

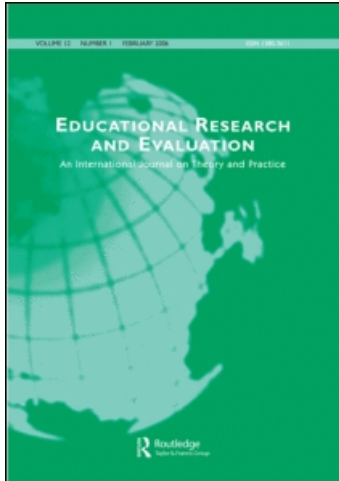
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A cross-national analysis of the relations of school choice and effectiveness differences between private-dependent and public schools¹

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We apply propensity score matching to the estimation of differential school effectiveness between the publicly funded private sector and the public sector in a sample of 26 countries. This technique allows us to distinguish between school choice and school effectiveness processes and thus to account for selectivity issues involved in the comparison of the 2 sectors. Concerning school choice, we found 2 patterns: a choice of upwardly mobile parents for private schools and a preference for segregation by (lower) middle-class parents. As regards school effectiveness, our results indicate that, after controlling for selectivity, a substantial advantage in reading achievement remains among students in publicly funded private schools in 10 out of the 26 countries.

Keywords: school choice; school effectiveness; private-dependent and public schools; international comparison

Introduction

The differences in scholastic achievement between 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, a significant distinction is drawn within the private sector between private-dependent (i.e., publicly financed) and private-independent schools. This distinction is important for at least three reasons. Firstly, in many countries, especially in continental Europe, these two types of schools exist alongside each other and alongside public schools, often as an unintended outcome of the 19th-century struggle between the State and Church(es) for ownership and financing of schools. Secondly, the functions that these types of schools fulfil can differ significantly, depending on the social, religious, or ethnic groups that charter them. 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 1980s, Anglo-Saxon countries have experienced a renewed debate around school choice and school effectiveness, against the backdrop of resurging neoliberal ideas. Parental choice and state-funded private schools are often

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advocated in the USA as a means of introducing competition for pupils among schools and of 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 USA 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 the neoliberal discourse on the effectiveness of public and private schools).

Due to its implications for educational policy, differential effectiveness between private and public schools constitutes an important research topic. The debate started with the study of Coleman, Hoffer, and Kilgore (1982), who claimed that pupils attending Catholic schools in the USA performed at higher levels than those attending comparable schools in the public sector. This signalled 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. Meanwhile, Dronkers (2004) 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 daily life in most European societies, religious schools have not faded away throughout Europe. On the contrary, the religious school sector is either growing or strongly overrepresented in largely or increasingly secular states (France: Langouët & Léger, 1994; Germany: Dronkers, Baumert, & Schwippert, 2006; The Netherlands: Dijkstra, Dronkers, & Karsten 2004). This holds not only for those societies where such religious schools were traditionally present (France, the old German Länder, The Netherlands) but also for those societies in which religious schools had been abolished by communist regimes (like Hungary, see Dronkers & Robert, 2004). This trend might be explained by relating it to purportedly greater teaching effectiveness of religious schools compared to public ones. Although religious schools may have abandoned or relegated the religious socialization of their pupils, they may still try to achieve 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 greater average effectiveness of religious schools in Europe.

Public–private comparisons

Comparisons of achievement between students in private and public schools have been carried out mainly on a national basis. In the USA, research based on *High School and Beyond* and the *National Education Longitudinal Study* has generated

heated controversies about whether private – in particular Catholic – schools were able to raise the achievement of their pupils more than public schools did (Alexander & Pallas, 1983; Chubb & Moe, 1990; Coleman & Hoffer, 1987; Gamoran, 1996; Greeley, 1982; Hoffer, 1998; Jeynes, 2002; Neal, 1997; Noell, 1982; Willms, 1985). However, these studies yielded few consistent findings. Results depended on the timing of the study, on the particular choice of research design and variables, and on the precise statistical methods used.

