that education provides to a higher and wider culture, therefore, indirectly contributes to an increase in unequal educational opportunities.

Are Inequalities in Educational Outcomes Caused by Features of Educational Systems?

This overview of the various causes of unequal educational outcomes gives two answers to the main question of this book: Are meso- and macro-characteristics of educational systems the causes of educational inequality? On the one hand, the answer is negative: at maximum they are influencing unequal educational outcomes, but they are not at the root of inequality of education. Individual characteristics of pupils and parents are far more influential than any of the meso- or macro-features. On the other hand, the answer is positive: unequal educational opportunities get only their form within these features and these inequalities can vary by the educational system in which it develops. Perhaps the seemingly contradiction between individual factors or educational systems as causes of educational inequality is perhaps as fruitless as those between nature and nurture. It become now more and more that these kind of deterministic contradictions do not exist in human and societal nature. There do not exist pre-given features of individuals and their contexts, which determine outcomes. Individual potentials and constrains and opportunities stemming from the surrounding contexts are interacting with each other in a constant process of adaption and change. It is this constant process that also gives concrete forms to the individual potentials and to the institutions of the contexts. With the other, neither individual characteristics nor contexts would exist. This does not mean that the question about the importance of education is irrelevant. It is no longer a philosophical question of a-priories (individual or context), but a scientific question of how much and where and when. Cross-national analysis can be helpful to measure these much, where and when's. This book is hopefully a step in the good direction.

[39] Examples include Italy, Portugal or Spain.

[40] Examples include Germany, France and (in part) the Netherlands.

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