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## Parental Education, Immigrant Concentration and PISA Outcomes

Part of the underperformance of immigrant students in PISA can be linked to the fact that they tend to be concentrated in disadvantaged schools. Indeed, the latter is a stronger predictor of immigrant outcomes than either the concentration of immigrants in schools *per se* or even who mostly speak another language at home. Attendance in a disadvantaged school has a strong adverse impact on reading performance, whatever the origin of the student. In addition, immigrant students with highly educated mothers are more likely to attend disadvantaged schools than are non-immigrant students with mothers of similar education. So their performance suffers as well. These results highlight the fact that educational and social policies interact to limit opportunities for school success among immigrant students.



## INTRODUCTION

One of the notable contrasts observed in the PISA results for children of immigrants compared to those of children of non-immigrants concerns that between the so-called settlement countries of Australia, Canada, New Zealand and the United States, as well as many European countries. In the former group of countries, PISA results for the children of immigrants have shown small differences with those of children of non-immigrants and in some cases were better, while in European countries, assessment results for children of immigrants have generally lagged behind those of the children of non-immigrants, in some countries seriously so. The immediate reaction of many observers is to attribute this result to the selective migration policies of the first three countries and the attractiveness of the United States generally to highly educated migrants.<sup>1</sup>

The underlying assumption is that there is a link between the educational attainment of parents and the academic outcomes of their children, with higher parental attainment generally associated with better outcomes for their children. The mechanisms by which this operates are numerous and can include, among others, the transmission, in part, of innate ability from parent to child, the presence of educational resources in the home environment, parental assistance with learning and with schoolwork, exposure to cultural events and manifestations, and proficiency in language and expression. As is well known, the link is not a deterministic one, however, with some regression towards mean outcomes by the children of highly educated parents, and some progression towards better schooling and attainment results by children of parents having at best compulsory education.

The issue is an especially pertinent one for the children of immigrants, both because the cross-generational link may be affected by a language barrier among immigrant parents but also because immigrant populations in some countries include significant proportions of individuals with a level of education that may be considerably below the compulsory education level of the country of residence. For example, in the PISA 2009 results, more than 30% of children of immigrants in a number of countries (for example, Luxembourg or the Netherlands) had mothers who at best had completed primary education, perhaps no more than eight or nine years of schooling. Many had much less than this and significant proportions had no education at all.<sup>2</sup> In most OECD countries, compulsory education levels are equivalent to at least ten years of schooling and have been so for some time.

The question this raises is whether educational systems are accustomed to and indeed, perhaps presupposing that the parents of entering children have the compulsory education of the country, equipped to deal with such disadvantaged populations. Are they structured to deliver adequate outcomes for the children, regardless of the home environment, and in particular whatever the education level of the parents? To what extent do they depend on parental involvement to achieve their goals? What measures are already in place, or should be in place, to compensate for the more limited ability of poorly educated immigrant parents to assist their children with their schooling?

The measure of outcomes used in this chapter is not educational attainment per se, but rather reading assessment results as measured at age 15, that is, close to the age limit for compulsory education. The link between assessment results and access to higher education is the subject of Chapter 6 in this publication.

Although one might expect the human capital endowment of parents to be a significant element in the outcomes of their children, as will be seen, the lower human capital endowment of the immigrant population by itself does not account for all of the reading differences between children of immigrants and children of non-immigrants. Other factors are at play, which exert a significant role.

One other such factor is the school's composition, that is, the characteristics of the student population. Given that immigrants tend to concentrate in certain neighbourhoods and districts of cities in virtually all countries, the issue of a possible peer effect on outcomes is an especially pertinent one. However, the dimension along which concentration occurs and which affects outcomes is not self-evident. Is it the concentration of immigrants per se in certain neighbourhoods which is associated with the less favourable outcomes one observes for the children of immigrants in many countries? Or is it rather the concentration of students who largely speak another language at home? Or the concentration of immigrant students in disadvantaged schools? This is an issue that will figure prominently in this chapter.

In examining the association between a particular characteristic and differences in outcomes between children of immigrants and non-immigrants, there are two elements to consider: how different the two populations are with respect to the characteristic in question and how different the populations are with respect to the impact of the characteristic on outcomes. Modelling exercises normally focus on adjusting for the former, often (but not always) assuming that the impact is more or less of the same magnitude for both the target and reference populations. In practice, this may not be the case, and the differences may provide some insight concerning where policy interventions may be especially effective.

The purpose of the chapter is to examine the impact of parental education on outcomes more closely and, in particular, the effect of peer educational disadvantage on assessment outcomes. As will be seen, this generally has a greater impact on outcomes than the other concentration measures cited above and indeed, than parental educational attainment. In an ideal world, immigrant children<sup>3</sup> would be distributed throughout all schools in the same proportion by educational attainment as their non-immigrant counterparts. In practice, this is far from being the case. The extent to which immigrant outcomes are related to this unequal distribution is a matter of some interest.



The chapter pays particular attention to differential impacts of certain factors on outcomes for the children of immigrants. The emphasis as well will be on characteristics which policy can reasonably affect or where the results suggest a means of policy intervention, the cost and feasibility of which remain to be determined. It is clear, for example, that policy can scarcely hope to affect the educational attainment of the parents of immigrants once they have arrived, but it can play a mediating role and provide the assistance which higher levels of education normally allow parents to give.

### Box 5.1 Data sources and definitions

Participating countries and economies in PISA 2009 numbered 65, of which 34 were OECD member countries. The reading assessment that was carried out is the fourth in a series going back to the year 2000, but only the second in which reading has been a major domain of assessment. The PISA sample sizes vary from country to country, as do of course the total numbers of students of age 15. The analyses presented in this chapter are from the 2009 assessment.

Given the range of countries participating in PISA, there is considerable heterogeneity in the data, both with respect to the educational attainment of students' parents and assessment results, and in absolute terms as well as for the children of immigrants compared to the children of non-immigrants (Table B5.1a).

This poses some problems for the analysis. Some people categorised as "immigrant" in some countries became immigrants by virtue of border changes which occurred following an internal migration. This is the case, for example, in countries formed by the break-up of the Soviet Union and Yugoslavia. It is difficult to determine to what extent "migrations" in these cases partake of standard cross-border movements in which migrants are faced with new institutions, customs and perhaps languages, to which they and their children traditionally have had to adapt. Nevertheless, the choice has generally been made to include them, while recognising that the diversity of situations across very different countries may make it more difficult to identify common patterns.

Sample size considerations also limit the number of countries which one can include in the analysis. For the purposes of the analyses presented here, only countries with at least 100 first- or second-generation<sup>4</sup> children of immigrants in the sample have been retained. Even with the 100-student minimum, there are nonetheless some sample-size issues figuring in many of the analyses and data occasionally have to be suppressed because the sample sizes are insufficient to provide reliable estimates.<sup>5</sup>

For the analyses of concentration effects, each sampled school in a country has been placed into a quartile defined according to the estimated (weighted) percentage of students in the school with a particular characteristic. Three characteristic measures were considered: *i*) the percentage of students in the school who are children of immigrants; *ii*) the percentage of students in the school who are children of immigrants and largely speak another language at home; and *iii*) the percentage of students in the school with mothers with less than upper secondary attainment.<sup>6</sup>

The percentages were defined only for schools with at least 20 responding students for the characteristics in question, in order to ensure a reasonably reliable measure of school concentration. The number of schools and students (unweighted and weighted) excluded by this criterion is given in Table B5.2. Overall the minimum 20-student criterion excluded some 7% to 10% of the sample representing an estimated 10% to 13% of students. For some countries, however, in particular Denmark, Germany and Latvia the percentage of sample excluded was considerably larger for some of the characteristics, ranging from 25% to 35%. If the sampling rates across all schools are similar, it is likely that it was the smaller schools which were excluded. Across schools and on average across countries, the percentage of children of immigrants in included and excluded schools was broadly similar.

Analyses involving parental educational attainment are carried out on the basis of the educational attainment of the mother, if present, otherwise they are based on that of the father. The mother's educational attainment was chosen because traditionally school success has been considered to be more strongly linked to the attainment of the mother than with that of the father. In practice, however, the PISA data do not reveal much difference in this regard.

### Box 5.2 **Country cluster: Grouping countries by immigrant characteristics**

Given sample-size limitations in general, data have had to be pooled across countries for certain analyses. Countries, however, are quite heterogeneous, both with respect to their immigrant populations and the nature of their educational systems, as well as with respect to policies concerning immigrant children. It is often difficult to account for all of these in modelling exercises. How then should countries be grouped?

The strategy adopted here has been to take a two-stage approach. The first stage consisted of grouping countries, using a standard clustering algorithm,<sup>7</sup> based on certain characteristics observed to be significant factors in explaining student outcomes. The characteristics are the following: the difference in the distribution of the educational attainment of the mothers of immigrant versus non-immigrant students, the percentage of immigrant students in the country mostly speaking another language (than the test language) at home; and the percentage of immigrant students in each school disadvantage quartile, from the least advantaged (quartile 1) to the most disadvantaged (quartile 4). The characteristics used for clustering thus incorporate both home and school background effects.

The clustering procedure identified three clusters:<sup>8</sup> Cluster 1, which includes the United States and most western and northern European countries, but excludes southern Europe; Cluster 2, which includes all non-OECD member countries with sufficient PISA sample sizes for immigrant analysis except Singapore, but also Greece and Portugal; and Cluster 3, which includes the settlement countries of Australia, Canada, New Zealand, three “new” migration countries, namely Ireland, Italy and Spain, plus Israel and Singapore.

The clusters can be characterised as follows (Figure 5.1): Cluster 1 consists of countries having a less educated immigrant population on average and a high concentration of immigrants in disadvantaged schools. Cluster 2, the “non-OECD” group is characterised by immigrants whose educational attainment is similar to that of the domestic population, who generally speak the host country language at home and whose immigrants are relatively evenly distributed across schools. The third cluster differs from the second in having a relatively high percentage of students mostly speaking another language at home, a feature which it shares with Cluster 1. On the other hand, it tends to have a somewhat more educated immigrant population compared to non-immigrants than Cluster 2.

This clustering result has a certain intuitive appeal, first of all, in splitting off most non-OECD member countries with their generally unusual immigrant populations, involving often border change migration or migration of persons of similar linguistic backgrounds or of expatriate populations often assessed in their own language or in English (Dubai [UAE] and Qatar). Secondly, the clustering procedure groups the selective migration countries together (Australia, Canada, New Zealand) and interestingly, three new migration countries (Ireland, Italy and Spain). Note that if partner countries are excluded from the clustering process, these three are joined in this same group by two other OECD member migration countries, namely Greece and Portugal, which are otherwise grouped with partner countries and economies. Although these new migration countries, which were becoming labour migration countries in the period when the immigrant parents of PISA-assessed students arrived there, are similar to the selective migration countries in certain respects, they differ in having outcomes for children of immigrants that are not generally as favourable. Cluster 3 also includes Israel, where permanent migration is almost entirely ethnic/religious in character and Singapore, where migration is very highly educated. By contrast, Cluster 1 groups countries together where immigrant children perform relatively unfavourably compared to non-immigrant children, with the possible exception of the United Kingdom and the United States, where the differences are not so large.

Figure 5.1 also shows the difference in reading scores between the children of immigrants and non-immigrants, which illustrates that the link between outcomes and characteristics is not straightforward. One could conclude provisionally, however, that the scenario associated with less educated immigrant populations, of linguistic origin different from that of the country of residence and concentrated in disadvantaged schools (Cluster 1) is not one that appears particularly conducive to positive outcomes.

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Box 5.2 **Country cluster: Grouping countries by immigrant characteristics** (continued)

▪ Figure 5.1 ▪  
**Countries grouped according to certain immigrant-related characteristics**

	Reading score of children of immigrants compared to non-immigrants	Percentage of children of immigrants speaking another language at home	Difference in distribution of educational attainment of mothers of immigrant compared to non-immigrant children (percentage points higher[+] / lower[-])				Percent of immigrant students in each school educational disadvantage quartile			
			At best primary	Lower secondary	Upper secondary	Tertiary	Advantaged (Q1)	Less advantaged (Q2)	Less disadvantaged (Q3)	Disadvantaged (Q4)
<b>Cluster 1</b>										
Belgium	-68	51	+16	+5	-7	-14	11	14	24	50
Austria	-68	74	+12	+16	-21	-6	12	16	24	48
Sweden	-66	66	+13	+4	-7	-10	18	20	19	43
Denmark	-61	52	+18	+10	-8	-19	10	18	22	51
France	-61	40	+16	+16	-17	-15	10	17	16	57
Germany	-57	58	+16	+5	-22	+2	13	19	22	45
Norway	-54	77	+12	+3	-1	-14	18	22	21	39
Luxembourg	-52	77	+29	+2	-16	-14	24	15	26	35
Switzerland	-49	57	+14	+16	-24	-6	19	20	23	38
Slovenia	-48	55	+1	+20	-3	-18	16	17	23	44
Netherlands	-45	43	+32	+3	-21	-14	11	13	17	59
United Kingdom	-25	47	+10	+5	-15	+1	16	13	20	51
United States	-22	60	+20	+8	-7	-21	10	10	27	53
<b>Average</b>	-52	58	+16	+9	-13	-12	14	17	22	47
<b>Cluster 2</b>										
Greece	-59	39	-3	+0	+9	-6	17	20	21	42
Argentina	-41	17	+13	-3	+2	-12	12	30	22	36
Estonia	-34	11	-0	+1	-6	+5	28	43	11	18
Portugal	-26	19	-14	+3	+2	+9	31	32	27	10
Russian Federation	-25	19	+1	+3	+4	-8	21	29	21	30
Croatia	-16	3	+2	+10	-4	-8	23	24	29	24
Latvia	-13	19	-0	-2	+0	+2	26	26	10	39
Hong Kong-China	-3	11	+17	+10	-18	-8	14	24	27	35
Montenegro	5	10	+2	-4	-6	+8	28	40	14	18
Kazakhstan	6	10	+1	+3	+0	-4	21	20	28	31
Macao-China	7	8	+3	+10	-5	-8	18	29	26	27
Jordan	11	6	-4	-5	-2	+11	38	31	21	10
Serbia	16	3	-1	-1	-1	+3	31	25	24	20
<b>Average</b>	-13	13	+1	+2	-2	-1	24	29	22	26
<b>Cluster 3</b>										
Italy	-72	67	+6	-9	-0	+3	19	26	28	27
Spain	-57	42	+1	-4	+3	+0	16	34	29	22
Ireland	-30	45	+1	-6	-12	+17	22	23	30	25
New Zealand	-13	47	+1	-5	-13	+16	24	27	23	26
Canada	-6	49	+5	+0	-6	+1	20	22	26	32
Israel	-0	40	+4	-2	-9	+7	19	31	32	18
Singapore	2	79	-6	+0	-17	+23	30	26	21	23
Australia	10	36	+3	+0	-9	+6	24	24	21	31
<b>Average</b>	-21	51	+2	-3	-8	+9	22	27	26	25
<b>Outlier countries</b>										
Brazil	-101	4	+8	-5	-12	+10	6	39	21	34
Mexico	-99	18	+21	-9	-7	-6	9	16	31	45
Dubai (UAE)	95	55	-16	-8	-7	+31	33	29	26	12
Qatar	97	42	-6	-1	-0	+8	34	26	23	17

Source: Table B2.1a, Table B3.1 and Table B5.1a.