Despite the prevalence of publicly funded private schooling in Europe, evidence on the extent to which private schools on the continent have been more or less effective in bringing about higher cognitive outcomes is relatively scarce. Nonetheless, some studies have indicated a potential advantage of attending a private-dependent or a religious school in The Netherlands (Dijkstra, Dronkers, & Hofmann, 1997; Koopman & Dronkers, 1994; Sturm, Groenendijk, Kruithof, & Rens, 1998), France (Langouët & Léger, 1994) and Germany (Dronkers et al., 2006; Dronkers & Hemsing, 2005) on measures such as test scores, dropout rates, and graduation rates. However, the private-dependent school advantage was far from straightforward (often depending on contextual circumstances) and often could not be replicated using different datasets. Analyses of the effectiveness differences between private and public schools are more rare outside Europe and the USA, although there is an emerging scientific literature in Latin America (Somers, McEwan, & Willms, 2004).

Although the differences in scholastic achievement between public and private-dependent schools are relevant for nearly all developed countries, little cross-national research has looked into these differences in a comparative way. Making use of the Programme for International Student Assessment (PISA) 2000 survey (Organisation for Economic Co-operation and Development [OECD], 2001), Dronkers and Robert (2008a, 2008b) have conducted a systematic comparison of the effectiveness of public, private-dependent, and private-independent schools in 22 OECD countries. Their analysis has found that, although the larger part of the gross scholastic achievement differences between public and private-dependent schools can be explained by differences in student intake and by related differences in school composition, private government-dependent schools still have a higher net scholastic achievement in reading than public schools with comparable students, parents, and social composition. Moreover, the private-dependent sector advantage was found to be universal, meaning that it was more or less equal in the various countries.

Dronkers and Robert (2008a, 2008b) also showed that the effects of private-dependent schools on educational performance deviate from those of private independent schools. This shows up the fallacy of lumping private-dependent and private-independent schools together as schools operating under comparable market circumstances: Positive and negative effects of both types will cancel each other out (this mistake is made by, for instance, Vandenberghe & Robin, 2004, in their analysis of the PISA 2000 data, and by Somers et al., 2004, in their analysis of Latin-American private schools).

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 beneficial for children from higher social strata.

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 discuss this literature at length, we point out some useful 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 – and therefore unmeasured – selectivity involved in opting for a private school instead of a public one. Indeed, a number of studies have shown that private and public school students differ in substantial ways, such as in parental education, income and wealth, educational resources present at home, and parental involvement in the pupil's educational career (Coleman & Hoffer, 1987; Coleman et al., 1982; Goldring & Phillips, 2008; Greeley, 1982; Witte, 2000; Yang & Kayaardi, 2004). More generally, when attendance of a school, whether public or private, is “free”, meaning both parental and school selection occur before a student can enroll, selectivity is always an issue. Wealthier, better informed, and better educated parents will presumably have an advantage in finding and in gaining access to the “best” school for their child (Ball 1993, 1997; Ball, Bowe, & Gewirtz, 1995; Echols & Willms, 1995; Goyette, 2008; Jarvis & Alvanides, 2008).

Analyses in the school effectiveness tradition – Dronkers and Robert (2008a, 2008b) follow that tradition – assume that the measured parental and pupil variables will control for any selectivity induced by school-choice processes. This assumption seems appropriate when comparing the effectiveness of public schools within and across countries, as most often public schools have fixed catchment areas and involve virtually no parental school choice, aside from the indirect choice of residence.

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 (as in The Netherlands). A host of factors associated with parental and student background might be linked to both choice processes and outcomes, and this almost surely brings about the problem of unmeasured heterogeneity, which might or might not be solved by the measured parental and pupil variables. More generally, the fact that both parents and schools are relatively unconstrained in picking a school or a student amplifies self-selection problems.

