



# **A Cross-national Analysis of the Relations between School Choice and Effectiveness Differences between Private-Dependent and Public Schools. A New Approach**

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# Cross-national Analysis of the Relations between School Choice and Effectiveness Differences between Private-Dependent and Public Schools. A New Approach<sup>1</sup>

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## Abstract

We present a new approach to measuring school effectiveness. We apply propensity score matching to control for the selectivity of the school-choice in our estimation of effectiveness differences between public and private-dependent schools in 26 countries. We use pooled waves of PISA 2000, 2003 and 2006 for all countries which had sufficient private-dependent secondary schools. The reading score is our dependent variable. The results show that the distinction between the processes of school choice and school effectiveness is important for a valid estimation of the differential effectiveness of private-dependent schools in comparison with public schools. We found two sets of factors influencing the choice of private-dependent schools: a *choice of the upward mobile parents for private schools* and *segregation by (lower-) middle class parents*. Pupils at private-dependent schools in 10 countries have higher reading scores than pupils on public school, after taking into account the selectivity of school-choice, while in two countries pupils at private-dependent schools have lower reading scores than pupils in the public sector. Our analyses do not support any neo-liberal claim of a higher effectiveness of private-dependent schools in all countries, and also contradict the outcomes of Dronkers & Robert (2008) that private-dependent schools in all countries are more effective. But the higher effectiveness of private-dependent schools in a large minority of countries can not be explained by selectivity as a consequence of school choice processes.

## 1. Introduction

The differences in scholastic achievement of public and private schools have been the topic of a large number of studies in the educational sciences, sociology and economics, mostly in the USA but also to some extent in Europe. In this literature, the distinction between public schools, private government-dependent schools and private-independent schools is particularly important for three reasons. Firstly, in many countries these three types of schools exist alongside each other, especially in continental Europe where their coexistence emerged as the unintended outcome of the 19<sup>th</sup> century struggle around school ownership and financing between the State and Church(es). Secondly, the functions of these three types of schools can differ significantly, depending of social, religious or ethnic groups that charter these types of public and private schools. Thirdly, the distinction between public schools and private government-dependent schools also relates to current policy debates about the organization, provision and financing of collective goods like education.

Since the '80s, Anglo-Saxon countries have experienced a renewed debate around school choice and school effectiveness, driven by neoliberal ideas. Parental choice and state-funded private schools are often advocated in the United States as a means of introducing competition for pupils among schools and decreasing the level of bureaucracy, thereby improving the quality of teaching and reducing the cost of education (Chubb & Moe, 1990). Another argument used in the American context states that schools should offer young people an education that is in accordance with the way of life of their parents. This latter line of reasoning comes closer to the

European tradition of government dependent religious schools (Godwin & Kemerer, 2002). The developments taking place in the United States influenced the discourse on the relation between public and private schools in Europe (especially in the UK and Scandinavia, where fully subsidized private schools were rare, but also in countries like Belgium, Germany, France and the Netherlands where subsidized private schools had been established long before the rise of this neoliberal discourse on the effectiveness of public and private schools).

The neoliberal discourse on public and private schools makes any differences in the effectiveness of public and private schools an important research question. The debate started with the study of Coleman, Hoffer & Kilgore (1982), which claimed that catholic schools in the USA had a higher effectiveness than public schools. This study was the start of a huge and still ongoing debate and research in the USA on public and private schools, subsidized chartered schools, potential state subsidizing of religious schools and parental school choice. Coleman and Hoffer (1987) and Bryk, Lee and Holland (1993) provided comprehensive follow-up studies. Dronkers (2004), meanwhile, reviewed the empirical evidence of scholastic achievement differences among public, Catholic and Protestant schools in Europe.

A less clamorous line of debate on public and private schools is centered on the survival (or even the rise) of religious schools in continental Europe (but also in Australia). Despite the decreasing relevance of church and religion in the daily life of most European societies, the religious schools in these societies have not dwindled away. On the contrary, the religious school sector in societies with somewhat inactive religious populations is either growing or strongly over-represented (France: Langouët and Leger 1994; Germany: Dronkers, Baumert & Schwippert, 2006; The Netherlands: Dijkstra, Dronkers & Karsten 2004). This holds not only for those societies where such religious schools were present traditionally (France, the old German Länder, The Netherlands) but also for those societies in which religious schools had been abolished during the communist regimes (like Hungary, see Dronkers & Robert, 2004). A possible explanation is that religious schools are generally more effective in their teaching than public schools. While religious schools no longer aim for the religious socialization of their pupils, they still try to reach more non-cognitive educational goals that are valued by non-religious parents as well. A better educational administration, a stronger value-oriented community encompassing parents and schools and a more deliberate selection policy of religious schools might be the most important mechanisms in producing the higher average effectiveness of religious schools in Europe.

Given the cross-national differences in selectivity of public and private schools, we propose in this paper a new approach, by explicitly disentangling school choice processes from school-effectiveness.

## **2. International comparisons**

Although the differences in scholastic achievement of public and private schools is relevant for nearly all developed countries, little cross-national research has been conducted on the differences in scholastic achievement of public and private schools, which distinguish between private-dependent and private independent schools (see as an example of such a neglect Vandenberghe & Robin, 2004).

Dronkers & Robert (2008) have conducted a systematic comparison of the effectiveness of public, private-dependent and private-independent schools in 22 OECD countries, using PISA 2000 data. They found that the main differences in the gross scholastic achievement of private and public schools in these 22 countries can

be explained by differences in their student intake and by the related differences in school composition. But their analysis also shows that private government-dependent schools have a higher net scholastic achievement in reading than comparable public schools with the same students, parents and social composition. The explanation is the better school climate in the former, in comparison to the latter. The different administrative, learning and teaching conditions in private government-dependent and public schools do not explain differences in this net scholastic achievement. This is not to say private government-dependent schools do not have a more favorable student intake. On the contrary, differences in the social composition do exist and they explain the largest part of the higher gross educational outcomes of their students. However, even after factoring in student background and school composition, the achievement of students in private-dependent school is significantly higher than that of their counterparts in public schools. The private-dependent school advantage is largely due to enhanced school climate that students experience in this type of school. Another analysis of the same PISA 2000 data (Corten & Dronkers, 2006) suggests that private government-dependent schools are more effective for pupils from families with low levels of cultural possessions. They found no indication that private government-dependent schools were more favourable for children from higher social strata.

Finally, the effects of private government-dependent schools have been found to be more or less equal in the various countries (Dronkers & Robert, 2008: 32-33). Put differently, none of these countries are exceptional or deviant regarding the difference in educational outcomes between their private government-dependent schools, in spite of divergence in the historical background, in the origin of their non-public school sector and in their current constitutional arrangements. This universal effect of private government-dependent schools suggests that these differences in scholastic achievement may be a consequence of post-industrial societies, wherein education has become a major dimension of inequality, alongside occupation and wealth. In these societies, formal and informal school choice may have become an important means for social mobility, and private government-dependent schools, whatever their history, have, on average, a better school climate and thus a relatively higher net scholastic achievement. This universal aspect of education and its functioning in modern societies has been noted for many countries by Meyer, Boli, Ramirez and their associates (see for instance, Ramirez & Boli 1987).

### **3. Unmeasured selectivity of school choice and school effectiveness**

The literature on the possible causes of scholastic achievement differences among schools is extensive. Although we cannot exhaustively review this literature, we draw on the most recent overviews (Sammons, Hillman, & Mortimore, 1995; Scheerens & Bosker, 1997; Teddlie & Reynolds, 2000). The main problem encountered when trying to assess the school effects on achievement resides in the unknown unmeasured selectivity of choosing a private school instead of a public one. Analyses in the school effectiveness tradition (Dronkers & Robert (2008) follow that tradition) assume that the measured parental and pupil variables will control for this unmeasured selectivity of school choice. This assumption might be correct if one compares only the effectiveness of public schools which have fixed catchment-areas and where free parental school choice is virtually non-existent. But this assumption is questionable if it is applied to the choice between public and private schools, even in societies in which the choice between public and private government-dependent schools is hardly influenced by school fees (like the Netherlands). The ability and the willingness of

parents to pay considerable fees for private schools introduces without any doubt unmeasured heterogeneity, which might or not might be solved by the measured parental and pupil variables (even when these control variables are as rich and abundant as in the PISA data).

Therefore, we propose in this paper a new approach, by explicitly disentangling school choice processes from school-effectiveness. In a first step, we estimate the likelihood of choosing a private-dependent school rather than a public one. The result assigns to each pupil a propensity score of choosing a private rather than a public school, based on the characteristics of the pupil, her parents and the visible and quasi permanent features of the chosen school. The second step of this new approach consists of estimating the effectiveness of non-public schools, based on a matched sample of pupils with similar propensities of choosing a private or a public school.