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### Box 5.2 **Country cluster: Grouping countries by immigrant characteristics** (continued)

Following this initial clustering in terms of characteristics, which is still highly aggregated, subgroups have been formed, which respect the initial clustering according to characteristics, but are now grouped according to criteria involving national or migration history, linguistic/cultural affinities and/or similarity in outcomes. Many of these will appear “natural”, others perhaps less so; the latter reflect inevitable compromises. The objective is to accumulate enough sampled students of immigrant origin in each group to be able to carry out more detailed analyses. The groups have been assigned names to assist in remembering their composition, which may not always do justice to the diversity of situations in the countries grouped together.

They are as follows:

- Cluster 1:**
- Germanic: Austria, Germany, Luxembourg and Switzerland
  - Franco-Dutch: Belgium, France and the Netherlands
  - Nordic: Denmark, Norway, Slovenia, and Sweden
  - Anglo-American: the United Kingdom and the United States
- Cluster 2:**
- China group: Macao-China and Hong Kong-China
  - Former Soviet Union: Estonia, Kazakhstan, Latvia and the Russian Federation
  - Former Yugoslavia: Croatia, Montenegro and Serbia
  - Mixed group: Argentina, Greece, Portugal and Jordan
- Cluster 3:**
- Settlement: Australia, Canada, Israel, New Zealand and Singapore
  - New migration: Italy, Spain and Ireland.

These country groups will be used on occasion, when sample sizes make it problematic to carry out results except for a limited number of countries. On occasion, the groups will be used as well to present average results across countries, when the statistics are too extensive to appropriately present individual countries. Note that in averaging across countries, each country is assigned the same weight, regardless of population. The objective is to show results for an average country and policy environment, not for all countries in a particular group confounded.

## EDUCATIONAL ATTAINMENT AND ASSESSMENT RESULTS

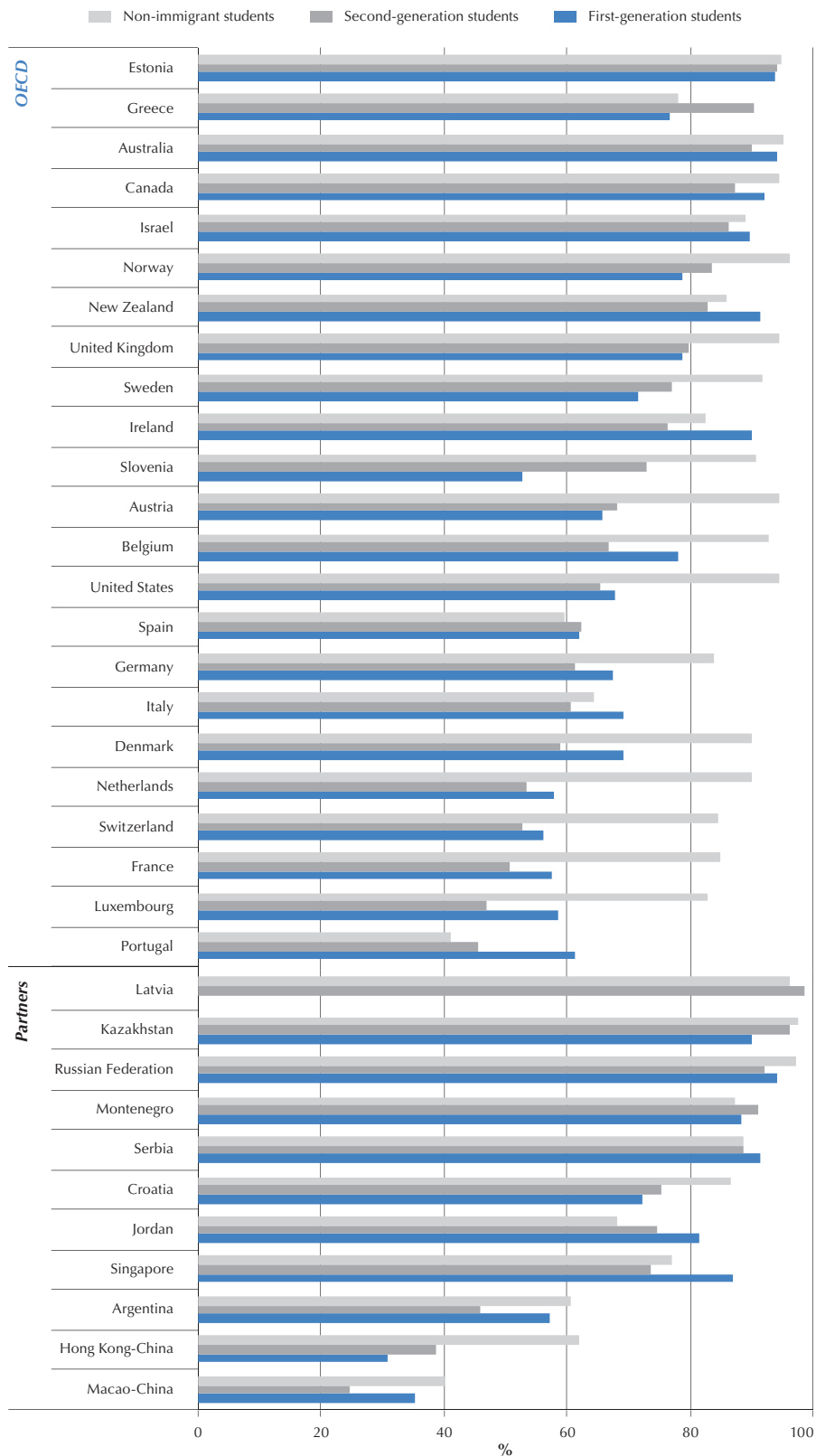
Rather large differences exist in the educational attainment of immigrants across countries and within countries, relative to those of non-immigrants. So-called “guest-worker” migration in many European countries consisted of the migration of generally low-educated workers to take on low-skilled jobs, especially in construction and manufacturing, whereas the selective migration policies of countries like Australia and Canada guaranteed a flow of immigrants whose educational attainment was much more similar, and indeed in some cases, higher than that of the native-born population. Chain or network migration tends to ensure that past migration patterns continue to influence current patterns.

Figure 5.2 contrasts the percentage of native-born mothers with at least upper secondary attainment with that of immigrant mothers, as reported by the students assessed in PISA, where the countries are sorted according to the percentage of mothers of second-generation students with at least upper secondary attainment (Box 5.3). In many countries, the percentage of non-immigrant mothers with at least secondary attainment is higher by some 20 to 40 points than that of immigrant mothers. Many immigrant mothers in these countries have significantly less than compulsory education levels in their new countries of residence.

One would expect that reading assessment results would normally be associated with parental attainment levels. This is indeed the case and it holds true with few exceptions almost everywhere, for both children of immigrants and non-immigrants. Some of this can be attributed to innate ability being transmitted from parent to child, but this is only a partial explanation, educational attainment itself being at best an imperfect reflection of ability. It may apply even less so to the immigrant population, because greater inequalities in origin countries and generally lower levels of education in those countries mean that the link between educational attainment and ability may be weaker. In addition, educational systems also influence the link between parental attainment and reading outcomes, with some systems attenuating the effect of parental attainment on outcomes more than others.



Figure 5.2  
**Percentage of 15-year-olds whose mother has attained at least upper secondary education**



Countries are ranked in descending order of the percentage of second-generation students whose mother has attained at least upper secondary education.

Source: Table B2.2i.



### Box 5.3 How 15-year-olds report parental education

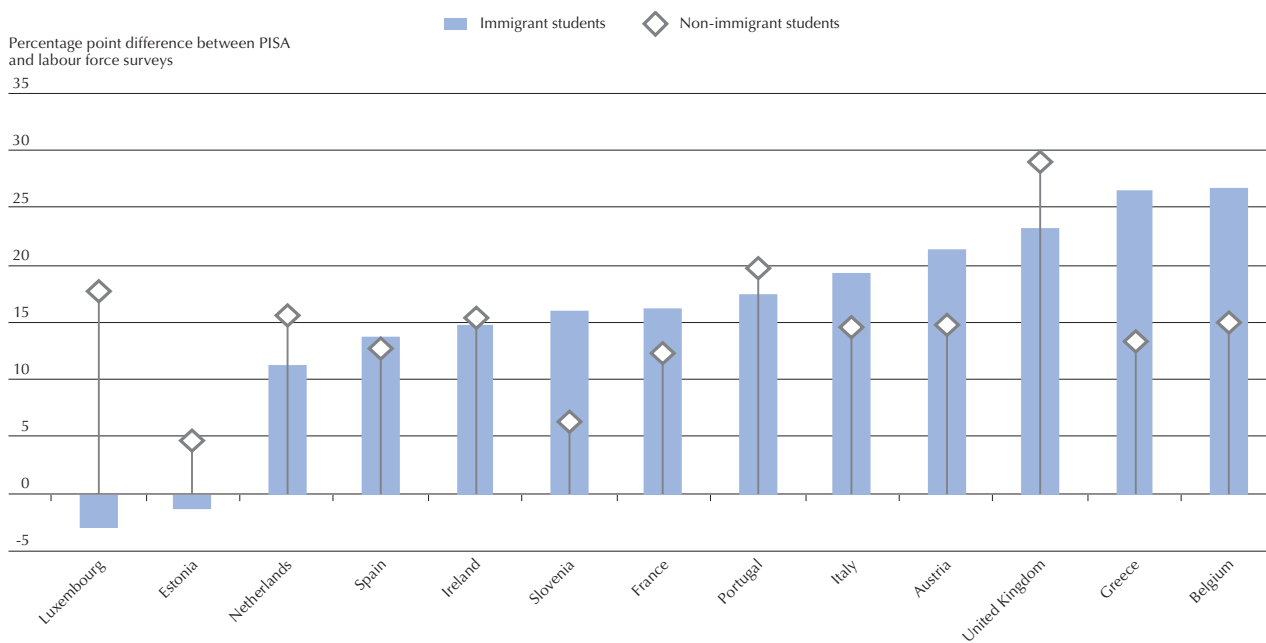
In the PISA assessments, the educational attainment level of the parents is reported by the students who are assessed. To what extent is this reporting accurate?

There are many reasons why one might expect the reporting to be subject to error, especially among children of immigrants. Many immigrants were educated in their countries of origin, where the structure of educational systems may be different from those in the country of residence. Still, one would expect that the basic levels (primary/secondary/tertiary) and their designations would tend to be well-nigh universal across countries. In addition, immigrants tend to be more often overqualified than non-immigrants for the jobs which they occupy, which may distort the perception which youth have of the educational level of their parents. On the other hand, immigrants in some countries have attainment levels which are lower on average than general education levels in the country and their children may tend to inflate the attainment of their parents, because of misperception, shame or another reason.

In most labour force surveys, one can identify mothers with children of a particular age as well as the immigrant status of persons within a household. To obtain some idea of the quality of the reporting of parental educational attainment, a comparison was carried out using the European Union Labour Force Survey, for the characteristics of households with children in the age range 13 to 17, pooling over the 2007-2009 surveys in order to accumulate a large enough sample to obtain reliable estimates.

■ Figure 5.3 ■

#### Mothers with at least upper secondary education, PISA vs. Labour Force Surveys



Note: Labour force survey estimates are for young persons 13-17 years of age and were estimated using the 2007-09 European Union Labour Force Surveys. PISA estimates are from the 2009 assessment. The estimates cover countries for which the sample sizes were large enough to yield reliable estimates.

Countries are ranked in ascending order of the percentage point difference between PISA and Labour Force Survey estimates of immigrant students whose mother has attained at least upper secondary education.

The results indicate that the 15-year-old children of immigrants in PISA generally tend to report educational levels for their parents that are higher than those reported by the parents themselves or their spouses in labour force surveys (Figure 5.3), but this is also the case for children of non-immigrants and, on average, to approximately the same extent. On average across countries the percentage of mothers with at least upper secondary attainment reported by 15-year-olds in PISA is 16 points higher than those reported by the parents of 13 to 17-year-olds in labour force surveys. However, there is considerable variation across countries. In a number of countries, there are fairly large differences in reporting bias between immigrants and non-immigrants (Luxembourg, Slovenia, Greece and Belgium), with children of non-immigrants reporting relatively higher levels in Luxembourg and lower levels in the latter three countries. If labour force survey reporting can be considered a reliable benchmark, analyses using PISA data which depend on differences in parental attainment levels between immigrants and non-immigrants may be subject to distortion for some countries.