To address the issue of selectivity, we propose another approach, namely propensity score matching, to explicitly disentangle 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, his or her parents, and the features of the chosen school. The second step of the approach consists of estimating the effectiveness of non-public schools, based on a matched sample of pupils with similar propensities of choosing a private school but who nonetheless attended a public one.

In this article, we focus on the choice between public and private-dependent schools (private schools which get their financial resources mainly from the national, regional, or local governments of their country) and on the corresponding differences in school effectiveness in the cognitive domain (reading).²

Another approach to disentangling the relations between choice and effectiveness

To distinguish between school choice and school effectiveness processes, we employ a technique called propensity score matching.³ 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 and 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 match⁴ pupils who did with those that did not choose private schools, our treatment and control groups. Students in the treatment group that could not be matched based on their propensity score are discarded from subsequent analyses. The mean estimated difference in academic achievement between the matched treatment and control groups represents the effect of attending a private school on achievement for students with propensity scores within the range of the matched sample, that is, the average treatment effect for the treated.

We want to stress that propensity score matching techniques are not a “magic bullet”. They only account well for selection 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, that is, 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. Ordinary least squares (OLS) regression analysis (which is most commonly used in school effectiveness analysis, multilevel models included) estimates the average treatment effect of private school attendance 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 attending a private school for the full sample, but only for a selective part, namely those pupils who have the possibility to actually choose a private school. 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 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.⁵ 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 consists of 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, that is, they are thought to play a particularly important role in school choice selectivity (Ball, 1993; Gorard, 1999; Witte, 2000). 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 study of the effects of private and public schools, 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, & Coleman, 1985; Morgan, 2001).

Data and methods

Our analyses are carried out using the PISA survey dataset. 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.⁶ Other datasets such as the Trends in International Mathematics and Science Study (TIMSS) and the Progress in International Reading Literacy Study (PIRLS) allow only for the distinction between public and private schools, and are thus less useful given the above-mentioned differences in effectiveness between private government-independent and private government-dependent schools (Dronkers & Robert, 2008a). We restrict ourselves in this article to the comparison between public and private-dependent schools.

Three waves of the PISA survey have been carried out so far, in 2000, 2003, and 2006 (OECD, 2001, 1004, 2007). Use has been made of all three waves by pooling them into one database.⁷ This strategy allows us to maximize the number of private-dependent schools present in the database. We selected all countries in Europe, other industrialized countries, Latin America, and Asia that have a minimum of 10 schools per category. We omit all countries in which the private-dependent schools cater for less than 1% of the pupil population.⁸

We use only the score on the reading test as indicator of students' educational performance. Reading performance is fully measured in all three waves, whereas the

scores from the mathematics or sciences tests only feature partly or in fewer waves. Earlier analyses have shown that the parameters of private and public schools do not vary substantially between these three indicators of educational performance (compare the results of Dronkers and Robert, 2008a, who use reading as indicator, with Dronkers and Robert, 2008b, who use math as indicator).

The PISA data are cross-sectional data and provide no information about the length of the stay of the pupils at the current school or about the characteristics of former schools of the students. This might lead to a misspecification of the effect of the characteristics of the current school, especially if all 15-year-old pupils in a specific country have moved recently to another school.

Based on existing literature comparing private and public schools, as well as on the availability of comparable data in the three waves of PISA, a variety of family and school characteristics that are likely to influence school choice and school effectiveness have been included in the analyses. Gender, immigrant status, cultural possessions, household wealth, and 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. These student and parental characteristics were the most powerful predictors in earlier analysis with the PISA data, while parental income (separate from household wealth) is not available in PISA. The school's social composition (percentage of students having at least one 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 visible school 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 level. All of the school characteristics included are relatively visible to parents and may therefore play a role in shaping school choices. We did not include school characteristics which are less visible for parents (like teacher quality), because their role in the parental school choice process is random due to their unobservability by parents. Finally, to gauge the potential deterrent effect that financial costs of attending a school might have, a tuition variable, that is, whether the school charges tuition fees or not, 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.