In this paper, we focus on the choice between public and private-dependent schools (basically private schools which get their financial resources mainly from the national, regional or local governments of their country) and to the corresponding differences in school effectiveness in the cognitive domain (reading). In subsequent studies, we will compare the choice/effectiveness gaps between public and private-independent schools, as well as compare school effects concerning student attitudes.

#### **4. A new approach to disentangle the relations between choice and effectiveness**

The distinguishing between the analysis of school choice processes and the analysis of school-effectiveness can be done using a method called propensity score matching.<sup>2</sup> It is a relatively new method in the field of educational sciences, although it has been used for several decades in other fields, particularly in economics (see Rosenbaum & Rubin, 1983, for one of the original pieces in this method and Dehejia & Sadek, 2002, for a more recent review). The technique approximates a quasi-experimental design with secondary data by comparing individuals in a “treatment group” (in this case, pupils in private schools) to those in a “control group” (pupils in public schools) who have a similar likelihood of experiencing the treatment according to observable characteristics. This comparison is accomplished by using a logistic regression to estimate the propensity that the pupil will choose a private school. The propensity score is defined as follows (Rosenbaum & Rubin, 1983):

$$P(T) \equiv \Pr \{T = 1/S\} = E\{T/S\}$$

where  $p(T)$  is the propensity of choosing a private school,  $T$  indicates that the pupil did or did not choose a private school (the treatment) and  $S$  is a vector of covariates influencing the private school choice. The resulting propensity score is used to match pupils who did with those that did not choose private schools, our treatment and control groups, on shared observed covariates. Using propensity score matching, the mean estimated differences in academic achievement between the two groups, the average achievement effect for the treated, represents the effect of attending a private school on educational achievement among pupils who do and do not attend a private school but who have similar propensities of attendance on the basis of observable characteristics.

We want to stress that propensity score matching techniques are not a “magic bullet”. They only account well for selection and endogeneity if two assumptions are met. First, all observable variables influencing both the treatment – school choice - and the outcome – academic achievement- must be included in the propensity score

model, i.e. there has to be conditional independence. Second, selection processes have to be captured well by variables predicting the propensity to experience the treatment of interest. But these issues arise no matter what method one uses, even the simplest. Thus, when comparing different modeling strategies, it is important to remember that every method has its own limitations. OLS regression analysis (which is most commonly used in school effectiveness analysis, multi-level models included) estimates the average treatment effect of school choice for the full sample when controlling for the other covariates. Propensity score matching restricts the available sample to treated and untreated cases that have comparable propensity scores. If there is no considerable overlap in the propensities of those in the treatment and the control group (like in most of our countries) the differences in educational achievement will not reflect the average treatment effect of school choice for the full sample, but only for a selective part of the pupils of these countries, namely those who have the possibility to make a choice. From this perspective, the results of propensity score matching presented here should be seen as complementary to the earlier results, obtained through OLS regression.

The great advantage of using propensity scores lies in the fact that matching is performed on only one dimension instead of the all the variables on which the propensity score is computed (in this case, 15 pupil and school variables). Because of the large number of predictors, matching on all of the variables simultaneously would be virtually impossible. However, the same propensity score may result from very different values on the predictor variables entered in the logistic regression through which the propensity score is estimated.<sup>3</sup> To account for this possibility, a more sophisticated propensity matching has been performed using both the propensity scores and the Mahalanobis distance. The algorithm involves two steps. The first one works by selecting all the control cases (in this case, pupils attending public schools) that have a propensity score within a range of a quarter of a standard deviation below or above each treatment case (in this case, pupils attending private-dependent schools). In a second step, for all the selected control cases in the previous stage, a Mahalanobis distance is computed based on five variables (highest parental education, highest parental occupational status, family wealth, immigration status and cultural possessions index). These five variables have been chosen based on theoretical considerations, i.e. they are thought to play a particularly important role in school choice selectivity. Eventually, the control case with the lowest Mahalanobis distance is chosen as a match. This type of matching allows for a greater weight to be assigned to the variables included in the Mahalanobis distance matching. Simultaneously, it ensures that pupils attending public schools match (as close as possible) pupils attending private-dependent schools not only on the propensity scores but also on the five social background variables on which the Mahalanobis distance is computed.

There are very few applications of propensity score matching in the educational sciences, but the first dates back more than 20 years and is used for the same topic: effectiveness differences between public and catholic schools in the USA (Hoffer, Greeley and Coleman, 1985).

## **5. Data and Methods**

Our analyses are carried out using the PISA survey. This dataset has the particular advantage of offering information both on school boards and funding sources. Thus, it enables the distinction between all of the three school types mentioned above, namely public, private government independent and private government dependent.<sup>4</sup> Other data-sets like TIMSS and PRILS allow only for the distinction between public and

private schools and are, thus, less useful given the already established differences in effectiveness between private government-independent and private government-dependent schools (Dronkers & Robert, 2008). We restrict ourselves in this paper to public and private-dependent schools.

Three waves of the PISA survey have been carried out so far, in 2000, 2003 and in 2006. Use has been made of all three waves by pooling them into one database.<sup>5</sup> This strategy allows us to maximize the number of private-dependent schools present in the database. We selected all the countries in Europe, other industrialized countries, Latin-America & Asia that have a minimum of 10 schools per category. We also delete all countries in which the private-dependent schools cater for less than 2 percent of pupil population.

Based on existing literature comparing private and public schools, as well as on availability of comparable data in the three waves of PISA, a variety of family and school characteristics likely to influence school choice and school effectiveness have been included in the analyses. Gender, immigrant status, cultural possessions, wealth, both maternal and paternal education and occupational status have been incorporated to account for family background variation in the population of private and public schools. The school's social composition (percentage of students having at least a parent with a university degree), the school's size, its admission policies (whether it considers parental endorsement of the school's educational philosophy and attendance of its special programs as criteria when admitting students), as well as variables related to the school's resources, namely student-teacher ratios, computer-student ratios and a composite index of educational resources have been considered as potential factors influencing school choice on the school side. These school characteristics can be observed easily by choosing parents. Moreover, they are quasi-permanent and thus are reliable indicators of these school characteristics at the actual moment of school-choice, a few years earlier. Finally, to gauge the potential deterrent effect that financial costs of attending a school might have, a tuition variable, i.e. whether the school charges or not tuition fees has been included.

The characteristics of pupils, parents and schools of the countries with enough public and private-dependent schools are shown in table 1.

[About here table 1]

26 countries on four continents have public and private-dependent schools, although some cater only for a small percentage of all 15 year-old pupils.

## **6. Results for the choice of private-dependent schools versus public schools.**

All individual characteristics of parent and pupils which might influence the choice of private-dependent schools versus public schools and the visible school characteristics have been included in the equation predicting the choice of a private-dependent school over a public one in all of the countries with public and private-dependent schools.

Table 2 shows the parameters of these equations for all countries separately. One has to remember that these parameters are the net effects of choosing private-dependent schools, because we account for the other individual and school characteristics in the same equation.

[About here table 2]

In general these results show that the choice pattern between private-dependent and public schools differs across these 26 countries. Admission based on parents' endorsement of the school's philosophy is positively influencing the likelihood of choosing a private-dependent school in nearly all countries, but not in Finland, Sweden and Indonesia. Parental endorsement figures in the admission policies of all private-dependent schools in France and Norway. Admission policies based on participation in a special program are favouring the choice of a public school in nearly all countries, except in Belgium, the Netherlands, Sweden, Switzerland, Argentina, Chile, Indonesia where such policies increase the chance of a private-dependent school option.<sup>6</sup> A high score on the socio-economic composition of the student-body variable increases the chance of attending a private-dependent school except in France, the Netherlands, Norway, Portugal, Hong Kong, Indonesia, Korea and Thailand where it increases the probability of a public school choice. A higher number of teachers per student in schools impacts positively<sup>7</sup> on the likelihood of choice of private-dependent schools only in Austria, Belgium, Czech Republic, Norway, but the same variable increases a public school choice in Germany, Hungary, Ireland, Portugal, Spain, Sweden, Switzerland, Canada, Argentina, Chile, Indonesia and Korea. The payment of tuition is positively associated with choice of a private-dependent schools in most countries, but it clearly represents an obstacle to private school choice in France, Hungary, Italy and Portugal. The gender of the pupil matters in the option for a given school type in many countries. Parents with a male child tend to choose private-dependent schools more often in Austria, Belgium, Czech Republic, Germany, Ireland, Luxembourg, Argentina, Korea and Thailand, while they will prefer a public school in Italy and Chile. Native parents<sup>8</sup> choose more frequently private-dependent schools in Belgium, Canada and Hong Kong, but public schools in Finland, France, Italy, Norway, Sweden and Indonesia. Interestingly, the mother's educational level is positively related to choice of a public school in the Czech Republic Denmark, Germany, Ireland, Portugal, Sweden, Switzerland, Hong Kong and Indonesia, while the father's educational level is hardly significant. The occupational status of both parents is positively related with the choice of a private-dependent school in Austria, Belgium, Czech Republic, Finland, Germany, Ireland, Luxembourg, Norway, Sweden, Canada and Hong Kong, but in Italy, the Netherlands and Korea higher parental occupational status is linked with the choice of a public school.