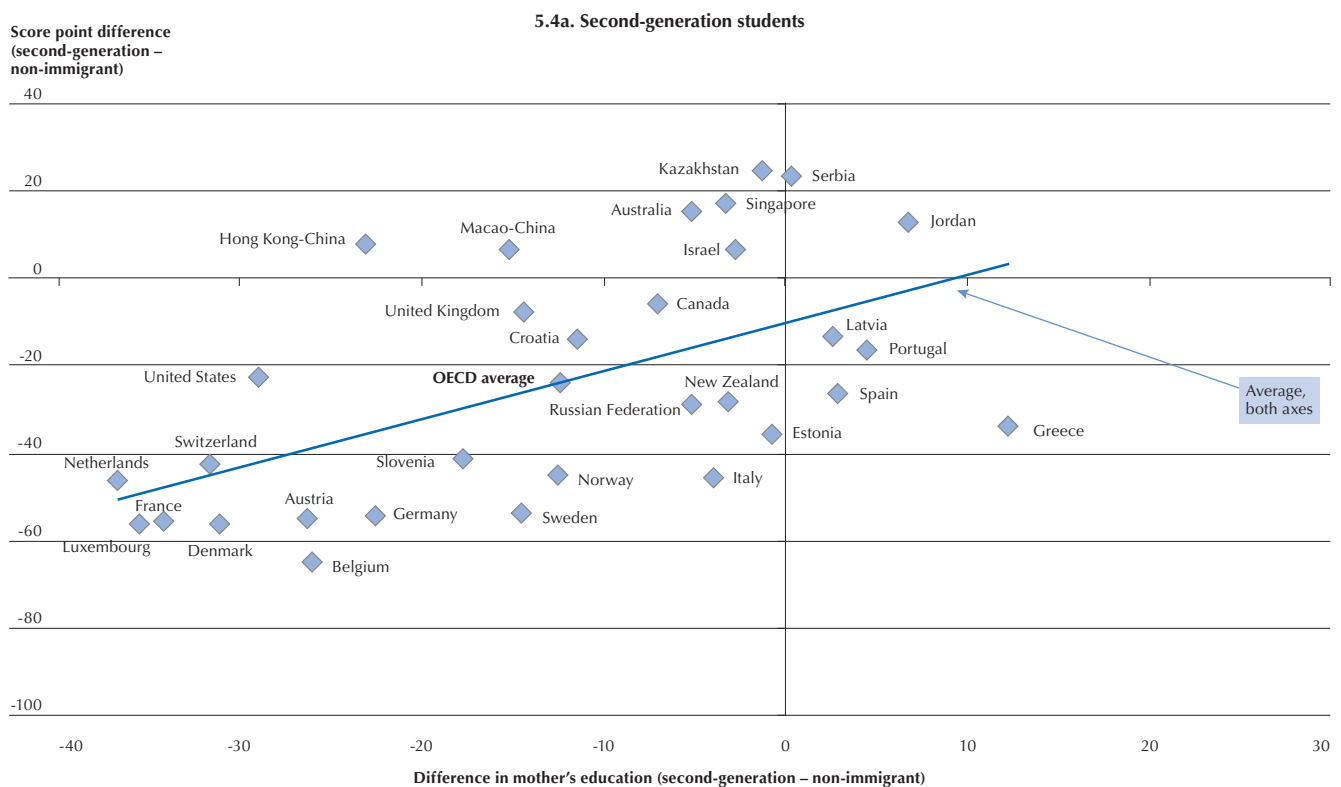


It should be noted, however, that irrespective of the quality of the educational system, there is a natural progression in the outcomes of children with the lowest parental attainment (progression towards the mean) and a regression to the mean by children with the highest parental attainment levels. Regression towards the mean in itself will result in some apparent offsetting of the effect of parental attainment on outcomes which has little to do with the particular merits or demerits of educational systems, but is a purely statistical phenomenon reflecting movement away from an extreme value. Expectations are of course that educational systems will be able to go beyond this and offset some of the real social disadvantages associated with low parental attainment, which would manifest itself through such things as a lower level of educational resources in the home, a lower ability to assist with homework, etc.

To what extent are the observed results for the children of immigrants in PISA-participating countries a function of the education attainment level of the parents? There exists considerable diversity in the composition of immigrants and in the history of migration among countries having administered the PISA assessment to 15-year-olds and the cross-country relation between differences in mothers' attainment (compared to non-immigrant mothers)<sup>9</sup> and differences in reading outcomes has not been found to be strong (Figures 5.4a and 5.4b). The cross-country correlations for both first and second generation students are in the neighbourhood of about 0.5. In other words, differences in mothers' attainment levels explain about 25% of the variance in reading score levels across countries.<sup>10</sup>

■ Figure 5.4 ■

### Relationship between reading performance of students and mother's educational attainment, by immigrant background

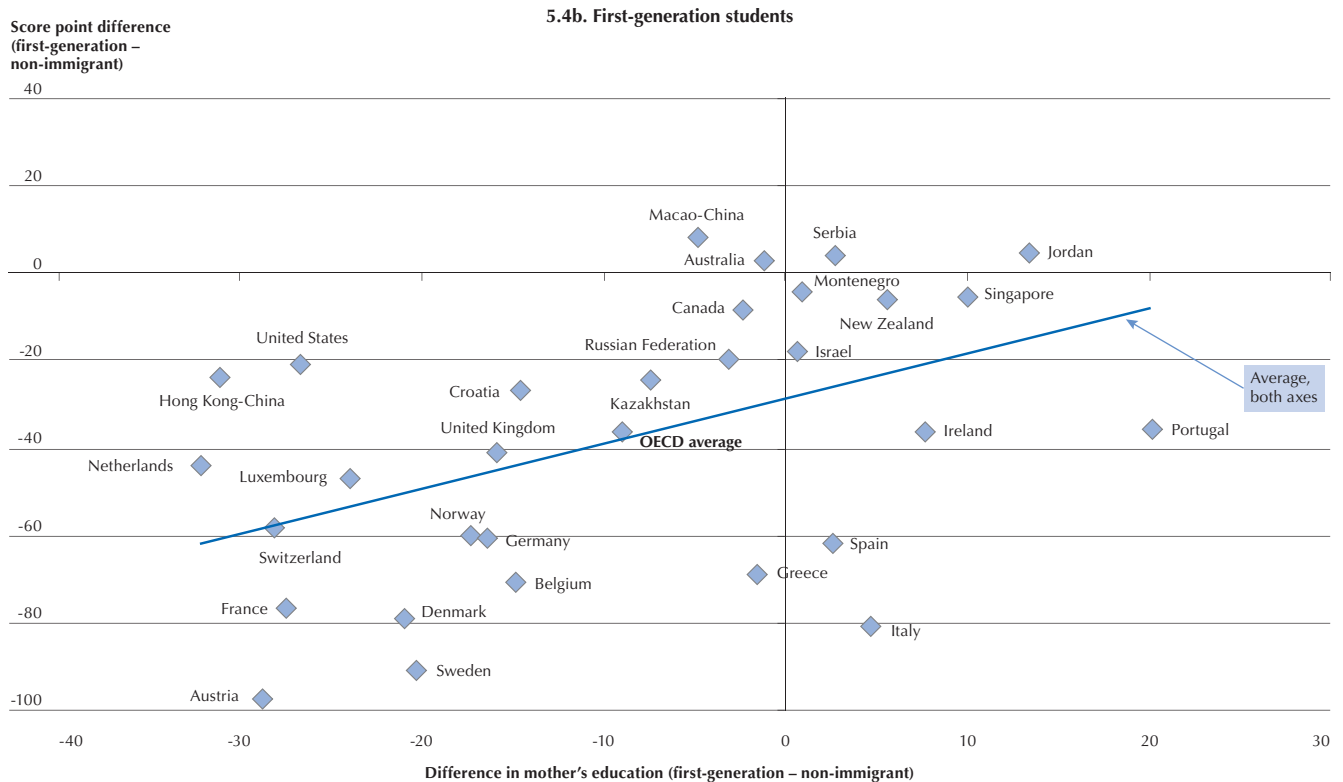


Note: The difference in mother's education is measured by the difference in the percentage of mothers having at least upper secondary education for the two comparison groups.

Source: Tables B2.1a and B2.2i.

Figure 5.4

### Relationship between reading performance of students and mother's educational attainment, by immigrant background (continued)



Note: The difference in mother's education is measured by the difference in the percentage of mothers having at least upper secondary education for the two comparison groups.

Source: Tables B2.1a and B2.2i.

Nonetheless, there are a number of regularities in the data that are worthy of note. It is generally the case that countries where immigrant children do relatively well compared to children of non-immigrants (say, within 20 points) are characterised by the fact that mothers of immigrant children have on average educational attainment levels that are better than, or do not differ substantially from those of children of non-immigrant mothers.<sup>11</sup> There are, however, exceptions to this general rule, in particular, the United States and Hong Kong-China for first and second generation students, where immigrant children “over perform” relative to what one would expect on the basis of the maternal attainment levels.

Conversely, if immigrant maternal attainment levels are low on average (say 15 percentage points lower), it is almost always the case that reading results for their children on average differ unfavourably from those of non-immigrants, with Hong Kong-China and the United States again being the exceptions.

One can summarise these two observations by noting that good maternal education on average (relative to that of non-immigrant mothers of 15-year-olds) appears to be a necessary condition for good results for immigrant children as a group and poor maternal education a sufficient condition for poor results, in both cases given the current educational policy environment in the countries in question. There are of course many children who perform well, despite low parental education, but it is the group performance that is being considered.

On the face of it, the conclusions drawn here are not especially auspicious regarding the ability of educational systems in general to address educational disadvantage, transferring, as it were, the responsibility for poorer / better outcomes for immigrant children to the nature of the migration intake into the country. As will be seen, however, differences in attainment levels of mothers statistically do not seem to account for many of the individual differences in reading assessment results, even if poorer maternal attainment seems to result on average in poorer outcomes for the children. Something else seems to be at play, beyond maternal immigrant educational disadvantage alone.



In addition to the exceptions of the United States and Hong Kong-China, there is another “exceptional” group of countries, where children on average appear to be “underperforming”, given the rather favourable attainment levels of their mothers. The population concerned is that of first-generation students and all of the exception countries are relatively “new” immigration countries, which have had large immigration inflows over the past 15 years (Italy, Greece, Spain and Ireland, with Portugal only marginally different). The educational systems of these countries may have had some difficulties adapting to the new high levels of inflows (Table B5.3).

## THE DIFFERENTIAL IMPACTS OF MATERNAL ATTAINMENT ON OUTCOMES

The educational composition of the immigrant population is but one element among those which exert an influence on the reading outcomes of the children of immigrants and one over which educational systems cannot have a direct impact, although they may be able to compensate for home disadvantage to some extent, through assistance at school, special classes or tutoring, etc.

A second element concerns the relation between mother’s education and reading results, which may differ across countries, but also between immigrant and non-immigrant students within the same country. Figure 5.5 give some idea of the diversity observed in this regard across countries. Here one sees examples of countries where the maternal-education gradients<sup>12</sup> are parallel for the various migration statuses (Sweden and Italy); countries where there is convergence of the gradients with increasing educational attainment (Canada and Israel); and countries where there appears to be, on the one hand, divergence between natives and the second generation, and on the other, a parallel evolution for natives and the first generation (France and Germany and to some extent, Switzerland).

■ Figure 5.5 ■

### PISA reading scores as a function of mother’s educational attainment, selected countries

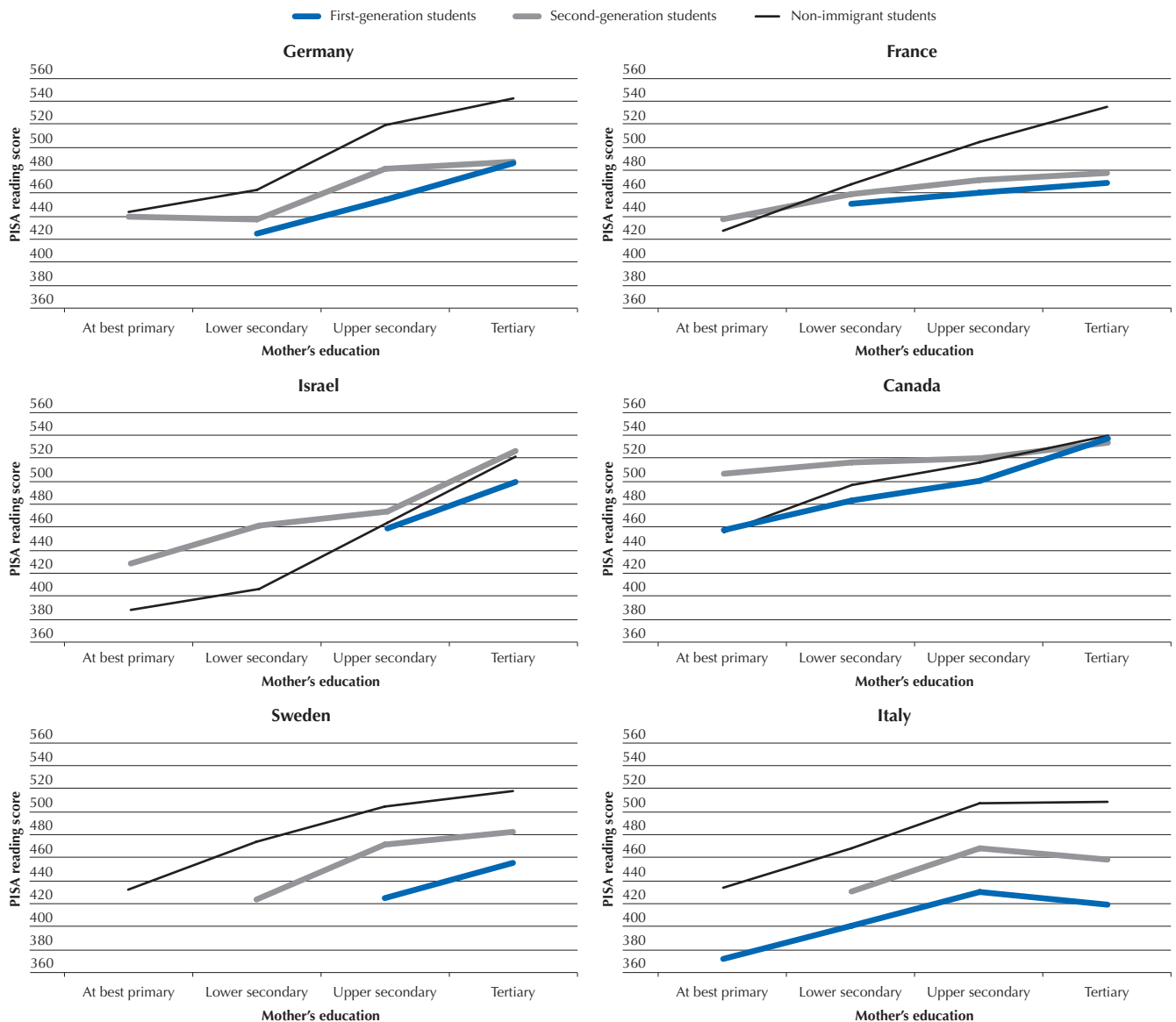
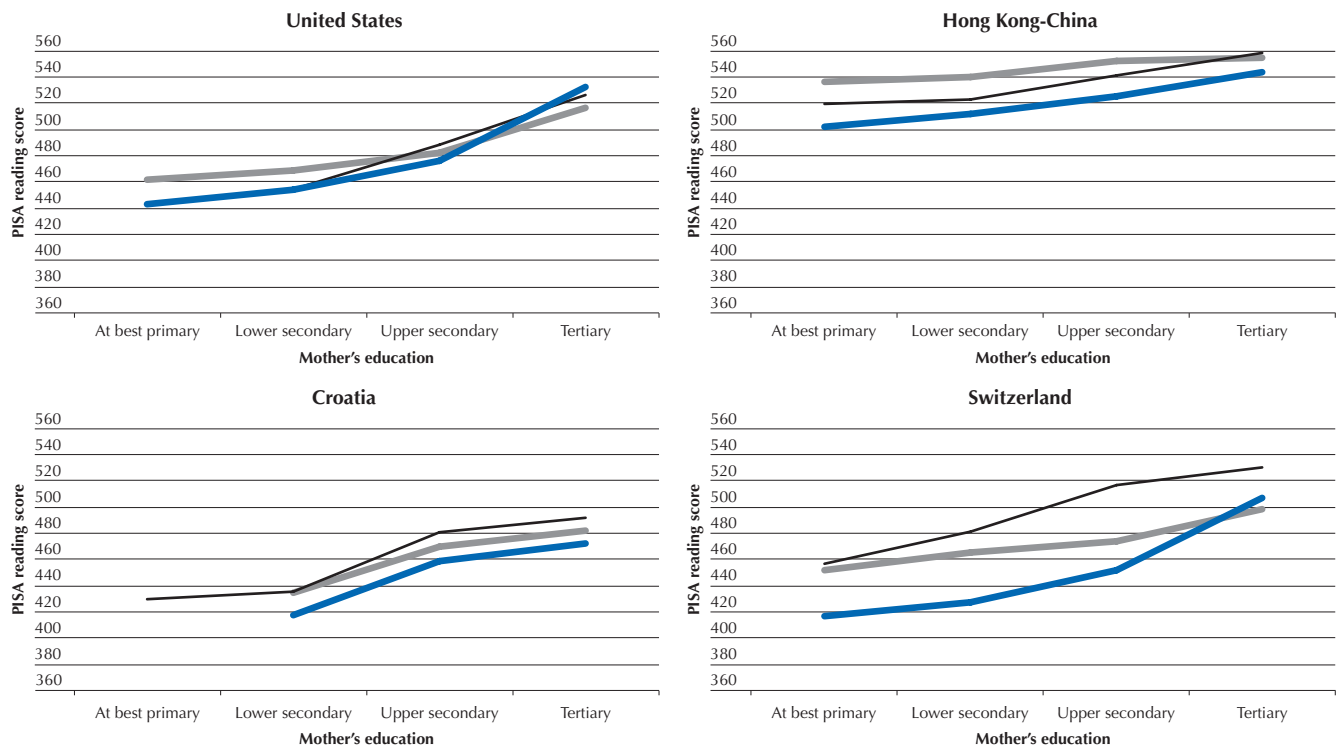