Twenty-six countries on four continents have enough public and private-dependent schools to be included in the analyses, although in some cases the private-dependent sector caters for a small percentage of all 15-year-olds (but always more than 1%).

Results for the choice of private-dependent schools versus public schools

A set of 26 logistic regression analyses including all the parent, pupil, and visible school characteristics presented in the previous section has been used to predict the selection of a private-dependent school rather than a public school for each country separately.

Table 2 shows the regression coefficients of these analyses. Since we use multiple regressions that simultaneously include all of the predictors, the resulting coefficients can be interpreted as "net" effects on the school choice.

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
ISCED 0/1 Mother education	2.47	5.87	0.78	2.76	3.65	3.19	4.59	9.51	0.7	5.4	5.46
ISCED 2	7.49	7.65	2.59	8.55	11.3	4.87	11.05	19.07	9.51	14.94	29.17
ISCED 3b, 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 5b	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 Father education	1.71	5.46	0.63	3.09	5.82	2.85	3.85	11.03	0.73	8.16	6.31
ISCED 2	5.8	7.12	1.72	9.26	13.73	5.35	9.9	18.11	5.9	18.96	28.58
ISCED 3b, 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 5b	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

(continued)

Table 1. (Continued).

	Luxembourg	Netherlands	Norway	Portugal	Slovakia	Spain	Sweden	Switzerland	Canada	Israel
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
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 Mother education	18.86	7.48	1.74	32.71	0.96	18.62	2.55	5.54	1.85	4.19
ISCED 2	13.67	13.55	4.63	22.23	4.4	23.56	8.32	20.49	6.89	5.1
ISCED 3b, 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 5b	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 Father education	15.14	6.93	2.04	32.96	1.04	19.06	4.01	4.58	3.42	4.18
ISCED 2	10.01	11.2	5.75	22.37	2.95	20.35	12.47	17.65	10.99	6.14
ISCED 3b, 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 5b	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
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
Girls' schools %	8.59	1.42	0	0	0.15	0.23	0	0.42	0.63	13.4
Boys' 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	24.13	48.71	34.71	19.57	24.49	29.34	48.45	24.71	38.29	48.9
(% parents having tertiary education) - (average)	1420.93	1005.02	292.24	974.41	554.6	709.66	492.27	455.52	756.66	831.83
School size										

(continued)

Table 1. (Continued).

	Luxembourg	Netherlands	Norway	Portugal	Slovakia	Spain	Sweden	Switzerland	Canada	Israel
Tuition % having tuition fees	23.86	90.97	38.33	80	14.18	43.85	45.14	48.27	80.43	80.25
Admittance – parents' 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
	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				

(continued)

Table 1. (Continued).

	Argentina	Chile	Hong Kong	Indonesia	Korea	Thailand
ISCED 0/1 Mother education	18.1	9.02	26.55	37.05	7.15	41.57
ISCED 2	22.54	18.85	29.58	25.46	14.95	29.89
ISCED 3b, 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 5b	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
ISCED 2	22.88	17.56	29.35	23.1	11.6	27.7
ISCED 3b,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 5b	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
Girls' schools%	1.76	7.16	11.6	0.56	35.32	2.95
Boys' 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 (% parents 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 – parents' 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-sec composition	School size	Admission- parents' endorsement	Admission- special program	Student- teacher ratio	Computer- student ratio	Educational resources	Tuition
EUROPE																	
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* (0.084)	0.319* (0.024)	0.620* (0.043)
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*
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* (0.249)
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)	1.531* (0.124)	1.31* (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)	-0.007 (0.004)	-0.002 (0.005)	0.319 (0.492)	-0.001 (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)	-0.007 (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* (0.100)	-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)	0.002 (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)	-0.003 (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 (0.604)	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* (0.054)	-0.042 (0.052)	-0.020 (0.052)	-0.001 (0.003)	0.000 (0.003)	2.494* (0.000)	-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)	0.003 (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)	0.551 (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)	1.233* (0.217)

(continued)

Table 2. (Continued).