[About here figure 1]

Based on this huge variation in factors which affect the choice between public and private-dependent schools in the various countries, easy characterisations, such as choice always being driven by class, educational capital, fear of immigrants, wealth, school resources or selectivity, are simply misleading. Therefore figure 2 shows the result of a cluster analysis of the coefficients of the public versus private-dependent school-choice in all countries.<sup>9</sup> Countries where these coefficients are more similar are clustered closer together, while countries with more divergent coefficients are placed further away from each other. The cluster analysis points to the existence of two clusters<sup>10</sup>. The first cluster consists of Austria, Ireland, Czech republic, Finland, Denmark, Germany, Sweden, Switzerland and Hong Kong. Table 3 shows that the private-dependent schools in these nine countries are chosen by pupils with more cultural possessions at home, lower educated mothers and mothers with higher occupational status. One might characterize the private-dependent school-choice in these countries as the *choice of the upward mobile parents*. The second cluster

contains Belgium, the Netherlands, Portugal, Thailand, Hungary, Slovakia, Israel, Italy, Spain, Chile and Korea. Table 3 shows that the private-dependent schools in these eleven countries are chosen by male native pupils with less cultural possessions at home, higher educated mothers, parents with lower occupational status, and who are less likely to pay tuition. One might characterize the private-dependent school-choice in these countries as a choice for *segregation by (lower-) middle class parents*.

[About here table 3]

The general conclusion of this section on the choice between private-dependent and public schools is that there is much more variation between countries much more than one might expect. Private-dependent school choice is not only or mostly based on opting for school with the best teaching conditions (low student/staff ratio; a high socio-economic composition of the student body). It can also be driven by defensive motives (avoiding immigrants, lower tuition).

## **7. The effectiveness in reading achievement of private-dependent schools compared to that of public schools**

In this section we present the results from the second step of the propensity score matching. We only compare pupils who have a more or less equal risks or propensities to go to a private-dependent versus a public school, while we delete those pupils in private-dependent schools who have no comparable match among pupils in public schools. Table 4 summarizes the results of our analyses while also offering an introduction to the propensity score matching technique.

[About here table 4]

The first column gives the average difference in reading scores between pupils in private-dependent schools and public schools, without any control for covariates. Given the school-choice selectivity shown in section 6, it is no surprise that the pupils of private-dependent schools in Austria, Belgium, Germany, Hungary, Ireland, Norway, Slovakia, Spain, Sweden, Switzerland, Canada, Argentina and Chile, have higher readings scores on average, but, quite surprisingly, pupils of private-dependent schools in Italy, Luxembourg, Hong Kong, Indonesia and Thailand score significantly lower compared to those in public schools. The second column gives the number of pupils involved in this simple comparison. Because these differences are not controlled for school-choice selectivity and parental background effects, these differences are not necessary reflecting effectiveness differences between private-dependent and public schools.

The third column gives the average difference in reading scores between pupils in private-dependent schools and public schools, but now only for those pupils from both school types who fell within the common range of the propensity of choosing a private school in that country. Column 4 gives the number of pupils who fell within such a common range of propensity scores in that country. This number is (sometimes considerably) smaller than the full sample of pupils (column 2), because of the lack of common characteristics of those choosing public and private-dependent schools, or the high selectivity of school-choice. In Luxembourg, Sweden, Canada, Argentina and Indonesia this drop is large, while in Belgium, Germany and the Netherlands this decrease is small. The average difference in reading scores tends to drop when applying this restriction, but substantial differences remain: pupils of

private-dependent schools in Austria, Belgium, Germany, Hungary, Ireland, Norway, Spain, Sweden, Canada, Argentina and Chile still have higher reading scores on average, while pupils of private-dependent schools in Italy, Luxembourg, Hong Kong, Indonesia and Thailand score significantly lower.

However, within a common range, the distributions of the propensity scores of pupils in private-dependent and public schools can be quite different and thus still produce biased results. Therefore, as a next step, we match each pupil attending a private-dependent school to one with a similar propensity score but attending a public school. Note that, the actual level of the propensity score is irrelevant for the making of a match: as long as the pupils of a match have the same propensity score (low or high), but attend different school types. This restriction strongly reduces the number of pupils/cases as can be seen in column 6, but the difference in reading score between the matched pupils (column 5) gives now a more valid indication of the true discrepancies in school effectiveness between private-dependent and public schools. The only significant positive differences in the reading score between pupils of private-dependent schools and public schools are registered in Belgium, the Czech Republic, Germany, Hungary, Ireland, Netherlands, Portugal, Canada, Argentina, and Chile. Pupils of private-dependent schools in Austria and Thailand score significantly lower than their counterparts in public schools. In the remaining countries the differences in the reading score between pupils of private-dependent schools and public schools is not significant. Note that this more strict control of the selectivity of school-choice changed the results for Austria (became negative), Czech Republic, Netherlands, Portugal (became positive), Italy, Luxembourg, Spain, Sweden, Hong Kong and Indonesia (became insignificant). This shows that controlling for the selectivity of school-choice is important.

Mahalanobis distance matching allows for a greater weight to be assigned to the following variables: highest parental education, highest parental occupational status, family wealth, immigration status and cultural possessions index. This more refined analysis which combines matching on choice and controlling for covariates (column 7) does not change the results much, compared with the analysis based on simple propensity score matching (column 5). Significant positive differences in the reading score between pupils of private-dependent schools and public schools persist in Belgium, Czech Republic, Germany, Hungary, Ireland, Portugal, Canada, Argentina, and Chile after applying this stricter control for differences in the school choice process. Pupils of private-dependent schools in Finland, Italy, Korea and Thailand score significantly lower than pupils in public schools. In the other countries, the differences in reading score between pupils of private-dependent schools and public schools are not significant. Note that different (stricter) method of control for the selectivity of school-choice changed the results for Austria and Netherlands (became insignificant), as well as for Finland, Italy and Korea (became negative).

Finally, table 4 shows that there is no relation between the two clusters, based on the coefficients of the choice between private-public and public schools, and the effectiveness of these private or public schools. In both clusters, some countries have private-dependent schools that are more effective, while other countries within the same cluster have public schools that do better.

The results above confirm that controlling for the selectivity of school-choice is important. However, even after the more refined control for background variables and school-choice selectivity, private-dependent schools are significantly more effective in raising their pupils' reading score compared to public schools in ten countries while the opposite is true only in three. In thirteen countries there is no

significant difference and thus there is no effectiveness difference between these school types.

## **9. School Choice and Effectiveness**

The analyses show that the proposed distinction between the processes of school choice and school effectiveness is important for a valid estimation of the differential effectiveness of private-dependent schools in comparison with public schools.

The choice of private-dependent schools in these 26 countries varies by school characteristics, especially school composition, school-size, parental endorsement participation in special programs as admission criteria, tuition payment and educational resources. We found two patterns of private-dependent school choice. The first one can be characterized as a *choice of the upward mobile parents for private schools*. The second one might be pictured as a school-choice for *segregation by (lower-) middle class parents*

After having taken into account these different school choice processes, pupils at private-independent schools in Belgium, Czech Republic, Germany, Hungary, Ireland, Netherlands, Portugal, Canada, Argentina, and Chile (thus a large minority of the countries studied) still have higher reading scores than pupils in the public schools of the same country. Their observed higher reading scores cannot be explained by the school choice processes and this might be an indication of a higher effectiveness of private-dependent schools. However in Austria and Thailand (thus a small minority of the studied countries), pupils at private-dependent schools have lower reading scores than pupils in the public sector. Thus, in these cases, the school choice processes hide the even lower effectiveness of these private-dependent schools, compared to the higher effectiveness of the public schools. Our analyses do not support any neoliberal claim of a higher effectiveness of private-dependent schools in all countries: in the majority of the countries studied (Denmark, Finland, France, Italy, Luxembourg, Norway, Slovakia, Spain, Sweden, Switzerland, Israel, Hong Kong, Indonesia and Korea), we found no significant difference between the scores of pupils of private-dependent and public schools. The patterns of school-choice within the various countries are not related with potential higher effectiveness either of private-dependent or of public schools. This empirical finding contradicts a neo-liberal theories according to which school choice is driven mainly (if not exclusively) by the parental search for the most effective schools. Obviously, more complex processes are at work, for instance the differences in school climate between public and private-dependent schools (Dronkers & Robert, 2008).

These results also deviate from those of Dronkers & Robert (2008). They found, using a usual OLS multi-level regression containing corrections for student background variables and school composition, that private-dependent schools had higher effectiveness than public schools in *all* countries. This is not confirmed in this study, as we find the same positive difference only for a (large) minority of the countries studied. However, our study contains a wider variation of countries than the range Dronkers and Robert (2008) analyzed.