Figure 5.5

## PISA reading scores as a function of mother's educational attainment, selected countries (continued)



Source: Table B5.1a.

Now in all the countries shown here and indeed in general, the curve for the second-generation students lies above that of first-generation students, as one might expect, since for native-born children of immigrants, there is no disruption of education as a result of migration and in principle, there is at least the possibility, if not always the reality, of significant exposure to the language of the destination country from a very early age. In addition, many immigrant parents of second generation students may themselves have arrived in the country at a young age and been partly educated in the country (Table B1.2, Chapter 1).

A more systematic linear regression analysis of the relationship between mothers' education and reading assessment results is shown in Table B5.3. Figure 5.6 gives the essential results. Note that all of the statistics in Table B5.3 and Figure 5.6 and in others to come can be interpreted in terms of PISA score points. In Figure 5.6 only results for Clusters 1 and 3 are portrayed; those for Cluster 2 are erratic, but can be consulted in Table B5.3.

The first observation based on the results of the table (Figures 5.6a and 5.6b) is that controlling for educational attainment accounts for only about 10-15 points of the total difference between children of immigrants and children of the non-immigrants for Cluster 1, consisting largely of most northern and European countries with immigrant populations of below average education. But this is at best a third of the total difference, indicating that differences in reading outcomes in these countries involve more than just low parental education. For Cluster 3, where the difference in attainment levels between immigrants and non-immigrants are smaller, the adjustment has little effect, indeed in some cases it even increases the difference.

The more favourable results for second-generation students compared to the first cited above are evident for all country groupings. A less obvious result than this, however, is the fact that there are significant immigrant-specific effects of education and that these are even more important than those attributed to the lower attainment levels of immigrant parent populations. In practice, this manifests itself in an apparent flattening of maternal education gradients for children of immigrants in Clusters 1 and 3, that is, there appears to be less improvement in reading results with mothers' education among children of immigrants than observed among the children of non-immigrant mothers. This is especially the case for second-generation students. This is the reason for the improvement in immigrant children outcomes seen in Figure 5.6b, when one removes the effect of this flattening.

Figures 5.7a and 5.7b show the result graphically, presented in a somewhat different way. The lines have been inserted as an aid in visualising the result. The figures show that there is less variation in PISA results across OECD countries among children of non-immigrants than among children of immigrants (the "slopes" of the lines are flatter), but there is less difference between children of high- and low-attainment immigrant mothers than between children of high- and low-attainment non-immigrant mothers (the bandwidth is smaller for children of immigrants).



Figure 5.6

Differences between reading outcomes across immigrant backgrounds adjusting for mother's education

Figure 5.6a. First-generation and non-immigrant students

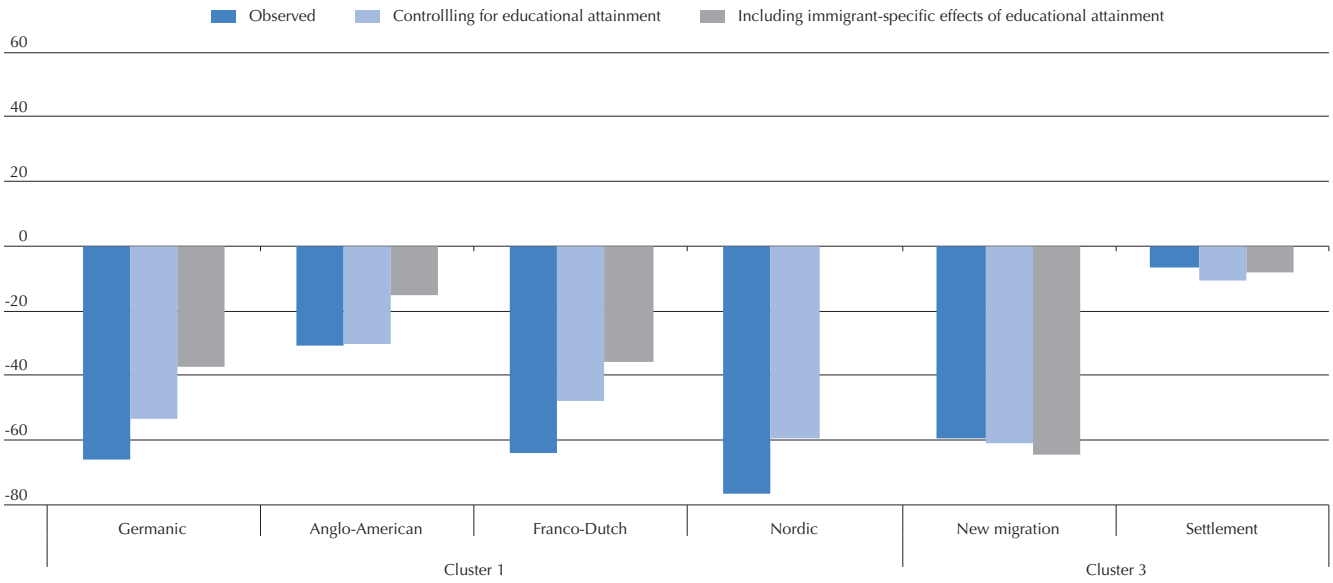
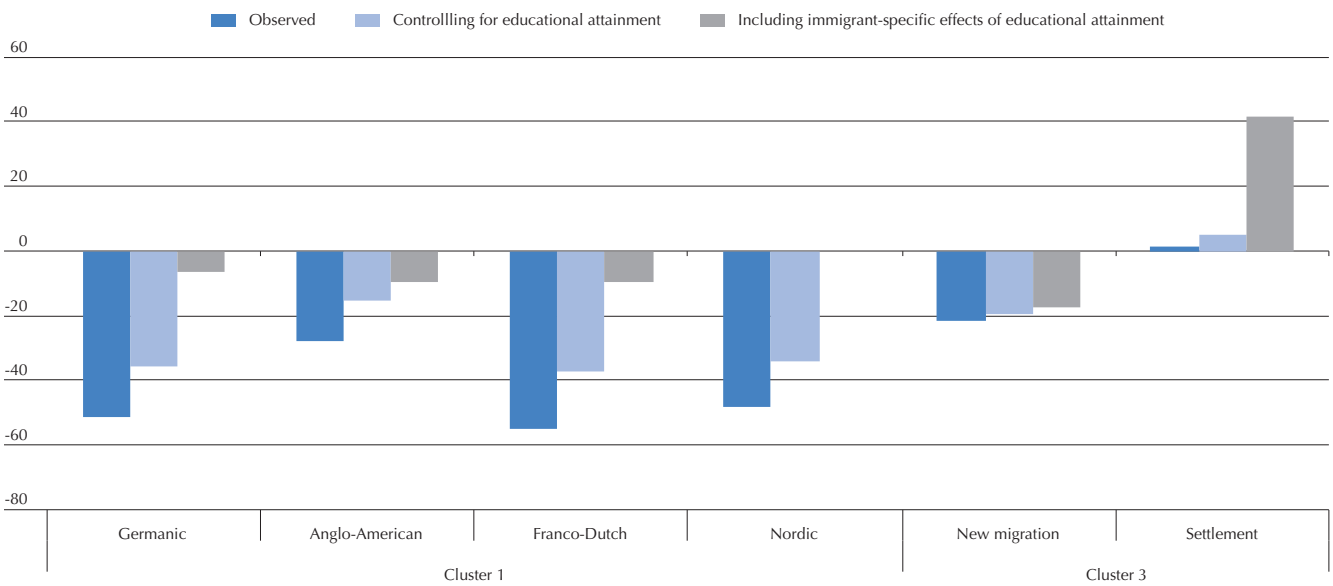


Figure 5.6b. Second-generation and non-immigrant students



Source: Table B5.3.

Figure 5.7  
Average reading score by educational attainment of the mother,  
immigrant and non-immigrant students

Figure 5.7a. Immigrant students

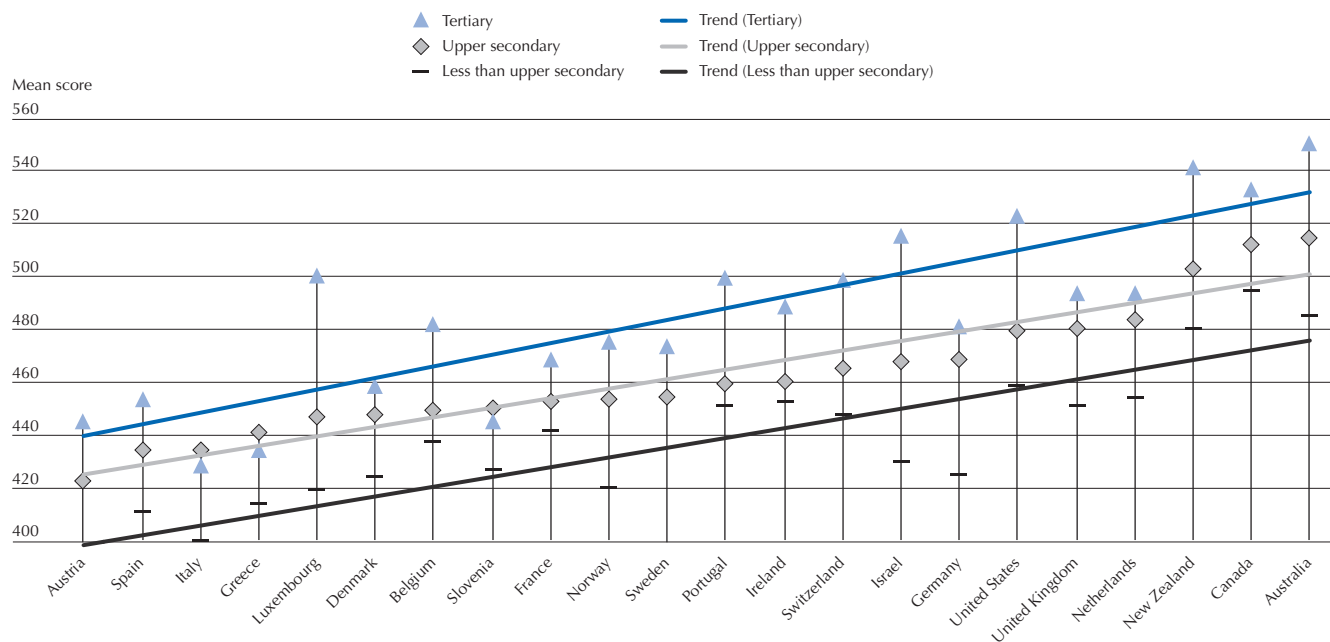
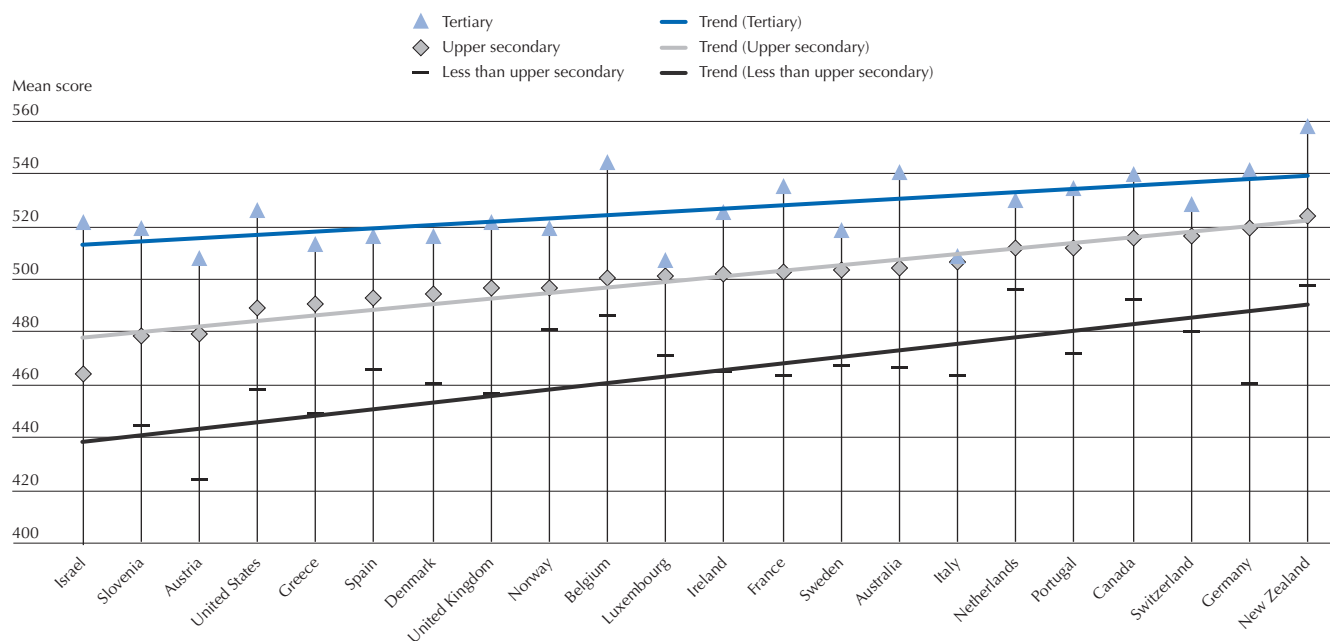