Regression coefficients	Gender	Immigrant	Foreign language used at home	Cultural possessions	Family wealth	Mother ISCED	Father ISCED	Mother SES	Father SES	School-size composition	School size	Admission-parents' endorsement	Admission-special program	Student-teacher ratio	Computer-student ratio	Educational resources	Tuition
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)
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 (0.003)	-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)
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* (0.680)	-0.019 (0.018)	3.935* (0.456)	0.521* (0.029)	1.760* (0.099)
Indonesia	-0.087 (0.132)	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)	0.002 (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-size 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.

The results indicate that, in general, the choice pattern between private-dependent and public schools differs across these 26 countries. Admission based on parents' endorsement of the school's philosophy positively influences the likelihood of choosing a private-dependent school in all countries, with the exception of Finland, Sweden, and Indonesia. Parental endorsement figures in the admission policies of all private-dependent schools in France and Norway, so that a coefficient could not be computed for this variable in these two countries. Admission policies based on participation in a special program positively influence the likelihood of the choice of a public school in nearly all countries, except in Belgium, The Netherlands, Sweden, Switzerland, Argentina, Chile, and Indonesia, where such policies increase the chance of a private-dependent school option.⁹ A high score on the socioeconomic 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 either has no effect or it actually increases the probability of a public school choice. A higher number of teachers per student in schools impacts positively¹⁰ on the likelihood of selecting a private-dependent school only in Austria, Belgium, the Czech Republic, and Norway, but the same variable increases the odds of the public school option in Germany, Hungary, Ireland, Portugal, Spain, Sweden, Switzerland, Canada, Argentina, Chile, Indonesia, and Korea. The payment of tuition is positively associated with the choice of a private-dependent school 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 selection of a given school type in a substantial number of countries. Parents with a male child tend to choose private-dependent schools more often in Austria, Belgium, the Czech Republic, Germany, Ireland, Luxembourg, Argentina, Korea, and Thailand, while they will prefer a public school in Italy and Chile. Native parents¹¹ more frequently choose private-dependent schools in Belgium, Canada, and Hong Kong, but they prefer 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 to the choice of a private-dependent school in Austria, Belgium, the 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.

Based on this huge variation in factors which affect the choice between public and private-dependent schools in the various countries, easy characterizations – such as that choice is always driven by class, educational capital, fear of immigrants, wealth, school resources, or selectivity – are simply misleading. In an attempt to systematize the variation in the effects of various pupil and school characteristics across countries, we have made use of cluster analysis, using the country regression coefficients¹² as input. Figure 1 shows the country groupings that have emerged from the cluster analysis.¹³ Countries where coefficients are more similar are clustered closer together, while countries with more divergent coefficients are placed further away from each other. The cluster analysis suggests the existence of two clusters.¹⁴ The first cluster consists of Austria, Ireland, the Czech Republic, Finland, Denmark, Germany, Sweden, Switzerland, and Hong Kong. Table 3 shows that