But our conclusion also means that we can not dismiss the higher effectiveness of private-dependent schools, at least in some countries, by referring to the selectivity of these schools as a result of school choice processes. Private-dependent schools are significantly more effective than comparable public schools, in a substantial number of countries. The insignificant difference between the reading scores of pupils of private-dependent and public schools in a relative majority of countries does not support the thesis of a universal higher effectiveness of private-independent schools.

It contradicts the conclusion of Dronkers & Robert (2008) that the universal higher effectiveness of private-independent schools was true for all relevant OECD countries and did not vary between them. This might mean that school choice processes might differ between countries due to dissimilar legal and social constraints, as well as opportunities of each country, and that the processes leading to a slightly higher effectiveness of private-dependent schools (for instance the better school climate, the more efficient administration and the larger parental involvement) can also operate differently in developed countries.

Our study has at least two limitations. We cannot make the distinction between secular and religious private schools in the PISA data collection. If we could make this essential distinction, we could test whether the higher net scholastic achievement of private government-dependent schools is related either to the religious background of school, teachers and parents or to the private character of the schools. The impossibility to distinguish between religious and non-religious schools within the private-independent school-sector of the US might explain why we do not find the same results as Coleman, Hoffer and Kilgore (1982) or Byrk, Lee and Holland (1993). Within the US private-independent sector are either religious (catholic and orthodox-protestant) or elitist schools (Cookson and Persell, 1985). In Germany, France and The Netherlands we can distinguish between religious school and elitist school, because the religious schools mostly belong to the private-dependent school-sector and the elitist schools to the private-independent school sector.

Another limitation is the cognitive educational performance. An important future research question would be whether this higher net scholastic achievement of private government-dependent schools is also true for non-cognitive outcomes, moral attitudes of the pupils. In one of the other products of the cross-national EU project „Religious education in a multicultural society: School and home in comparative context” we hope to address this question with the attitudes of these 15-year old pupils to environmental issues.

However, it is important to bear in mind that these results does not necessarily mean that an educational system with a high percentage of private government-dependent schools is more efficient as a system, providing the best education to all children. As we have seen, the social composition of private schools explains an important part of the selectivity of private schools. If the social composition of schools within an educational system is very polarized between public schools and private schools (which means a small overlap in propensity scores, like the US), such an educational system will be less efficient because the public school pupils attain lower educational outcomes than they would attain in a less polarized system. In that case, the lower educational outcomes of public schools pupils might not be compensated by the higher educational outcomes of private school pupils. Thus this educational system will be less efficient for that society as a whole than an educational system without private schools or a less polarized school composition.

Within a balanced educational context without too many rights in the private sector, a private provider of collective goods like education can produce better outcomes for two reasons. Firstly, because of a larger vulnerability for competition in educational ‘markets’, the private provider has to be more concerned about the quality of this collective good than a public provider. Secondly, a private provider also has more ‘space’ for influencing the quality of its product than a public provider, which has more legal and political constraints, as well as obligations other than those related to the school (other public services like fire-brigades, police, sport facilities and cultural activities). The better outcomes of private providers in supplying this kind of

collective good are, however, conditional, and can be constrained by a public context (such as financing, regulations, final examination, etc.), which aims to avoid very strong differences in the social composition of schools. If these constraints are absent, a private provider of this type of collective good might be tempted to obtain a higher quality, not through organization and efficiency, but by ‘buying’ only the best means of production, for example, students and school composition.

In any case, school choice between private and public schools and differences in school effectiveness of private-dependent and public schools are distinct and not necessarily related processes, which should be treated separately and which deserve further cross-national analysis.

## Notes

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<sup>2</sup> We use for the description of this technique the article of Frisco, Muller & Frank (2007), who use this technique in their analysis of the effects of parental divorce on children’s well-being.

<sup>3</sup> Normally, this should not be a big problem; see Morgan & Winship (2007).

<sup>4</sup> The PISA survey does not distinguish between denominational and non-denominational schools.

<sup>5</sup> We could only use the first PISA wave for France, because the public data set of the second and third PISA wave do not contain valid values for French public and private school indicator. We have to assume that all school characteristics have become a state-secret, too annoying for the French Republic to be published or analyzed.

<sup>6</sup> While this admission based on programs is necessary for all French and Norwegian private-dependent schools

<sup>7</sup> This is a negative coefficient in table 2, because the variable is the student-teacher ratio.

<sup>8</sup> Based on country of birth of (one of) the parents outside the country of birth and/or the foreign language used at home.

<sup>9</sup> We had to delete from the cluster analysis those countries (Argentina, Canada, France, Indonesia, Norway) for which not all parameters are available.

<sup>10</sup> Luxembourg is clearly a separate case, which has a few in common with the two clusters.

## Literature

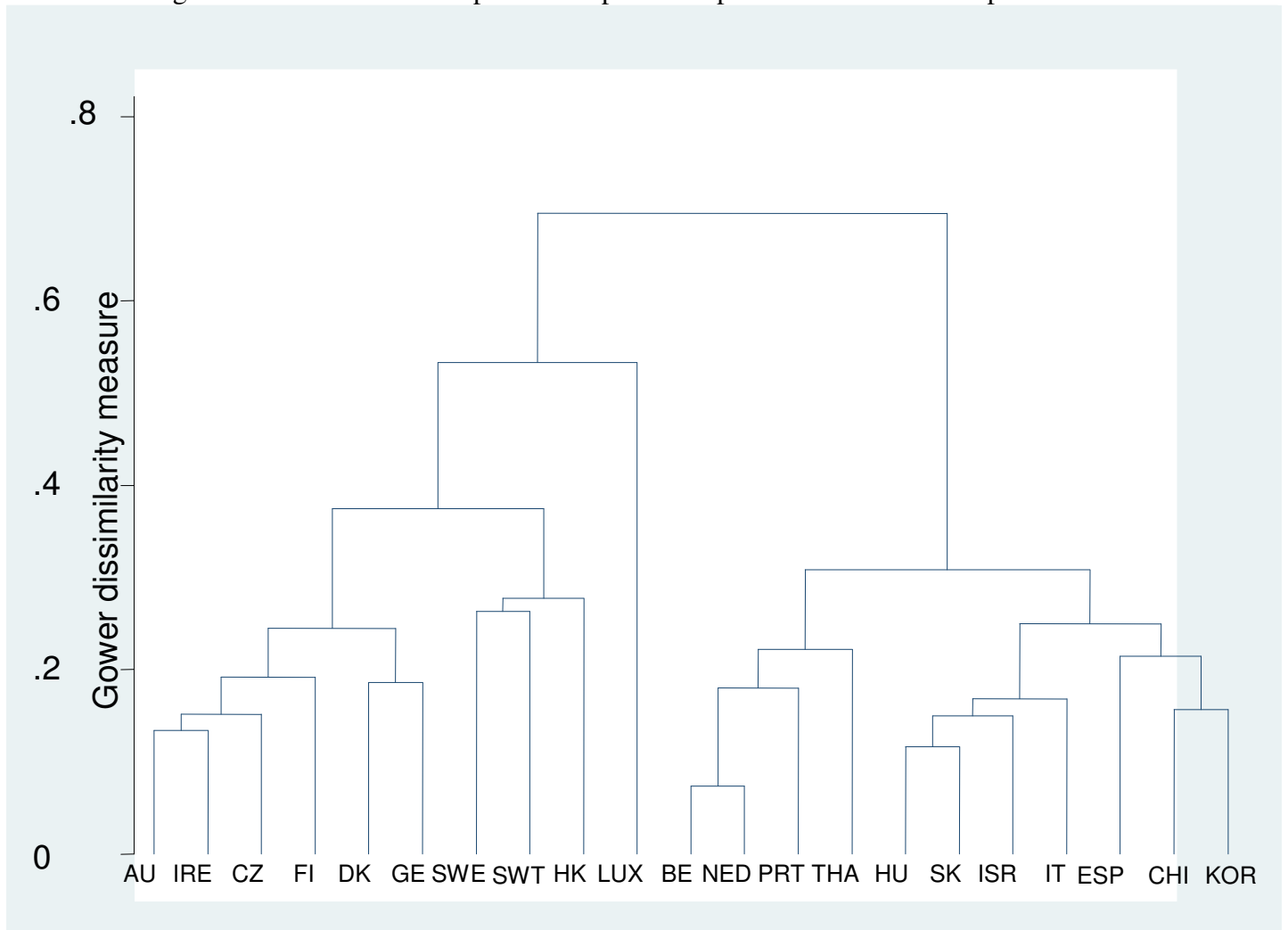
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Figure 1: Clusters of choice patterns of private-dependent schools versus public school