Figure 5.7b. Non-immigrant students



Countries are ranked in ascending order of the mean score in reading for the students whose mother has an educational attainment of upper secondary education.  
Source: Table B5.1b.



There are a number of possible hypotheses that come to mind to “explain” why the benefits of higher parental education on children’s outcomes might be less evident among children of immigrants than among children of non-immigrants. The first such explanation concerns the impact of the language spoken at home, which may often be different from that of the host country and which may hamper the acquisition of proficiency in the national language by the student. Among others, a greater recourse to a foreign language in the home environment may in particular offset the advantage which parents of higher attainment levels can be expected to have in assisting their children with school work.

A second hypothesis concerns the possibility that nominal educational attainment levels, especially at higher levels, for some immigrants may not be entirely comparable or equivalent to those obtained by non-immigrants in the host country. Hanushek and Woessmann (2008), for example, have shown that assessment results of children (as a proxy for educational quality) are better predictors of economic growth than formal educational qualifications, such as those measured here. The issue of the equivalence of qualifications is one that arises (in the labour market) generally for higher attainment levels. For some origin countries, foreign qualifications may convey only some of the impact on childrens’ outcomes that one associates with host-country higher educational attainment.

A third possible explanation concerns the possibility of a group impact on student outcomes, either associated with the concentration of immigrants in particular geographic areas and schools or with the characteristics of immigrants as a group. Immigrants in all countries tend to concentrate in particular areas of cities, with shops, religious establishments, and community groups that reproduce in part the environment of the home country. If immigrants are in general well-educated, the concentration of immigrants in specific areas and schools may not have any adverse effects; they may stimulate each other to better achievement. The concentration of disadvantage, however, may compound the impact of poorer parental education levels and socio-economic background. This is a point which will be examined in more detail later.

The broader question concerns the impact which the collective characteristics (real or imagined) of the group may have on how individuals are perceived and treated by social actors, institutions, educators, and employers, amongst others, a phenomenon known as statistical discrimination (Phelps, 1972). This is not discrimination in the sense of xenophobia or racism, but partakes of the human tendency to generalise, sometimes on the basis of limited or inaccurate information.

Controlling for the language spoken at home, of having a mother born outside an OECD country or attending a disadvantaged school had little impact on the flattened maternal education/score gradients. However a more detailed examination of these issues is beyond the scope of this chapter. They do illustrate a recurring theme, namely that immigrants constitute a group on which the effects of policies, institutions or socio-economic factors may not always be the same as for non-immigrants.

## THE EFFECT OF CONCENTRATION ON IMMIGRANT STUDENT OUTCOMES

In all countries and in all periods, immigrants have tended to congregate in neighbourhoods with other immigrants, often of their own origin, when they move to a new country. This is a natural process that increases social capital and allows immigrants to maintain or build a network of friends and relatives from their origin country who can help recreate a familiar social environment but also be of assistance to them in finding a job, administrative procedures and tasks required in their new country of residence. This tendency may be reinforced by the availability of affordable housing if immigrant income levels are low, but may also be counterbalanced by government measures or incentives aimed at dispersing the immigrant population over the national territory. A number of OECD countries, for example, sought to disperse refugees throughout their territory, so as to avoid undue burden on large urban centres, but also under the assumption that excessive concentration would hamper integration efforts.

Studies of this phenomenon have shown that concentration by itself need not be negative, provided that there is access to social and public services of a quality comparable to what is found elsewhere and provided that ethnic agglomerations do not become permanent enclaves, with little possibility of outward mobility (Damm and Rosholm, 2010; Edin, et al., 2005).

With respect to educational services, the policy of neighbourhood schools has tended to ensure that the composition of schools tends to reflect that of the neighbourhoods in which they are located. In some school districts,<sup>13</sup> there may be the possibility of attending an institution outside the neighbourhood, because of school voucher or open admission policies or because parents choose to place their children in private institutions. Lower- and upper-secondary level institutions generally draw on somewhat broader geographic areas, but perhaps not enough in order to ensure a better socio-economic mix.

To the extent that socio-economic origin is a determinant of school outcomes, early selection or tracking policies may also tend to place students of similar origins in the same institution, irrespective of their place of residence.

The question examined in this section is the extent to which the concentration of students of immigrant backgrounds in certain schools is associated with less favourable outcomes. There are, however, various ways of measuring concentration and it is not *a priori* obvious what measure of concentration is the appropriate one to use in this context. Is it the concentration of immigrant students per se that is associated with poor outcomes? Or rather the concentration of students with specific characteristics or in schools with particular characteristics?



The Coleman Report (Coleman, 1966) was among the first studies which examined the effect of school context, in particular socio-economic status and ethnic composition, on attainment. The negative correlation between immigrant concentration and attainment has been the object of a number of other more recent studies since then (Felouzis, 2003; Portes and Hao, 2004; Szulkin and Jonsson, 2007; Dronkers, 2010), which have confirmed the Coleman results. Although some studies have attempted to look at possible causes and mechanisms (Cebello-Boado and Medina, 2011), including composition effects, none have considered whether alternative measure of concentration might be more strongly associated with immigrant outcomes than immigrant concentration per se.

As indicated in the data section of this chapter three measures of concentration have been examined and the student sample for each country divided into quartiles on the basis of the three concentration measures. The first quartile is defined to have a low value on the measure and the fourth a high value. By way of recall, a listing of the three measures is repeated here:

- the percentage of children of immigrants in a school;
- the percentage of children of immigrants in a school speaking another language at home; and
- the percentage of students (whatever the origin) in a school who have mothers with less than upper secondary attainment.

The objective is to examine the extent to which concentration measured in these terms affects student outcomes in general and those of the children of immigrants in particular.

Table B5.4 and Figures 5.8a and 5.8b provide summary statistics for these measures and in particular, on the percentage of all children of immigrants who are in the high-concentration quartile, according to the measures listed above, and what share they are of all students in the quartiles. The individual country data are presented in the annex tables and the average over country groups in the figures.

Note, first of all, that if the distribution of the children of immigrants across quartiles were the same as that for non-immigrants, each quartile would contain 25% of both children of immigrants and children of non-immigrants, and the share of the children of immigrants in each quartile would be the same as their share of all students. As is evident from the table and figures, the observed situation is rather far from this statistical ideal.

Not surprisingly, the highest concentrations of children of immigrants occur for those measures which are themselves based on immigrant characteristics and which tend to “push” those schools with higher percentages of children of immigrants into the higher quartiles. For example, in most of the country groups in Figure 5.8a, some 50% to 70% of the children of immigrants are in the high-immigrant concentration quartile. And some 30% to 60% of immigrant children are in the quartile where there is the highest percentage of students speaking another language at home.

▪ Figure 5.8 ▪

### Children of immigrants in the high-concentration quartile, by various measures of concentration

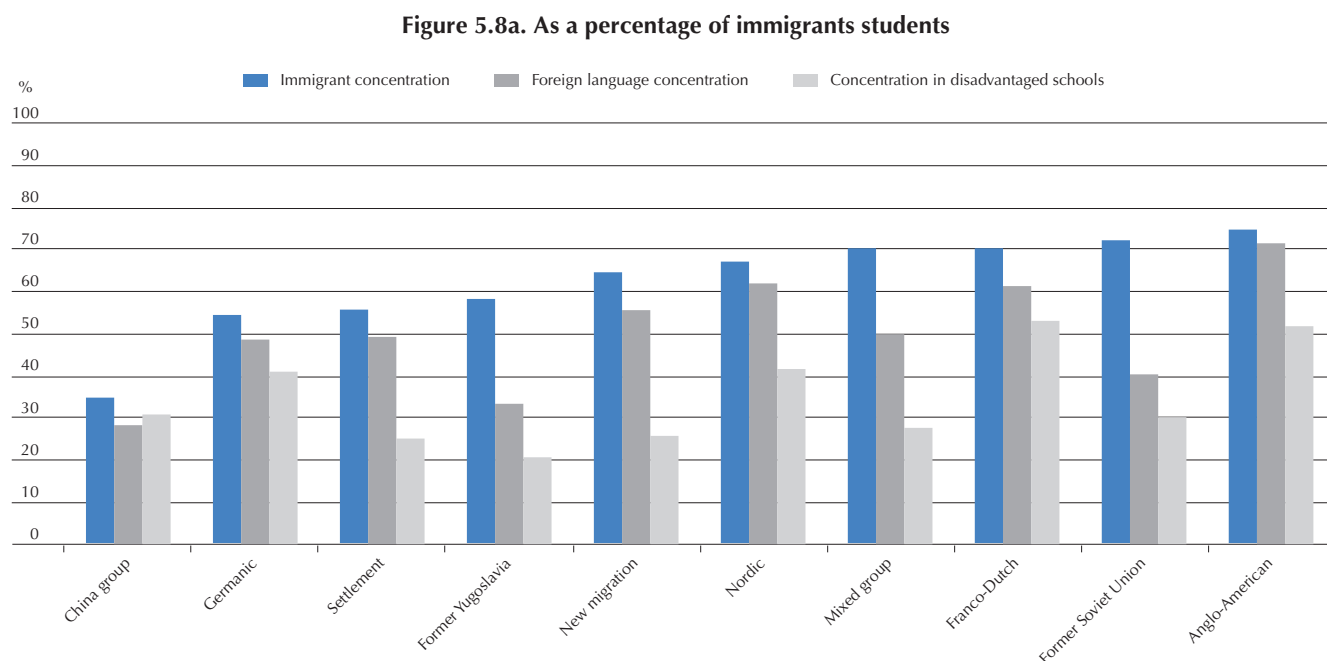
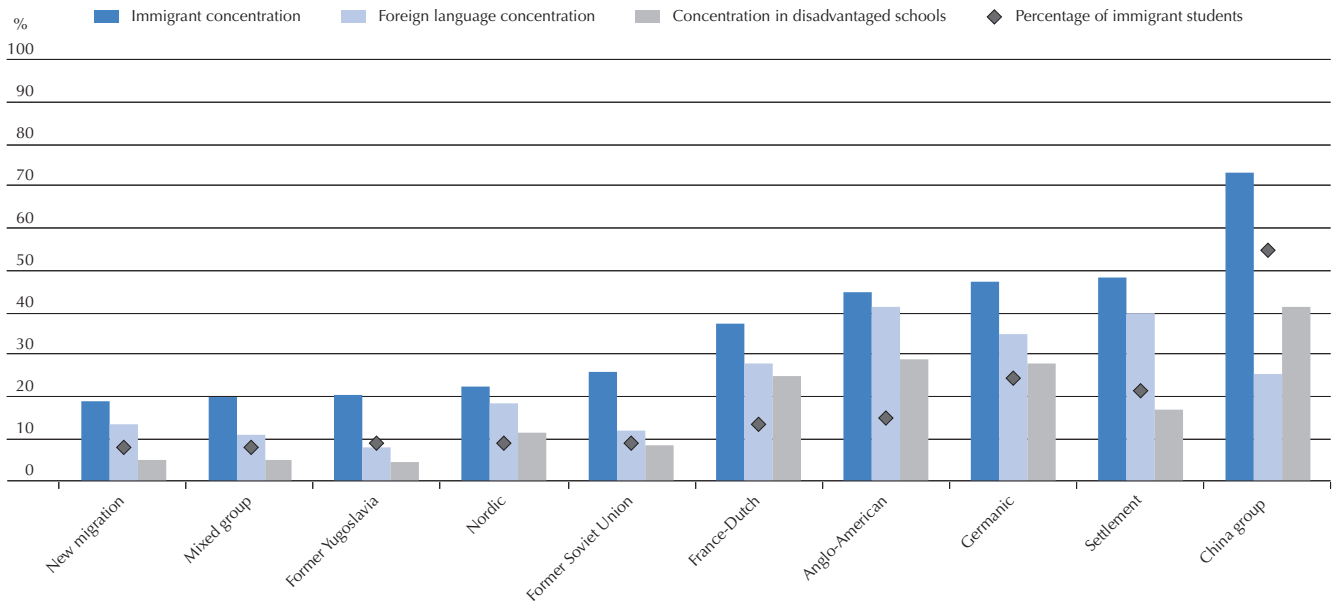




Figure 5.8

### Children of immigrants in the high-concentration quartile, by various measures of concentration (continued)

Figure 5.8b. As a percentage of all students in the quartile



Countries are ranked in ascending order of the immigrant concentration measure.