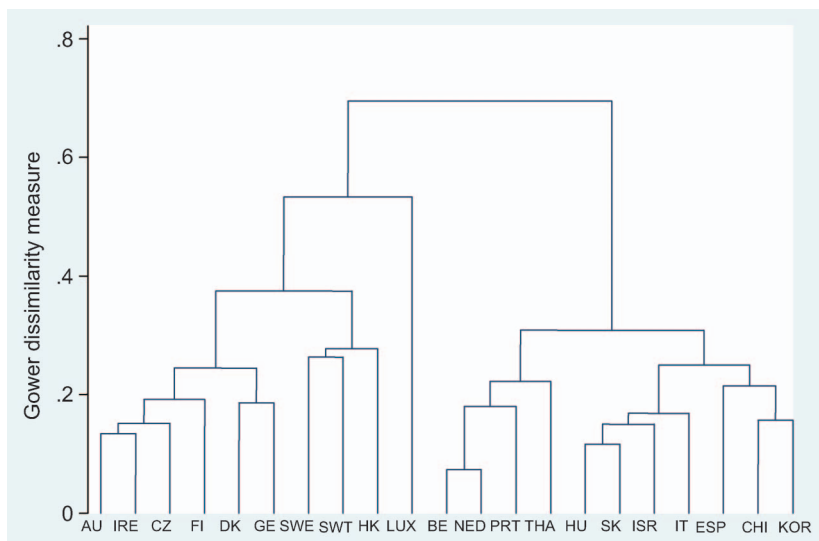


Figure 1. Clusters of choice patterns of private-dependent schools versus public school.

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.

the private-dependent schools in these 9 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 upwardly mobile parents*. The second cluster comprises Belgium, The Netherlands, Portugal, Thailand, Hungary, Slovakia, Israel, Italy, Spain, Chile, and Korea. Table 3 shows that the private-dependent schools in these 11 countries are chosen by male native pupils with less cultural possessions at home, higher educated mothers, parents with lower occupational status, and parents 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*.

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

The effectiveness in reading achievement of private-dependent schools compared to that of public schools

In this section, we present the results of the second step of the propensity score matching analysis. We only compare pupils who have more or less equal propensities

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

	Male	Immigrant	Foreign language used at home	Cultural Possessions	Family wealth	Mother ISCED	Father ISCED	Mother SES	Father SES	School Socioeconomic composition	School size	Admission parents' endorsement	Admission Special program	Teacher-Student ratio	Computer-Student ratio	Educational 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 versus a public school on reading achievement.

Cluster	Simple reading score difference between private and public school 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 school neighbour in propensity scores		No. of pupils (private/public)	Reading score difference of the private-public school pupils based on nearest neighbour and Mahalanibis distance		No. of pupils (private/public)
			score difference	of propensity scores of private and public school pupils		difference of the private-nearest school neighbour in propensity scores	difference of the private-public school pupils based on nearest neighbour and Mahalanibis distance				
EUROPE											
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	23.97 (4.04)***	9190	21.79 (4.13)***	5637	9.32 (7.94)	(459/322)	7.95 (6.82)	(459/336)			
Switzerland	20.25 (6.63)**	15893	11.25 (6.62)	11034	-8.19 (9.96)	(158/152)	-2.32 (9.52)	(158/155)			
OTHER INDUSTRIALIZED											
Canada	48.63 (2.92)***	21606	46.21 (2.94)***	14702	35.86 (6.14)***	(823/543)	31.60 (5.83)***	(823/556)			
Israel	4.42 (4.68)	2462	3.96 (4.72)	2449	1.38 (7.83)	(571/377)	5.44 (7.27)	(571/400)			

(continued)

Table 4. (Continued).

Cluster	Simple reading score difference between private and public school 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 nearest school neighbourhood in propensity scores	No. of pupils (private/public)	Reading score difference of private-public school pupils based on nearest neighbour and Mahalanobis distance	No. of pupils (private/public)	
Argentina	54.33 (4.14)***	2011	52.95 (5.33)***	1178	83.36 (17.29)***	(694/168)	24.76 (11.23)*	(694/203)	
Chile	37.01 (2.85)***	3718	31.05 (2.96)***	3470	15.18 (6.14)*	(1751/747)	23.03 (4.48)***	(1751/836)	
Hong Kong	-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	-2.36 (2.31)	5034	-1.54 (2.33)	4932	-6.44 (3.43)	(2073/1172)	-6.45 (3.15)*	(2073/1265)	
Thailand	-23.63 (3.30)***	11196	-22.60 (3.37)***	11009	-31.71 (4.72)***	(510/462)	-21.39 (4.58)***	(510/454)	
LATIN AMERICA									
ASIA									

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

to attend a private-dependent versus a public school. We omit those pupils in private-dependent schools who have no comparable match among pupils in public schools. This leads to the loss of quite a large number of pupils in the sample, particularly in countries where the private-dependent sector is small or obviously skewed towards better-off families.¹⁵ Table 4 summarizes the results of our analyses and the number of matched pupils.