Source: pooled data PISA dataset for 2000, 2003 and 2006. Au=Austria; Be=Belgium; CHI=Chile; CZ=Czech Republic; DK=Denmark; ESP=Spain; FI=Finland; GE=Germany; HK=Hong Kong; ISR=Israel; IT=Italy; IRE=Ireland; KOR= Korea; LUX=Luxembourg; NED=Netherlands; PRT=Portugal; SK= Slovakia; SWE= Sweden; SWT= Switzerland; THA=Thailand;

TABLE 1: Descriptive Statistics for variables entered in the propensity estimation model per country \*

	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy
Private independent	2,79	1,59	0,27	0,49	0	7,87	0,23	4,13	1,27	2,44	2,1
Private-dependent	6,52	67,58	4,64	22,09	4,43	14,24	5,48	0	8,82	57,52	2,91
Public	90,7	30,83	95,1	77,43	95,57	77,89	94,29	95,87	89,92	40,04	94,99
Gender (% girls)	49,77	48,2	49,63	50,66	50,87	50,74	50,21	50,18	48,47	50,56	50,58
Grade (average)	9,47	9,63	9,51	8,93	8,88	9,48	9,09	10,07	9,25	9,53	9,84
Grade (range)	6 to 11	7 to 12	6 to 10	7 to 11	7 to 10	7 to 11	6 to 11	7 to 11	6 to 11	7 to 12	7 to 11
Immigrant (%)	17,39	22,47	7,92	13,44	4,46	24,03	18,85	12,12	3,74	15,5	8,22
First generation immigrant (%)	8,02	6,57	1,37	4,42	1,9	2,87	8,33	6,12	1,99	5,4	3,2
Second generation immigrant (%)	9,37	15,9	6,55	9,02	2,56	21,16	10,52	6	1,75	10,11	5,02
Foreign language used at home (%)	8,27	13,6	0,85	4,89	1,45	5,12	7,71	2,99	0,74	1,22	12,1
Index of cultural possessions (average)	0,01	-0,3	0,19	-0,08	0,12	-0,3	0,04	0,15	0,33	-0,17	0,22
Family wealth (average)	0,26	0,14	-0,28	0,57	0,36	-0,15	0,32	-0,28	-0,38	0,09	-0,01

\* The data of Latin America and Asia needs to be added in table 1.

TABLE 1: Descriptive statistics for variables entered in the propensity estimation model per country (continued)

	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy
ISCED 0/1	2,47	5,87	0,78	2,76	3,65	3,19	4,59	9,51	0,7	5,4	5,46
ISECD 2	7,49	7,65	2,59	8,55	11,3	4,87	11,05	19,07	9,51	14,94	29,17
ISECD 3 b, c	38,46	8,77	19,17	11,42	4,49	23,98	22,08	7,86	17,63	8,08	11,61
ISCED 3a, 4	27,38	25,56	42,48	20,67	24,39	20,36	34,46	26,64	35,22	31,55	30,44
ISCED 5 b	13,61	27,61	15,81	34,66	27,69	15,14	9,2	14,8	17,24	21,36	10,71
ISCED 5a, 6	10,59	24,54	19,16	21,94	28,48	32,45	18,63	22,13	19,7	18,67	12,12
ISCED 0/1	1,71	5,46	0,63	3,09	5,82	2,85	3,85	11,03	0,73	8,16	6,31
ISECD 2	5,8	7,12	1,72	9,26	13,73	5,35	9,9	18,11	5,9	18,96	28,58
ISECD 3 b, c	34,03	7,73	24,07	20,47	4,65	21,61	18,21	9,38	22,81	8,46	9,19
ISCED 3a, 4	21,45	26,66	39,12	23,29	27,8	24,01	27,38	21,98	38,9	27,72	32,32
ISCED 5 b	21,61	22,44	11,28	22,34	22,05	9,7	12,85	12,49	13,5	17,62	9,73
ISCED 5a, 6	15,4	30,59	23,18	21,55	25,96	36,49	27,81	27,01	18,15	19,08	13,86
ISCED 0/1	0,87	3,1	0,3	1,53	1,98	1,77	2,94	4,87	0,26	2,9	2,05
ISECD 2	3,39	3,88	0,95	4,85	7,09	2,73	7,73	12,59	4,21	9,59	20,79
ISECD 3 b, c	27,73	5,53	13,78	9,09	3,42	14,88	14,78	7,6	15,24	6,36	9,43
ISCED 3a, 4	24,69	23,75	39,86	20	22,95	21,67	27,89	24,83	36,51	29,36	35,94
ISCED 5 b	24,23	26,8	15,58	33,33	26,74	14,61	13,97	16,02	18,03	24,09	12,79
ISCED 5a, 6	19,1	36,94	29,53	31,2	37,89	44,33	32,68	34,09	25,76	27,69	18,99
Mother SES (average)	41,82	43,67	45,77	42,77	43,06	42,57	43,28	45,02	45,97	43,7	43,44
Father SES (average)	44,31	46,1	44,68	44,7	44,66	44,11	45,13	43,6	41,17	42,77	42,78

TABLE 1: Descriptive statistics for variables entered in the propensity estimation model per country (continued)

	Austria	Belgium	Czech Republic	Denmark	Finland	France	Germany	Greece	Hungary	Ireland	Italy
value reading (average)	496,14	510,72	504,43	494,43	545,29	503,2	497,22	467,11	483,16	521,05	485,83
Girl schools%	1,79	0,35	0,35	0	0	0	2,49	0,14	0,72	25,77	0,1
Boy schools%	1,15	0,92	1,57	0,01	0	0	0,16	0,45	3,09	18,52	1,41
Mixed schools %	97,06	98,73	98,08	99,99	100	100	97,35	99,42	96,19	55,71	98,49
Social composition (% parent's having tertiary education)- (average)	19,04	36,57	29,43	31,06	37,82	44,08	32,12	34,09	25,69	27,62	18,96
School size	586,45	693,13	508,38	440,38	382,9	892,09	666,62	284,12	511,49	564,67	664,88
Tuition % having tuition fees	72,96	61,64	32,53	31,81	1,57	68,59	31	37,54	24,87	51,63	94,51
Admittance-parent's views considered -%	45,85	71,92	54,13	54,26	47,85	91,85	49,55	34,54	62,47	70,26	35,1
Admittance-special programs considered- %	79,26	69,96	80,89	65,04	66,73	100	74,48	61,22	88,38	66,7	76,89
Teacher-student ratio	12,23	9,49	14,93	11,53	11	12,55	17,55	9,43	10,88	14,22	8,97
Computer-student ratio (average)	0,22	0,15	0,11	0,19	0,16	0,13	0,08	0,08	0,21	0,1	0,17
Educational resources (average)	0,21	-0,09	-0,11	-0,1	-0,01	-0,49	0,16	0,16	-0,07	-0,09	0,21
Teacher shortage -neg scale (average)	-0,49	0,22	-0,15	-0,19	-0,3	-0,32	0,21	0,18	-0,38	-0,15	0,14

TABLE 1: Descriptive statistics for variables entered in the propensity estimation model per country (continued)

	Luxembourg	Netherlands	Norway	Portugal	Slovakia	Spain	Sweden	Switzerland	Canada	Israel
Private independent	0	0	0	2,1	0,29	6,9	0	2,89	3,66	5,44
Private-dependent	13,52	73,31	1,27	6,17	8,51	35,66	5,05	0,87	2,81	17,19
Public	86,48	26,69	98,73	91,73	91,2	57,44	94,95	96,24	93,53	77,37
Gender (% girls)	50,1	49,31	49,1	52,41	49,3	50,57	49,05	48,89	50,72	53,03
Grade (average)	9,15	9,47	9,99	9,36	9,59	9,67	8,99	8,84	9,82	9,9
Grade (range)	7 to 11	7 to 12	8 to 11	5 to 11	7 to 11	7 to 11	7 to 10	7 to 12	7 to 12	7 to 12
Immigrant (%)	48,05	17,64	12,94	12,26	6,4	7,43	20,28	36,99	18,7	38,09
First generation immigrant (%)	17,44	4,4	4,26	3,31	0,66	3,63	6,1	12,15	5,55	10,72
Second generation immigrant (%)	30,61	13,24	8,68	8,96	5,74	3,8	14,18	24,46	13,15	27,36
Foreign language used at home (%)	22,43	11,37	5,09	1,66	0,9	1,58	7,45	12,96	6,23	11,08
Index cultural possessions (Average)	-0,03	-0,32	0,2	-0,09	0,37	0,18	0,08	-0,25	-0,09	0,06

TABLE 1: Descriptive statistics for variables entered in the propensity estimation model per country (continued)