Source: Table B5.4.

The same sort of automatic “push effect” is not in principle present when the quartiles are defined on the basis of an exogenous measure such as the student’s mother’s education. For this case, which does not explicitly include any reference to immigrant characteristics, the fourth quartile also contains significant shares of immigrant students, ranging from as less than 15% in Portugal, in the partner economy Dubai (UAE) and the partner country Jordan, to over 55% in the Netherlands, with most European countries and the United States being at the high end of the range and the settlement and new migration countries at the low end under 30%.

What connection is there between the three measures? First of all, there tends to be a high concordance between immigrant and foreign language concentrations in the country groups composed essentially of OECD countries and, with the exception of the settlement and new migration countries, a smaller difference between these measures and that based on school disadvantage. Likewise, the settlement and Nordic groups of countries have low shares of the children of immigrants in the bottom quartile, whatever the measure (Figure 5.8a), than do other OECD country groups, as does the China group. Finally the bottom disadvantage quartile tends to show a lower share of the children of immigrants than the bottom quartiles for the other two measures.

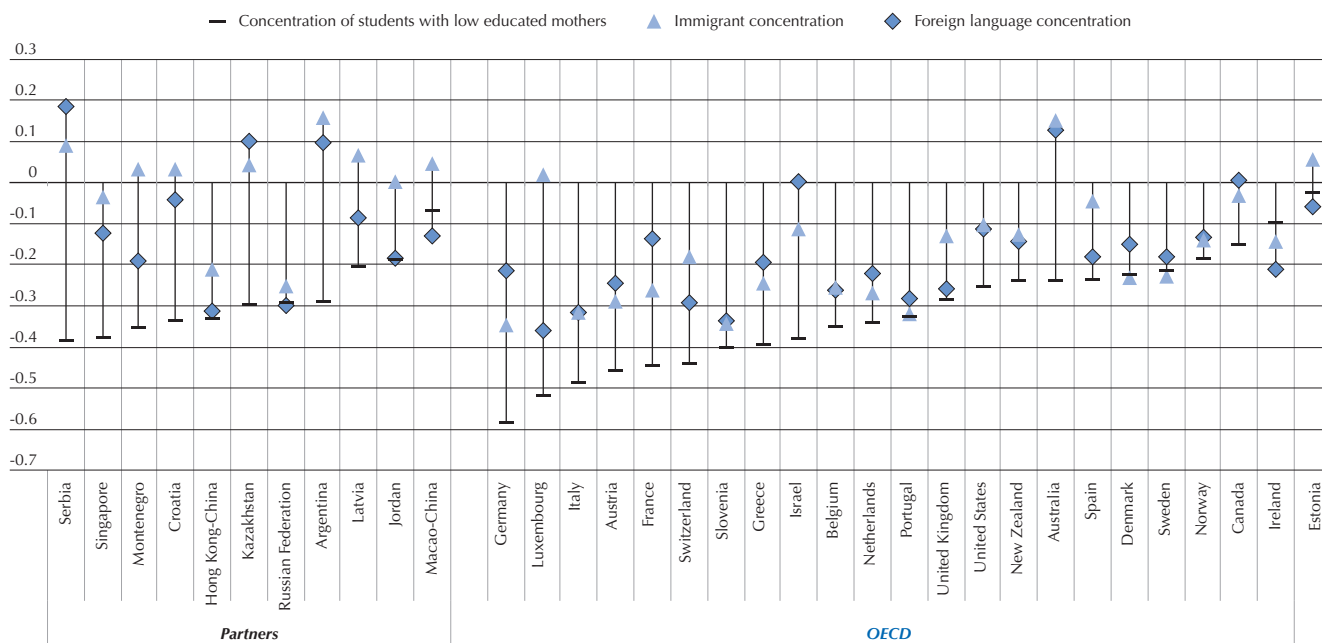
Note that only in some countries are children of immigrants overrepresented in the disadvantaged quartile, relative to their share of all students, in particular in the Nordic countries and the Germanic, Franco-Dutch and Anglo-American groups.

How close is the association between these various concentration measures and reading outcomes of the children of immigrants? Contrary to what one might have expected, it is generally the percentage of students from disadvantaged backgrounds (low educated mothers) in a school that is more highly (negatively) correlated with individual reading outcomes for the children of immigrants in almost all countries assessed (Figure 5.9). The percentage of children in a particular school who mostly speak a foreign language at home comes next in line, with the percentage of immigrants being the weakest covariate of the three. In many European countries, the association between immigrant outcomes and school disadvantage is especially high. The exceptions are the Nordic countries, Ireland, Estonia and Spain, although outcomes for children of immigrants in these countries are not always favourable compared to those of non-immigrant children.

In what follows the focus will be on the school disadvantage measure of concentration.

Figure 5.9

### Correlations between reading outcomes of children of immigrants and various measures of student concentration in schools



Countries are ranked in ascending order of the concentration of students with low educated mothers measure.

Source: Table B5.6.

## SCHOOL DISADVANTAGE, MATERNAL EDUCATIONAL ATTAINMENT AND READING OUTCOMES

As was seen earlier, in many countries the educational attainment of immigrants is lower than that of non-immigrants and the fact that one finds relatively more of their children in disadvantaged schools might be simply be a reflection of this. But the story is not so simple. A higher proportion of children of low-educated immigrants than of children of low-educated non-immigrants are in disadvantaged schools in most countries (Figure 5.10a). What is even more striking, however, is the even stronger overrepresentation of immigrant students of tertiary-educated mothers in disadvantaged schools in many countries (Figure 5.10b). In a number of countries, there are in relative terms more than twice as many students of highly-educated parents of immigrant than of native origins in disadvantaged schools. Recall that the disadvantage quartiles are characterised not by immigrant characteristics but rather by maternal educational disadvantage. The question then is: why the overrepresentation in disadvantaged schools, at all parental educational levels?

The primary determinant of the socio-economic composition of a neighbourhood is housing costs, and some arriving immigrants may not always have the luxury of choosing their housing freely, either because of more limited funds, lower salaries or because of discrimination in the housing market. The choice of a neighbourhood may initially be motivated as much by the wish to be living near co-nationals or co-ethnics as by the affordability of housing. The two are often linked. The initial choice of housing may not be seen as definitive by the migrant, but may become so because of persistent low income or discrimination in housing, a reluctance to move from what has become a familiar environment, or simply inertia, among other reasons.

It is known, for example, that highly-educated immigrants tend to be more often overqualified for the jobs they are doing than is the case for non-immigrants (OECD, 2007). Over qualification is likely to be associated with lower salaries, which would precisely make it more difficult to find housing in less disadvantaged neighbourhoods. It is indeed generally the case that immigrant students in disadvantaged schools as well as those with highly educated parents are more often from low-occupation status families than students whose parents are non-immigrants (Figure 5.11).<sup>14</sup>

This suggests that a closer examination of the impact of attending a disadvantaged school may be warranted, in particular the impact at different maternal educational attainment levels.



Figure 5.10  
Students by mother's education in disadvantaged schools

Figure 5.10a. As a percentage of all students with mothers having less than upper secondary education

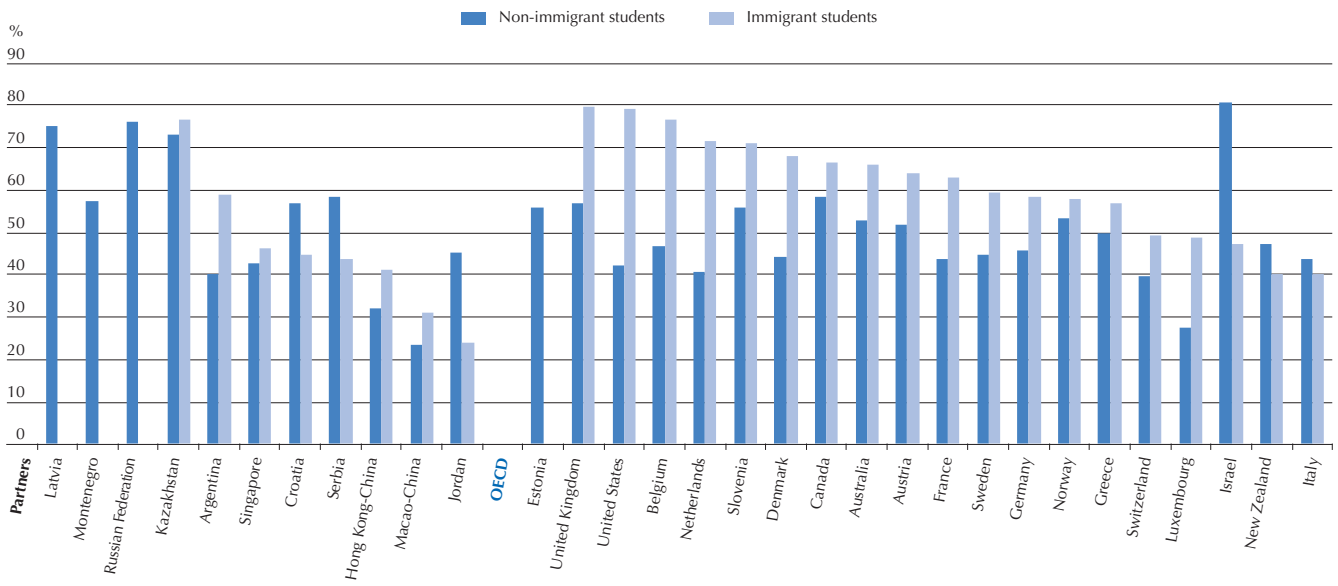
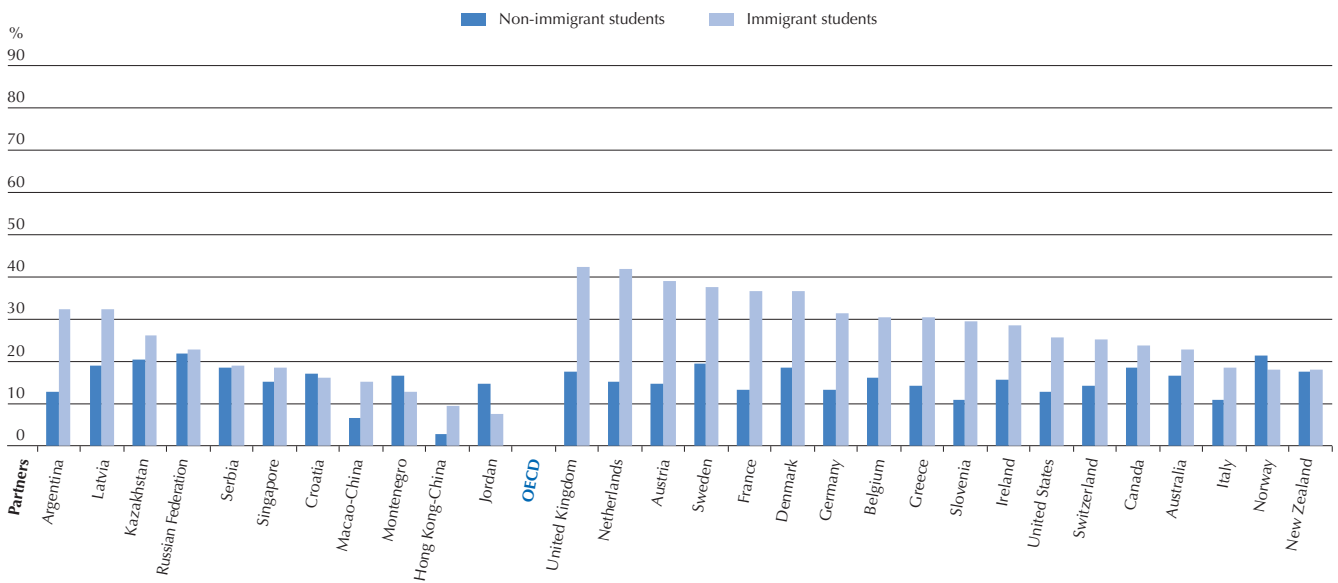


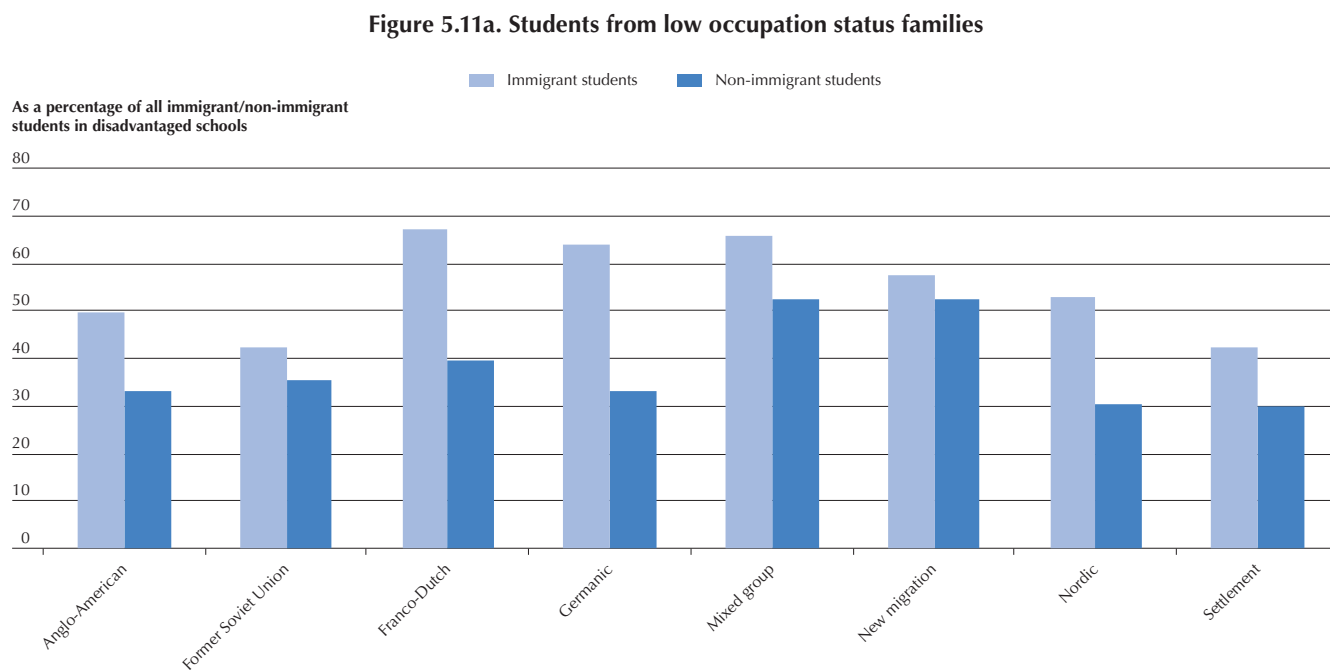
Figure 5.10b. As a percentage of all students with tertiary-educated mothers