The first column gives the raw average difference in reading scores between pupils in private-dependent schools and public schools, without any control for covariates. Given the school-choice selectivity discussed in the previous section, 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 reading scores on average. Quite surprisingly, however, 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, they do not reflect school effectiveness.

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 small overlap in propensity scores between pupils in the private-dependent and public sector, respectively. In Luxembourg, Sweden, Canada, Argentina, and Indonesia, the drop is particularly 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 the match, as long as the pupils of the matched pair 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, The 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 (the difference became negative), the Czech Republic, The Netherlands, Portugal (the difference became positive), Italy, Luxembourg, Spain, Sweden, Hong Kong, and Indonesia (the difference became insignificant). This shows that controlling for the selectivity of school choice is important for unmasking “true” school effects.

Although propensity score matching has the advantage of requiring matching on only one dimension, that is, the propensity score, it has the drawback that similar propensity scores can be the result of different combinations of parent, student, and school characteristics. To further verify our results, we have used propensity score matching with Mahalanobis distance on a few key student background indicators. The Mahalanobis distance matching allows for a greater weight to be assigned to the variables on which the distance is computed. We chose to include five variables in the Mahalanobis distance computations, namely 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 additional controls for the five covariates (Column 7), does not change the results much compared with the analysis based on simple nearest neighbour propensity score matching (Column 5). After applying this (stricter) form of control for school choice-induced selectivity, significant positive differences in the reading score between pupils of private-dependent and public schools persist in Belgium, the Czech Republic, Germany, Hungary, Ireland, Portugal, Canada, Argentina, and Chile. Pupils of private-dependent schools in Finland, Italy, Korea, and Thailand score significantly lower than pupils of public schools. In the remaining 13 countries, the differences in reading scores between pupils in the two sectors are not significant. Note that the different (stricter) method of control for the selectivity of school choice changed the results for Austria and The Netherlands (the difference became insignificant), as well as for Finland, Italy, and Korea (the difference became negative).

Finally, no apparent relationship could be established between school choice and school effectiveness processes (Table 4). Both clusters derived based on the choice patterns contained countries with a more effective private-dependent sector, as well as countries where the public sector is more successful in raising the achievement outcomes of its pupils.

School choice and school effectiveness

Propensity score matching can provide a useful tool to differentiate between the effects of school choice and those of school effectiveness. Making this distinction is crucial for a valid estimation of the school sector differentials in effectiveness, that is, the gains in achievement that are brought about by the school itself rather than being a consequence of its student intake.

The choice of private-dependent schools in these 26 countries varies according to school characteristics, especially school composition, school size, admission criteria (both parental endorsement of the school's values and participation in special programs), 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 upwardly mobile parents for private schools*. The second one might be pictured as a preference for *segregation by (lower) middle-class parents*, through the use of the private-dependent sector.

We have also found large variation in sector-related effectiveness across countries. After having taken into account the differences between the private-dependent and public sectors generated by school choice processes, pupils at private-dependent schools in 10 countries (Belgium, the Czech Republic, Germany, Hungary, Ireland, The Netherlands, Portugal, Canada, Argentina, and Chile) still performed significantly better than their counterparts in the public sector. Their observed higher reading scores cannot be explained by the school choice processes, and this might be an indication of a greater effectiveness of private-dependent schools in these countries. However, in Austria and Thailand (thus a small minority of the countries studied), pupils at private-dependent schools have lower reading scores than pupils in the public sector. Thus, in these two cases, the school choice processes mask the actual lower effectiveness of private-dependent schools, compared to the higher effectiveness of the public sector. Religious or ethnic motives might explain the parental preference for private-dependent schools, despite their lower effectiveness.