	Luxembourg	Netherlands	Norway	Portugal	Slovakia	Spain	Sweden	Switzerland	Canada	Israel
Family wealth (Average)	0,38	0,43	0,68	-0,06	-0,38	-0,01	0,62	0,1	0,28	-0,04
ISCED 0/1	18,86	7,48	1,74	32,71	0,96	18,62	2,55	5,54	1,85	4,19
ISECD 2	13,67	13,55	4,63	22,23	4,4	23,56	8,32	20,49	6,89	5,1
ISECD 3 b, c	9,81	8,99	7,33	11,36	18,91	6,48	10,84	28,57	0	7,8
ISCED 3a, 4	20,73	34,08	30,15	11,11	56,53	21,73	16,38	18,99	40,49	19,01
ISCED 5 b	22,42	5,76	33,29	8,16	3,24	9,28	23,82	14,47	22,49	24,7
ISCED 5a, 6	14,51	30,13	22,85	14,43	15,95	20,34	38,1	11,94	28,27	39,2
ISCED 0/1	15,14	6,93	2,04	32,96	1,04	19,06	4,01	4,58	3,42	4,18
ISECD 2	10,01	11,2	5,75	22,37	2,95	20,35	12,47	17,65	10,99	6,14
ISECD 3 b, c	7,77	7,57	9,04	11,95	26,49	6,27	12,31	25,31	0	9,87
ISCED 3a, 4	26,14	28,69	29,24	10,64	47,78	20,43	16,99	11,9	41,3	16,95
ISCED 5 b	19,52	4,64	25,87	7,91	2,46	11,66	19,87	19,91	16,85	25,26
ISCED 5a, 6	21,42	40,97	28,06	14,16	19,28	22,24	34,35	20,65	27,44	37,6
ISCED 0/1	12,57	3,92	0,87	26,33	0,5	12,12	1,71	3	0,86	2,12
ISECD 2	8,67	7,71	2,14	20,18	2,02	16,81	4,91	13,44	3,77	3,13
ISECD 3 b, c	7,04	6,05	4,62	12,46	14,33	5,86	7,06	22,92	0	5,89
ISCED 3a, 4	23,25	27,38	23,88	12,7	54,57	22,64	15,65	14,61	33,58	14,57
ISCED 5 b	24,12	5,86	33,75	8,76	4,04	13,15	22,06	21,29	23,48	25,23
ISCED 5a, 6	24,35	49,08	34,74	19,58	24,54	29,42	48,62	24,75	38,31	49,05

TABLE 1: Descriptive statistics for variables entered in the propensity estimation model per country (continued)

	Luxembourg	Netherlands	Norway	Portugal	Slovakia	Spain	Sweden	Switzerland	Canada	Israel
Mother SES (average)	40,57	43,09	46,7	37,98	44,77	39,74	43,32	41,45	46,71	51,05
Father SES (average)	44,29	48,38	48,42	40,51	42,37	42,64	45,67	44,57	44,33	50
value reading (average)	469,5	521,25	495,83	476,52	473,39	484,93	512,93	494,87	514,45	451,29
Girl schools%	8,59	1,42	0	0	0,15	0,23	0	0,42	0,63	13,4
Boy schools%	0	0	0,01	0,05	1,65	0,91	0	0,11	0,43	9,43
Mixed schools %	91,41	98,58	99,99	99,95	98,2	98,85	100	99,47	98,94	77,16
Social composition (% parent's having tertiary education)-(average)	24,13	48,71	34,71	19,57	24,49	29,34	48,45	24,71	38,29	48,9
School size	1420,93	1005,02	292,24	974,41	554,6	709,66	492,27	455,52	756,66	831,83
Tuition % having tuition fees	23,86	90,97	38,33	80	14,18	43,85	45,14	48,27	80,43	80,25
Admittance-parent's views considered -%	50,6	50,45	31,09	56,57	23,07	44,86	49,28	31,25	28,34	75,02
Admittance-special programs considered-%	73,54	66,2	44,37	86,04	74,34	53,94	57,42	59,72	72,69	88,91
Teacher-student ratio	9,68	15,79	10,11	9,6	15,12	12,8	12,47	11,95	16,35	13,03
Computer-student ratio (average)	0,2	0,17	0,23	0,09	0,07	0,11	0,15	0,17	0,24	151,4
Educational resources (average)	0,11	0,27	-0,07	-0,18	-0,67	0,01	0,05	0,33	-0,03	-0,03
Teacher shortage - neg scale (average)	0,63	0,17	0,23	-0,47	-0,15	-0,55	-0,01	-0,23	-0,01	0,07

TABLE 1: Descriptive statistics for variables entered in the propensity estimation model per country (continued)

	Argentina	Chile	Hong Kong	Indonesia	Korea	Thailand
Private independent	7,25	11,88	0,79	29,38	22,7	6,71
Private dependent	23,07	39,67	62,12	4,37	28,44	4,32
Public	69,69	48,45	37,09	66,25	48,86	88,97
Gender (% girls)	53,75	49,85	50,4	50,49	44,99	57,56
Grade (average)	9,63	9,68	9,58	9,29	9,99	9,55
Grade (range)	7 to 14	7 to 11	7 to 12	7 to 12	9 to 11	7 to 11
Immigrant (%)	7,01	1,72	59,91	0,52	0,04	0,78
First generation immigrant (%)	0,95	0,65	21,34	0,21	0	0,1
Second generation immigrant (%)	6,06	1,07	38,57	0,31	0,04	0,69
Foreign language used at home (%)	0,58	0,44	6,22	24,75	0,1	30,51
Index of cultural possessions (Average)	-0,07	-0,12	-0,44	-0,6	0,15	-0,1
Family wealth (Average)	-1,18	-0,96	-0,33	-1,84	-0,12	-1,22
ISCED 0/1 Mother education	18,1	9,02	26,55	37,05	7,15	41,57
ISECD 2	22,54	18,85	29,58	25,46	14,95	29,89
ISECD 3 b,c	7,82	15,17	23,75	6,32	17,63	4,52
ISCED 3a, 4	9,6	23,93	7,49	20,38	30,87	11,7
ISCED 5 b	19,49	18,29	8,75	3,89	13,1	1,24
ISCED 5a, 6	22,47	14,73	3,89	6,91	16,3	11,09
ISCED 0/1 Father education	19,66	8	23,37	28,78	5,65	36,61
ISECD 2	22,88	17,56	29,35	23,1	11,6	27,7
ISECD 3 b,c	8,62	14,85	23,44	8,79	16,32	6,19
ISCED 3a, 4	10,5	23,55	8,16	23,82	24,83	14,77
ISCED 5 b	17,12	16,97	8,75	4,86	12,64	2,29

ISCED 5a, 6	21,22	19,07	6,93	10,65	28,96	12,43
Mother SES (average)	43	33,82	38,04	33,96	41,18	33,34
FATHER SES (average)	41,86	38,69	38,9	34,16	44,37	34,72
value reading (Average)	403,48	432,18	525,45	377,15	536,61	429,48
Girl schools%	1,76	7,16	11,6	0,56	35,32	2,95
Boy schools%	1,2	5,48	5,29	1,44	18,4	0,41
Mixed schools %	97,03	87,36	83,11	98	46,28	96,65
Social composition (% parent's having tertiary education)-average	31,15	24,27	8,15	13,08	31,3	15,18
School size	631,4	1092,53	1046,02	635,55	1198,09	1687,19
Tuition % having tuition fees	78,74	85,57	89,51	61,22	98,99	46,76
Admittance-parent's views	67,06	62,65	82,33	72,8	40,27	80,39
Admittance-special programs	83,9	77,41	69,22	77,28	60,25	89,26
Teacher-student ratio	10,2	26,91	18,28	18,49	17,72	22,49
Computer-student ratio	80,9	51,68	4,97	19,25	0,25	1,8
Educational resources	-0,03	-0,16	0,02	-0,58	0,16	-0,1
Teacher shortage (neg scale)	-0,58	0,19	-0,07	0,96	-0,49	0,66

Source: pooled data PISA dataset for 2000, 2003 and 2006;

Table 2: The coefficients of the logistic regression predicting the choice of a private-dependent school relative to a public school per country, including tuition.