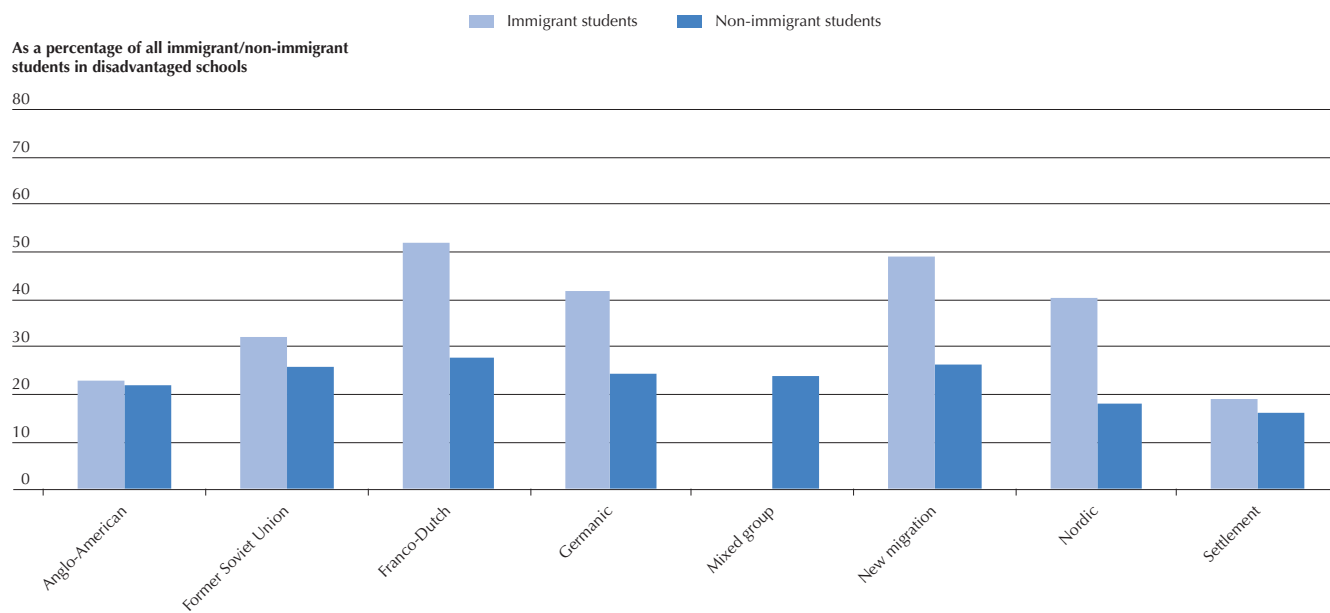
Countries are ranked in descending order of the percentage of immigrant students.

Source: Table B5.7.

Figure 5.11  
**Students in disadvantaged schools from low occupation status families**



**Figure 5.11b. Students with tertiary-educated mothers from low occupation status families**



Note: Low status occupations are those with an ISEI (International Socio-Economic Index of Occupational Status) index value lower than 40.

Source: Table B5.8.



Two questions will be addressed by the analysis which follows:

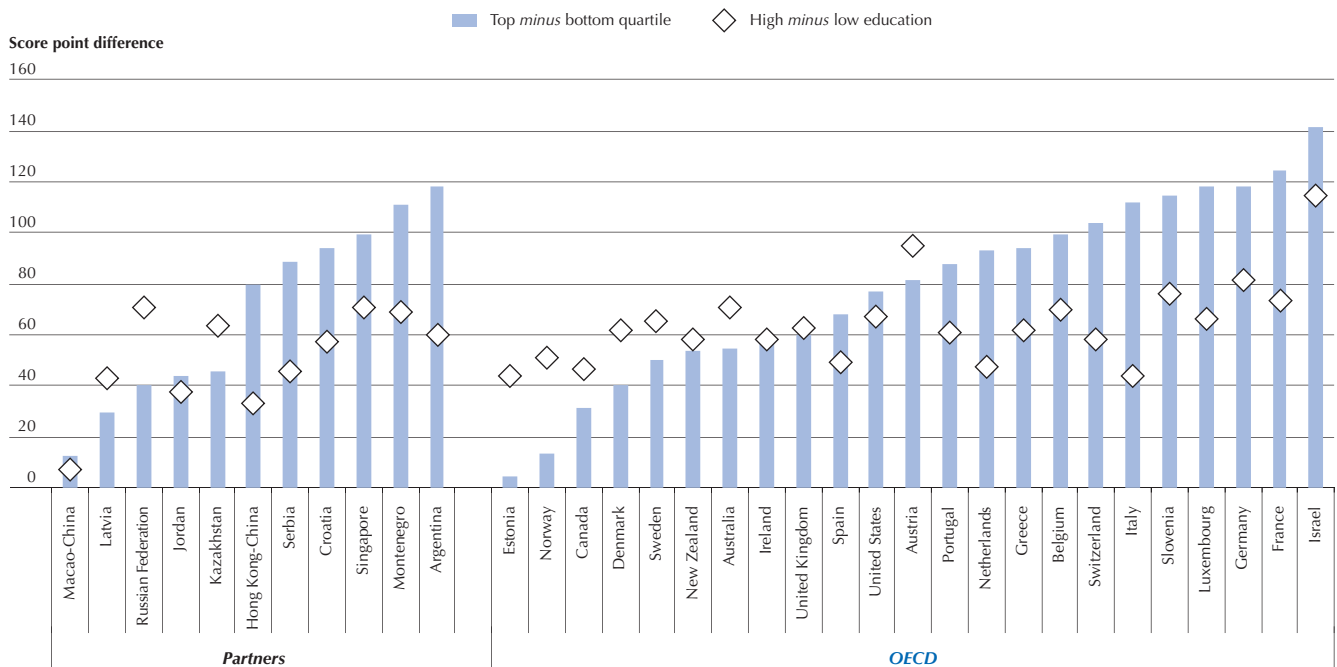
1. What is the association between school disadvantage and reading outcomes overall and by educational attainment of the mother? Can the fact that a mother is highly educated compensate for attendance of their children at disadvantaged schools?
2. Is there an immigrant-specific effect of school disadvantage on outcomes?

For these analyses, individual national samples in PISA are not always equal to the task of examining reading outcomes by both the mother's attainment and the school disadvantage quartile together. This necessitates examining results by the country groupings described earlier, although even here, some cells have had to be suppressed because of insufficient samples.

Figure 5.12 contrasts reading-score differences between students who live in advantaged versus disadvantaged school quartiles and students with high- versus low-educated mothers. The comparison pertains to all students, not only students of immigrant background, to give a general picture of how well national educational systems address educational disadvantage in general. For many countries, the picture is not always a positive one.

▪ Figure 5.12 ▪

### Difference in scores between students in the top or bottom school disadvantage quartiles and those with mothers who have high or low education, all students



Countries are ranked in as ascending order of the difference between top and bottom quartile.

Source: Table B5.9.

Indeed, for many, whether they are OECD member countries or not, the “penalty” associated with attending a disadvantaged school is much larger than the difference in reading scores between students with high- versus low-educated mothers. The school disadvantage effect is often substantially stronger than the family background effect. In some countries, among them Italy, France, Germany, Slovenia, Luxembourg and Israel, the school disadvantage effect is almost twice as strong. There are very large differences in scores between schools where there are many students of low-educated parents and those where there are very few. In the Nordic countries, the settlement countries (except for the United States, Estonia, the United Kingdom and Ireland) it is generally the reverse situation, that is, the effect of parental educational attainment is more important.

Note that this is not a pattern that is unique to children of immigrants or to certain countries. It appears to hold for both children of non-immigrants as well as children of immigrants, for all country groupings and at all educational levels (Figure 5.13). Note the magnitude of the disadvantage effect (top quartile score minus bottom quartile score) across country groups, for example about 70 points for students of tertiary-educated mothers in the settlement-country group and about 120 points in the Franco-Dutch and Germanic groups (Table B5.9).

Figure 5.13

### Reading outcomes of students in advantaged and disadvantaged schools, by educational attainment of mother and immigration status

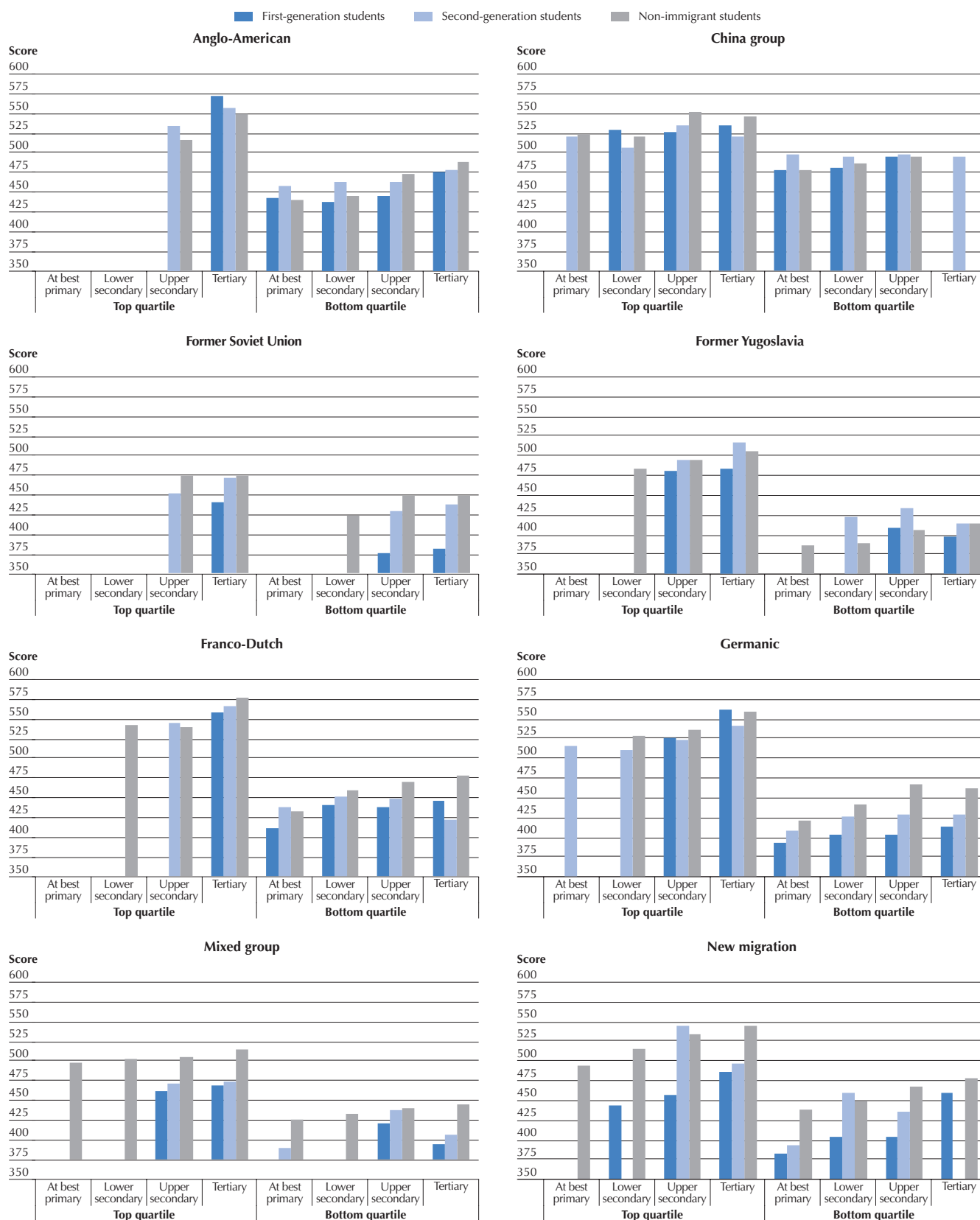
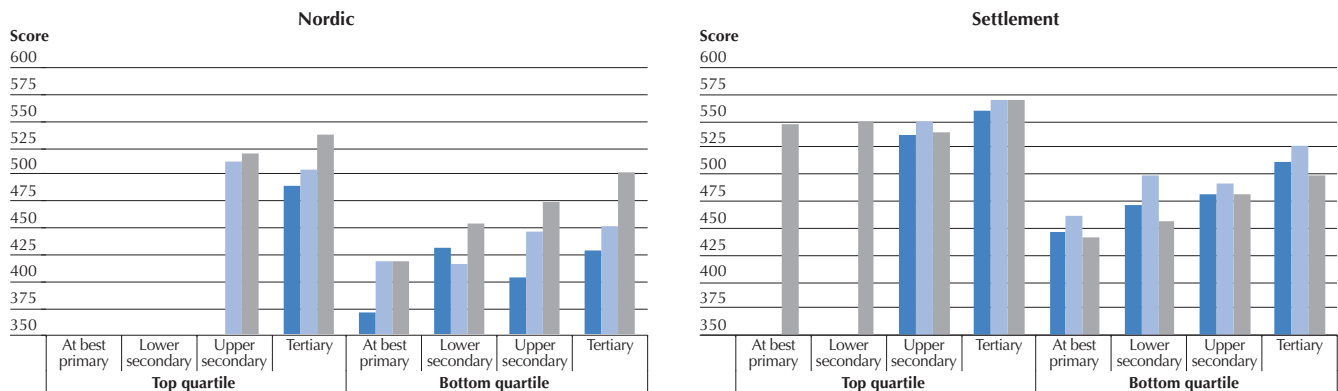






Figure 5.13

### Reading outcomes of students in advantaged and disadvantaged schools, by educational attainment of mother and immigration status (continued)



Notes: Estimates for which sample sizes were insufficient to ensure a reliable estimate were suppressed.