Our findings contradict neoliberal theories related to school choice and school effectiveness at least on two counts. First, we could not find any correlation, at the country level, between school choice and school effectiveness patterns. The lack of a choice-effectiveness link contradicts the notion of the existence of a universal consumer logic operating in school markets, whereby parents always choose the most effective schools for their children. In fact, in a number of countries parents chose to send their children to a private-dependent school *despite* the lower success of this type of schools in raising achievement.

Second, we could not find any universal private-dependent schooling advantage. On the contrary, in the majority of the countries included in the analyses (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. These results also deviate from those of Dronkers and Robert (2008a, 2008b). They found, using a customary OLS multilevel regression analysis containing corrections for student background variables and school composition, that private-dependent schools were more effective than public schools in *all* countries. This finding is not confirmed in this study, as higher achievement scores in the private-dependent sector emerged only for a (large) minority of the countries studied. However, our study contains a wider variation of countries than the range Dronkers and Robert (2008a) analyzed.

Nonetheless, the findings of our study also indicate that we cannot simply dismiss the notion of greater effectiveness of private-dependent schools, at least in some countries, by referring solely to the selectivity argument. Private-dependent schools remain significantly more effective than comparable public schools in a substantial number of countries, even after complex adjustments and controls for their student intake.

Cross-national variation in both choice and effectiveness patterns related to the publicly funded private sector points to the potential role played by country-specific institutional and social factors. Dissimilarities in the legal framework regulating the private-dependent schooling sector, as well as the general education system containing it, give rise to divergent opportunities and constraints to which private-dependent schools must adapt. In turn, the legal framework is often the result of prolonged social and political processes with deep historical roots. Furthermore, differences in religious and ethnic composition of public and private schools in the various countries, which we could not take into account, might explain this cross-

national variation in choice and effectiveness. Moreover, in some countries, the cleavage between public and private-dependent schools might be deep for still relevant historical reasons, while in other countries students now move freely from public to private-dependent schools and vice versa.

Further cross-national analyses are needed to pinpoint the exact institutions and legacies that are involved in moulding both school choice and school effectiveness between the private and the public sectors.

Notes

1. This article is one of the products of the cross-national project “Religious Education in a Multicultural Society: School and Home in Comparative Context”, directed by Emer Smyth (Economic & Social Research Institute, Dublin, Ireland) and financed by the European Commission within the 7th Frame Work (FP7-SSH-2007-1- REMC).
2. 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 on environmental issues and school climate.
3. For the description of this technique, we use the article of Frisco, Muller, and Frank (2007), who use this technique in their analysis of the effects of parental divorce on children’s well-being.
4. We use nearest neighbour and nearest neighbour with Mahalanobis distance matching.
5. Normally, this should not be a big problem (see Morgan & Winship, 2007).
6. The PISA survey does not distinguish between denominational and non-denominational schools.
7. We could only use the first PISA wave for France, because the public dataset of the second and third PISA waves does not contain valid values for French public and private school indicator. We have to assume that this private-public distinction has become a state secret, too annoying for the secular French Republic to be published.
8. There were too few charter schools in the USA (which are considered by PISA as private-dependent schools) to be included.
9. While this admission based on programs is necessary for all French and Norwegian private-dependent schools.
10. This is a negative coefficient in Table 2, because the variable is the student–teacher ratio.
11. Based on country of birth of (one of) the parents outside the country of birth and/or the foreign language used at home.
12. Given the different measurement scales of variables, we multiplied the coefficient by the existing range in the sample to compute a maximum effect; also, the analysis uses the Gower measure and the Ward’s method of clustering.
13. We had to delete from the cluster analysis those countries (Argentina, Canada, France, Indonesia, Norway) for which not all parameters are available.
14. Luxembourg is clearly a separate case, which has few in common with the two clusters.
15. Information about the characteristics of the matched treated and control pupils and their parents is available from the first author.

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