Regression coefficients	Gender	Immigrant	Foreign language used at home	Cultural possessions	Family wealth	Mother ISCED	Father ISCED	Mother SES	Father SES	School-soc composition	School size	Admission-parents' endorsement	Admission-special program	Student-teacher ratio	Computer-student ratio	Educational resources	Tuition
<b>EUROPE</b>																	
Austria	-0,906* (0,112)	0,275 (0,161)	0,400 (0,226)	0,018 (0,063)	-0,024 (0,071)	-0,032 (0,050)	-0,023 (0,047)	0,009* (0,004)	0,006 (0,004)	2,17* (0,314)	-0,001* (0,0002)	2,415* (0,132)	-0,826* (0,176)	-0,121* (0,022)	-3,686* (0,600)	0,128* (0,052)	3,553* (0,236)
Belgium	-0,113* (0,043)	-0,683* (0,054)	0,541* (0,072)	0,045 (0,024)	0,072* (0,030)	0,013 (0,019)	0,022 (0,019)	0,002* (0,001)	0,001 (0,001)	0,761* (0,149)	0,0015* (0,000)	1,478* (0,050)	-0,082 (0,050)	-0,024* (0,008)	0,763* (0,184)	0,319* (0,024)	0,620* (0,043)
Czech Republic	-0,230* (0,098)	0,281 (0,174)	0,101 (0,592)	0,055 (0,056)	0,089 (0,059)	-0,149* (0,063)	-0,097 (0,060)	0,004 (0,004)	0,012* (0,004)	1,172* (0,268)	-0,007* (0,0003)	1,498* (0,131)	-0,470* (0,148)	-0,108* (0,015)	-2,866* (0,563)	0,119* (0,051)	2,510* (0,109)
Denmark	-0,177 (0,110)	0,311 (0,199)	-0,437 (0,376)	0,219* (0,061)	-0,038 (0,067)	-0,125* (0,053)	0,008 (0,054)	0,010* (0,004)	-0,005 (0,004)	0,989* (0,318)	-0,002* (0,0003)	2,245* (0,152)	-0,910* (0,166)	0,030 (0,026)	2,617* (0,508)	0,198* (0,069)	5,246* (0,124)
Finland	-0,084 (0,102)	0,015 (0,262)	1,503* (0,363)	-0,015 (0,061)	0,060 (0,075)	-0,073 (0,044)	0,020 (0,043)	0,006* (0,003)	0,004 (0,003)	4,002* (0,332)	0,002* (0,0003)	-1,149* (0,124)	1,531* (0,160)	-0,248* (0,035)	-12,88* (1,022)	0,364* (0,064)	2,749* (0,214)
France	0,076 (0,136)	-0,047 (0,176)	0,942* (0,316)	0,145 (0,075)	-0,022 (0,102)	-0,045 (0,063)	-0,013 (0,060)	-0,0007 (0,004)	-0,002 (0,005)	0,319 (0,492)	-0,0001 (0,0001)	Dropped †	Dropped †	-0,020 (0,031)	1,200 (0,783)	0,180* (0,075)	-0,219* (0,142)
Germany	-0,806* (0,112)	0,156 (0,187)	-0,370 (0,387)	0,217* (0,066)	0,345* (0,071)	-0,106* (0,052)	-0,078 (0,050)	0,003 (0,004)	0,014* (0,003)	2,312* (0,344)	-0,0003 (0,0002)	4,012* (0,251)	-1,117* (0,235)	0,062* (0,014)	5,539* (0,874)	0,143* (0,053)	2,229* (0,112)
Hungary	-0,137 (0,089)	0,135 (0,207)	-1,585 (1,052)	0,056 (0,057)	-0,032 (0,062)	0,089 (0,050)	0,054 (0,054)	-0,002 (0,003)	-0,0007 (0,003)	1,858* (0,249)	-0,003* (0,0002)	1,806* (0,103)	-0,163 (0,139)	0,102* (0,010)	-1,063* (0,285)	0,203* (0,054)	-0,408* (0,100)
Ireland	-0,477* (0,065)	-0,017 (0,091)	-0,149 (0,332)	0,043 (0,035)	0,121* (0,045)	-0,096* (0,026)	0,018 (0,024)	0,012* (0,002)	0,005* (0,002)	3,456* (0,267)	-0,004* (0,0002)	1,546* (0,087)	-1,957* (0,090)	0,094* (0,013)	-21,97* (0,888)	-0,294* (0,034)	1,708* (0,068)
Italy	0,353* (0,111)	0,342* (0,167)	0,333* (0,148)	-0,115 (0,068)	0,025 (0,079)	0,018 (0,048)	-0,004 (0,048)	0,0002 (0,004)	-0,014* (0,004)	2,224* (0,401)	-0,004* (0,0003)	1,348* (0,124)	-0,662* (0,131)	0,006 (0,020)	0,846* (0,268)	0,149* (0,057)	-2,975* (0,122)
Luxembourg	-1,769* (0,202)	0,612* (0,175)	-0,292 (0,231)	-0,023 (0,084)	-0,152 (0,100)	-0,013 (0,053)	-0,088 (0,057)	0,005 (0,005)	0,016* (0,006)	2,794* (0,753)	-0,010* (0,0005)	7,527* (0,420)	-8,054* (0,539)	0,024 (0,078)	-23,28* (2,220)	-0,804* (0,104)	5,560* (0,334)
Netherlands	-0,112 (0,058)	-0,464* (0,082)	0,011 (0,111)	0,040 (0,034)	0,034 (0,042)	0,003 (0,022)	-0,012 (0,022)	-0,005* (0,002)	-0,003 (0,002)	-0,393* (0,185)	0,0000 (0,0000)	1,343* (0,069)	0,085 (0,067)	-0,005 (0,008)	1,226* (0,457)	0,244* (0,031)	0,230* (0,095)
Norway	0,390 (0,249)	1,309* (0,371)	-0,163 (604)	0,949* (0,175)	-0,424* (0,169)	-0,071 (0,130)	-0,111 (0,136)	0,004 (0,009)	0,034* (0,009)	-8,475* (0,938)	0,005* (0,001)	Dropped ‡	Dropped ‡	-0,264* (0,078)	3,049* (1,022)	-1,415* (0,163)	4,001* (0,672)
Portugal	0,154 (0,094)	0,028 (0,168)	0,370 (0,364)	0,046 (0,056)	0,182* (0,064)	-0,088* (0,038)	-0,091* (0,039)	-0,004 (0,004)	-0,003 (0,004)	-3,645* (0,505)	0,001* (0,0000)	2,479* (0,161)	-1,748* (0,156)	0,107* (0,006)	0,380* (0,183)	0,350* (0,047)	-1,291* (0,103)
Slovakia	-0,018 (0,090)	-0,031 (0,181)	-0,638 (0,750)	-0,049 (0,059)	0,299* (0,067)	-0,042 (0,054)	-0,020 (0,052)	-0,001 (0,003)	-0,0000 (0,003)	2,494* (0,249)	-0,004* (0,0003)	1,492* (0,091)	-0,584* (0,101)	-0,013 (0,016)	-5,768* (0,967)	0,359* (0,068)	-0,384* (0,147)

Spain	0,094 (0,078)	-0,231 (0,157)	-0,169 (0,361)	-0,020 (0,048)	0,027 (0,056)	0,029 (0,027)	-0,027 (0,027)	0,0036 (0,003)	-0,004 (0,003)	0,577* (0,265)	-0,001* (0,000)	1,631* (0,107)	-1,245* (0,105)	1,267* (0,025)	11,090* (0,484)	0,151* (0,041)	3,310* (0,091)
Sweden	-0,177 (0,111)	0,732* (0,148)	0,306 (0,240)	0,266* (0,061)	-0,174* (0,074)	-0,154* (0,047)	0,004 (0,044)	0,014* (0,003)	0,012* (0,004)	4,478* (0,384)	-0,020* (0,0005)	-1,718* (0,152)	0,762* (0,137)	0,191* (0,015)	0,511 (0,356)	0,395* (0,067)	-0,197 (0,128)
Switzerland	-0,330 (0,167)	-0,236 (0,206)	0,013 (0,333)	0,295* (0,093)	-0,154 (0,116)	-0,236* (0,074)	0,108 (0,069)	0,009 (0,006)	-0,010 (0,006)	2,382* (0,525)	-0,0007* (0,0002)	0,598* (0,189)	2,033* (0,359)	0,090* (0,014)	0,061 (0,233)	-0,230* (0,079)	2,123* (0,217)
<b>OTHER INDUSTRIALIZED COUNTRIES</b>																	
Canada	-0,068 (0,087)	-0,177 (0,118)	-0,515* (0,230)	-0,064 (0,050)	-0,020 (0,063)	-0,053 (0,047)	0,038 (0,043)	0,007* (0,003)	0,008* (0,003)	5,710* (0,285)	-0,003* (0,0001)	3,006* (0,115)	-1,031* (0,116)	0,110* (0,015)	-10,63* (0,658)	0,933* (0,045)	Dropped ‡
Israel	-0,072 (0,105)	0,013 (0,110)	-0,389 (0,200)	0,139* (0,063)	-0,481* (0,067)	-0,016 (0,057)	-0,028 (0,051)	0,001 (0,004)	-0,004 (0,003)	2,871* (0,294)	-0,001* (0,0001)	0,143 (0,130)	-0,336* (0,156)	-0,012 (0,013)	-0,008 (0,020)	0,124* (0,052)	0,270 (0,159)
<b>LATIN AMERICA</b>																	
Argentina	-0,626* (0,167)	0,233 (0,336)	0,760 (1,004)	-0,164 (0,100)	0,232* (0,107)	0,090 (0,057)	0,094 (0,057)	-0,003 (0,005)	-0,002 (0,006)	6,365* (0,615)	-0,009* (0,0006)	2,537* (0,279)	-0,565 (0,322)	0,306* (0,024)	18,323* (2,896)	-0,064 (0,072)	Dropped ‡
Chile	0,178* (0,076)	-0,124 (0,294)	-1,423 (0,774)	0,099* (0,047)	0,239* (0,053)	0,027 (0,032)	-0,041 (0,031)	0,001 (0,003)	0,005 (0,003)	2,617* (0,329)	-0,001* (0,000)	0,680* (0,104)	0,225* (0,097)	0,074* (0,006)	19,362* (1,636)	-0,201* (0,038)	1,942* (0,126)
<b>ASIA</b>																	
Hong Kong	-0,074 (0,058)	-0,147* (0,062)	-0,193 (0,124)	0,335* (0,036)	-0,007 (0,047)	-0,307* (0,026)	-0,226* (0,025)	0,019* (0,002)	0,012* (0,002)	-2,223* (0,319)	-0,0006* (0,0002)	0,047 (0,085)	-1,664* (0,080)	-0,019 (0,018)	3,935* (0,456)	0,521* (0,029)	1,760* (0,099)
Indonesia	-0,087 (0,152)	Dropped ‡	1,264* (0,404)	-0,040 (0,089)	-0,131 (0,076)	-0,114* (0,061)	-0,052 (0,060)	0,006 (0,007)	0,004 (0,007)	-2,294* (1,024)	-0,010* (0,0006)	-0,578* (0,204)	1,301* (0,225)	0,112* (0,013)	-0,006 (0,033)	-0,363* (0,052)	2,735* (0,182)
Korea	-0,302* (0,062)	0,058 (1,421)	-2,170 (1,139)	0,036 (0,036)	0,053 (0,043)	0,030 (0,027)	-0,008 (0,026)	-0,009* (0,002)	0,0002 (0,002)	-1,230* (0,220)	-0,001* (0,0000)	0,946* (0,095)	-0,094 (0,066)	0,129* (0,019)	-1,192* (0,211)	0,063 (0,034)	3,727* (0,718)
Thailand	-0,256* (0,095)	-1,078 (1,017)	0,145 (0,110)	-0,090 (0,051)	0,366* (0,054)	0,012 (0,043)	-0,185* (0,043)	0,005 (0,005)	0,002 (0,004)	-4,098* (0,449)	0,0005* (0,0000)	0,505* (0,150)	-0,387* (0,175)	-0,007 (0,009)	3,226* (0,944)	0,007 (0,041)	0,895* (0,102)
Regression coefficients	Gender	Immigrant	Foreign language used at home	Cultural possessions	Family wealth	Mother ISCED	Father ISCED	Mother SES	Father SES	School-soc composition	School size	Admission-parents' endorsement	Admission-special program	Student-teacher ratio	Computer-student ratio	Educational resources	Tuition