Source: Table B5.10b.

There is still an advantage conveyed by having well-educated parents if one attends a disadvantaged school, but it comes in an environment where the average performance of students is far lower. On average, school disadvantage trumps parental advantage every time. School disadvantage appears to effectively lower the outcomes for everyone and perhaps more so for those from a more favourable background. By the same token, in schools where there is less disadvantage, results for students from less favourable backgrounds may improve as well. This may be the explanation behind the flattening of the education gradients cited earlier, in countries where results for children of immigrants are good as well as in those countries where they are lower.

Is there an immigrant-specific effect of concentration, that is, is attendance in a disadvantaged school worse for the children of immigrants than it is for children of non-immigrants? One might expect this to be the case, since lower proficiency in the language of the host country may compound the disadvantage “penalty” and not all immigrant students have spoken the language from an early age, nor is the host-country language necessarily spoken often in the home environment.

Table B5.5 summarises the results of a simple modelling exercise that seeks to estimate this. Since the concentration criterion is based on a measure of educational attainment (of students’ mothers), the estimates are provided adjusting for both parental educational attainment as well as for attendance in vocational education, which may also have the effect, in practice if not in intention, of concentrating students from low-educated families in the same schools.<sup>15</sup>

Figure 5.14 summarises the results. All but the new-migration and settlement country groups show the negative effects of the concentration in disadvantaged schools for the children of immigrants. Adjusting for this improves their scores compared to children of non-immigrants by about 9 points, which is somewhat less than the gain attributable to controlling for parental education itself.

But there is also an immigrant-specific effect for these same country groups, that is, the effect of school disadvantage is even more negative for children of immigrants than it is for children of non-immigrants. And removing this effect improves the scores of immigrant students by an additional 10 points on average, compared to non-immigrant students.

If concentration effects seem to have immigrant-specific effects in some educational systems, it is clearly not only the structure of the educational system as it exists for 15-year-olds that is at issue, but much more fundamental issues involving housing policy, school choice and social mix in the classroom, which exert effects at a much earlier stage in the educational system. This makes the question of addressing school disadvantage a particularly difficult one.

The policy choices available to address the issue of disadvantage are diverse. One can attempt to overcome the adverse effects of concentration by investing more in disadvantaged schools. There are a number of ways in which this could be done, such as attempting to attract better teachers, reducing class sizes, and providing additional remedial or tutoring help. Whether these measures would be effective for 15-year-old immigrant students is a point of debate. It is likely that intervention would need to occur much earlier, perhaps even at the pre-primary level. And some attempts to increase funding in disadvantaged schools have not always yielded the expected returns (Bénabou, et al., 2004).

Other policy options would aim to reduce concentration itself, for example through a broader dispersal of subsidised low-cost housing or through school-choice policies. Such policies are broad in scope and would have implications for other, less

disadvantaged neighbourhoods and schools. Again, these would undoubtedly be more effective if implemented early in the school trajectory. School-choice policies could quickly become controversial if, for example, they involved a departure from neighbourhood schools for young children.

The choices here are not simple ones. Increasing funding for disadvantaged schools may be politically the most feasible measure, but perhaps not the most effective. It is clear from Figure 5.11 that attending a disadvantaged school has on average an adverse effect on all students, whatever their origin and whatever the educational attainment of their mothers. If the concentration of disadvantage is not an immigrant-specific phenomenon, immigrant students are still more affected, simply because a higher proportion of them come from disadvantaged families. Addressing the issue of school disadvantage for immigrant students in practice would mean addressing it for all students. This, however, is an objective that goes beyond the immediate goal of successful integration of immigration children.

▪ Figure 5.14 ▪

### Differences in reading outcomes between immigrant and non-immigrant students adjusting for concentration of disadvantage at the school level

Figure 5.14a. First-generation and non-immigrant students

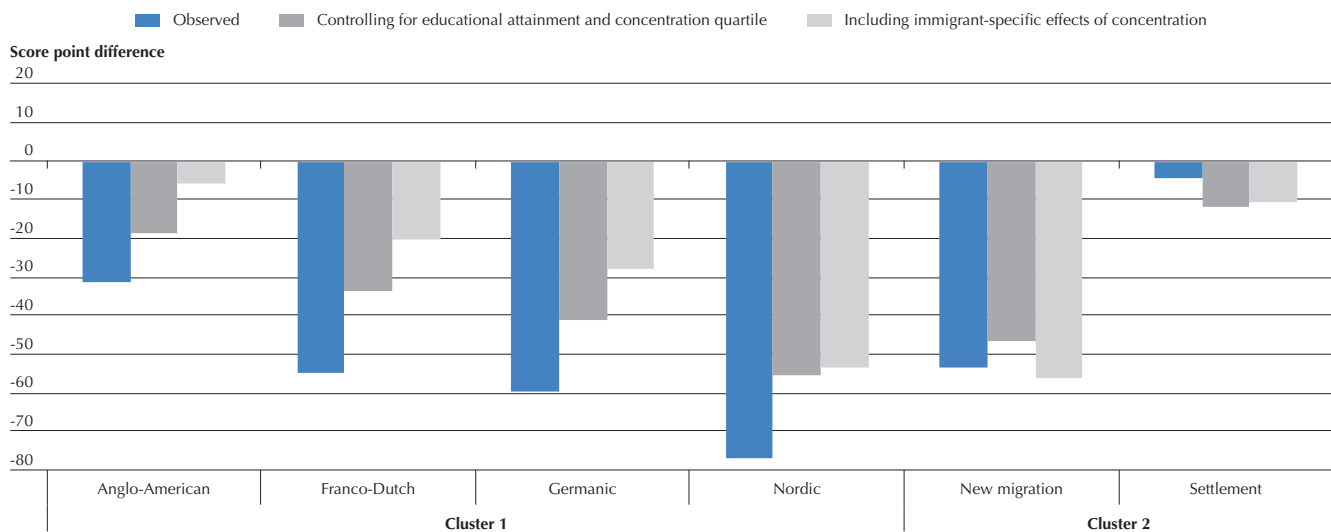
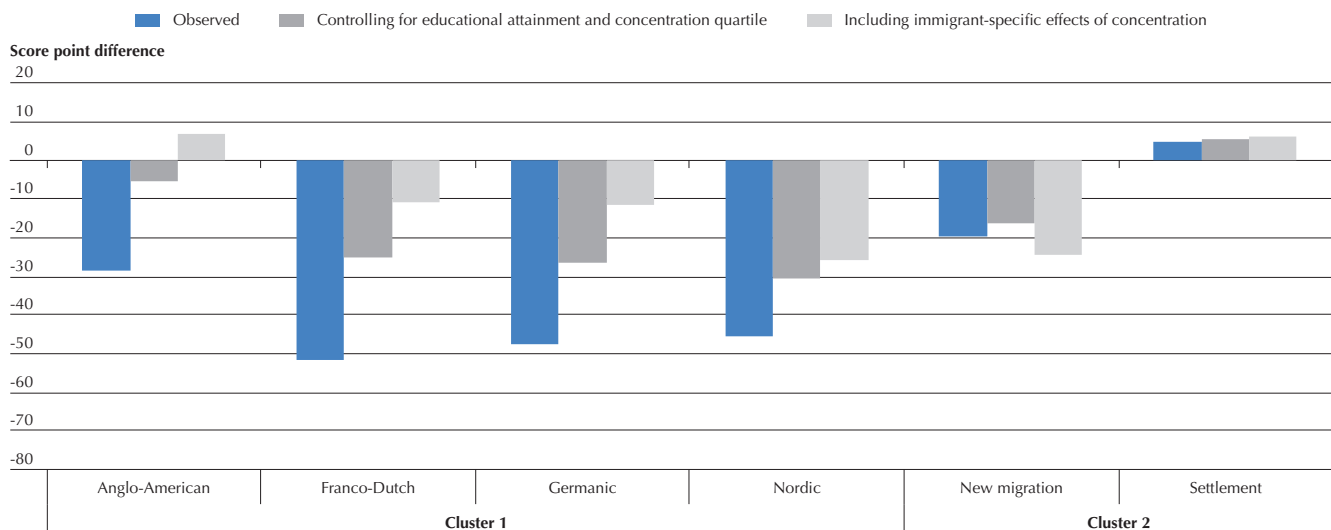


Figure 5.14b. Second-generation and non-immigrant students



Source: Table B5.5



## SUMMARY AND CONCLUSIONS

Countries where children of immigrants show less-favourable outcomes tend to have immigrant populations that are poorly educated and tend to show a higher-than-average concentration of these children in disadvantaged schools. This is true regardless of the parents' educational attainment, and seems unlikely to be a consequence of parental choice. It may reflect the fact that parents of students in disadvantaged schools, including those with a tertiary education, tend to have low occupational status, and the lower income this implies may limit their housing and schooling choices.

School disadvantage has a substantial negative effect on reading outcomes, regardless of the parents' level of education; in some countries immigrant children's unfavourable outcomes are as strongly related to the proportion of immigrant children in schools as to low parental attainment levels. This is observed even when attendance in vocational programmes has been accounted for. These results raise much broader questions concerning the mechanisms and processes that tend to concentrate disadvantage in geographically distinct areas. These exist in all societies and are generally income-related, but they appear to have a particularly penalising effect on immigrants in some countries.

One notable observation based on the analyses described in this chapter is that immigrant-specific effects are everywhere. The immigrant condition is characterised precisely by differences compared to the native-born population. The objective of policy is to ensure that over time, these differences are reduced and that social and economic outcomes of immigrants are similar to those observed for the non-immigrant population. Children of immigrants, however, are not necessarily immigrants themselves, and even those born abroad may have arrived at an early age. Still, the immigrant experience clearly has an effect on them, even when they have been fully educated in the host country. The outcomes observed at age 15 would thus appear to reflect the influence of the home and school environments from an early age. If interventions are to address disadvantage effectively, they need to redress early imbalances.

The focus on the convergence of (or inequality in) outcomes for immigrants and their children is important, but so is attention to the processes that "generate" those outcomes. Mainstream structures and institutions do not always seem to have quite the same impact on children of immigrants as they do on children of non-immigrants. Examining the specific impact of policies, socio-economic factors and institutions on immigrants and their children is one avenue of approach that merits a closer look.

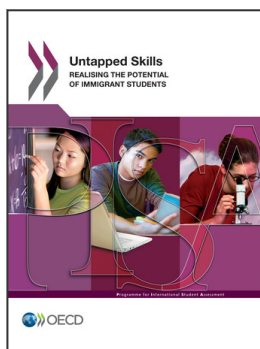
### Notes

1. Past migration tends to have a significant influence on the composition of future migration, because knowledge of opportunities and of possible impediments is transmitted back to origin countries, which tends to facilitate migration from the same sources. Past migration to the United States has generally been skill-biased, which has undoubtedly contributed to maintaining this, despite the fact that it has been largely family based, rather than skill selected. Much current irregular migration to the United States, on the other hand, tends to be of lower educated migrants, which has resulted in an immigrant population of lower attainment than in the past.
2. Labour force survey estimates suggest lower percentages of immigrants with low levels of education, but the latter had on average more children than those with higher levels.
3. The term "immigrant children" will be used throughout this chapter to mean "children of immigrants"; it may thus include students whose parents were born abroad but who were themselves born in the country. Likewise the term "native" will be used to designate the children of native-born parents.
4. The usual definition of first- and second-generation here is being used, that is, persons born abroad/in the country, respectively, of two immigrant parents.
5. The cut-off rule applied is that an estimate must be based on at least thirty observations from at least five schools in order to be published.
6. If the mother's education was missing or there was no mother in the household, the father's attainment was used.
7. The Cluster procedure in SAS<sup>®</sup>, using average linkages.
8. Four "outlier" countries were excluded from the exercise, whose immigrant populations are unusual in a number of respects. They are Brazil and Mexico where the immigrant populations are very small and where children of immigrants have very poor PISA results compared to children of the native-born, and Dubai (UAE) and Qatar, where the situation is at the other extreme, with very large immigrant populations (close to or greater than 50% of the total population) and reading outcomes for children of immigrants that are far superior to those of children of the native-born.
9. The attainment differences are measured in terms of the percentage of students with mothers who have at least upper secondary education.
10. Only countries for which the sample size for the immigrant subgroup was at least one hundred were retained for these tables.

11. See note to Figure 5.1.
12. By gradient here, we mean, roughly speaking, the general slope of the maternal education / reading assessment curve.
13. The term district here is used in a very broad sense, recognising that educational policies may be determined at the national, regional or even municipal level.
14. In this context, low occupation status is defined as an HISEI less than 40, which roughly corresponds to service workers (other major groups included are agricultural workers, production and related workers, transport equipment operators and labourers). Occupational data for both the student's father and student's mother were obtained by asking open-ended questions. The response were coded to four-digit ISCO codes (ILO, 1990) and then mapped to the international socio-economic index of occupational status (ISEI) (Ganzeboom, et al., 1992). Three indices were obtained from these scores: father's occupational status (BFMJ); mother's occupational status (BMMJ); and the highest occupational status of parents (HISEI) which corresponds to the higher ISEI score of either parent or to the only available parent's ISEI score. For all three indices, higher ISEI scores indicate higher levels of occupational status. For more info, see: <http://arno.uvt.nl/show.cgi?fid=63721>.
15. Vocational schools are defined by means of the ISCEDO variable, as ISCEDO=2 or 3. PISA 2009 collected data on study programmes available to 15-year-old students in each country. This information was obtained through the student tracking form and the student questionnaire. In the final database, all national programmes will be included in a separate variable (PROGN) where the first three digits are the ISO code for a country, the next two digits are the sub-national category, and the last two digits are the nationally specific programme code. All study programmes were classified using the International Standard Classification of Education (ISCED). The following indices are derived from the data on study programmes: programme level (ISCDL) indicating whether students are on the lower or upper secondary level (ISCED 2 or ISCED 3); programme designation (ISCEDD) indicating the designation of the study programme (A = general programmes designed to give access to the next programme level, B = programmes designed to give access to vocational studies at the next programme level, C = programmes designed to give direct access to the labour market, M = modular programmes that combine any or all of these characteristics; and programme orientation (ISCEDO) indicating whether the programme's curricular content is general, pre-vocational or vocational.

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