Source: pooled data PISA dataset for 2000, 2003 and 2006; †dropped due to be constant for private-dependent schools, ‡ dropped due to perfect correlation with other variables

Table 3: Correlations between coefficients of the logistic regressions (table 2) and belonging to one of the five clusters

	Male	Immi grant	Foreign language used at home	Cultural Posses sions	Family wealth	Mother ISCED	Father ISCED	Mother SES	Father SES	School Socio-economic com position	School size	Admission parents' endorsement	Admission Special program	Teacher Student ratio	Computer Student ratio	Edu cational resources	Tuition
Cluster A	-.22	.34	.36	.59*	-.08	-.77*	.04	.75*	.38	.33	-.21	-.20	.21	-.25	-.20	.12	.35
Cluster B	.54*	-.48*	-.35	-.51*	.17	.72*	.03	-.75*	-.55*	-.39	.35	-.12	.16	.26	.42	.19	-.53*

Source: pooled data PISA dataset for 2000, 2003 and 2006. N=21 (only countries with valid parameters for all variables). \* significance <.05

Table 4: Effect of attending a private-dependent school vs. a public school on reading achievement

Cluster	Simple reading score difference between private and public schools pupils	No of observed pupils	Reading score difference within the common range of propensity scores of private and public school pupils	No of observed pupils	Reading score difference of the private- nearest public neighbour propensity scores	No of pupils (private/ public)	Reading score difference of the private school based on nearest neighbour and Mahalanibis distance	No of pupils (private/ public)
<b>EUROPE</b>								
Austria	19,39 (3,70)***	7838	13,47 (3,73)***	6488	-16,13 (7,51)*	(627/389)	-8,14 (6,79)	(627/417)
Belgium	39,21 (1,63)***	13560	38,64 (1,63)***	13420	27,31 (2,83)***	(9684/ 3735)	24,82 (2,64)***	(9684/ 2529)
Czech Republic	-3,16 (3,75)	13194	-3,15 (3,75)	9641	12,73 (5,52)*	(616/477)	14,03 (5,68)*	(616/ 477)
Denmark	0,33 (2,21)	7353	-2,52 (2,34)	5850	10,96 (7,47)	(1723/ 340)	4,60 (6,84)	(1723/ 380)
Finland	-2,61 (3,40)	11644	-4,36 (3,44)	9791	-6,17 (7,56)	(516/ 374)	-14,09 (6,58)*	(516/393)
France	-0,21 (5,39)	2025	0,14 (5,42)	1940	0,51 (7,44)	(261/230)	2,89 (7,61)	(261/ 231)
Germany	44,93 (4,02)***	7861	43,92 (4,04)***	7528	23,01 (6,28)**	(499/368)	24,03 (6,00)**	(499/376)
Hungary	25,45 (3,19)***	5772	24,02 (3,18)***	5669	14,95 (4,99)**	(727/ 542)	13,10 (4,77)**	(727/555)
Ireland	33,84 (1,90)***	7559	29,25 (2,03)***	6600	12,58 (5,12)*	(3971/ 1082)	8,12 (4,02)*	(3971/ 1211)
Italy	-41,35 (4,21)***	17753	-41,19 (4,22) ***	17323	-8,55 (8,85)	(468 /323)	-19,65 (8,19)*	(468/ 339)
Luxembourg	-15,92 (3,38)***	6107	-12,70 (4,48) **	1345	16,20 (13,87)	(729/ 193)	7,13 (10,50)	(729/ 220)
Netherlands	-0,29 (2,18)	6793	0,36 (2,18)	6725	10,26 (3,42)**	(4939 / 1303)	2,74 (3,26)	(4939/ 1366)
Norway	25,78 (9,36)**	2414	20,33 (9,52) *	1664	8,97 (17,30)	(96/66)	17,83 (15,20)	(96/ 67)
Portugal	-5,89 (3,64)	8858	2,63 (3,75)	6450	20,33 (5,90)**	(592/464)	16,33 (5,81)**	(592/ 462)
Slovakia	17,84 (3,50)***	8062	2,52 (3,87)	7865	0,24 (5,71)	(519/442)	-6,39 (5,69)	(519/ 455)
Spain	27,11 (1,14)***	18575	21,86 (1,50) ***	14394	-2,19 (14,17)	(3592/ 609)	1,80 (5,71)	(3592/ 679)

Sweden	A	23,97 (4,04)***	9190	21,79 (4,13)***	5637	9,32 (7,94)	(459/ 322)	7,95 (6,82)	(459/ 336)
Switzerland	A	20,25 (6,63)**	15893	11,25 (6,62)	11034	-8,19 (9,96)	(158/152)	-2,32 (9,52)	(158/155)
<b>OTHER INDUSTRIALIZED</b>									
Canada		48,63 (2,92)***	21606	46,21 (2,94)***	14702	35,86 (6,14)***	(823/ 543)	31,60 (5,83)***	(823/556)
Israel	B	4,42 (4,68)	2462	3,96 (4,72)	2449	1,38 (7,83)	(571/ 377)	5,44 (7,27)	(571/ 400)
<b>LATIN AMERICA</b>									
Argentina		54,33 (4,14)***	2011	52,95 (5,33)***	1178	83,36 (17,29)***	(694/ 168)	24,76 (11,23)*	(694/203)
Chile	B	37,01 (2,85)***	3718	31,05 (2,96)***	3470	15,18 (6,14)*	(1751/ 747)	23,03 (4,48)***	(1751 / 836)
<b>ASIA</b>									
Hong Kong	A	-8,77 (1,73)***	7872	-7,02 (1,77)***	7704	-5,76 (3,75)	(5120/ 1255)	-4,39 (3,11)	(5120/ 1341)
Indonesia		-29,32 (3,91)***	4099	-9,92 (4,15)*	1924	-15,36 (7,93)	(298/ 170)	0,15 (7,47)	(298/ 187)
Korea	B	-2,36 (2,31)	5034	-1,54 (2,33)	4932	-6,44 (3,43)	(2073/ 1172)	-6,45 (3,15)*	(2073/ 1265)
Thailand	B	-23,63 (3,30)***	11196	-22,60 (3,37) ***	11009	-31,71 (4,72)***	(510/ 462)	-21,39 (4,58)***	(510/ 454)

Source: pooled data PISA dataset for 2000, 2003 and 2006;