

# AUTHOR ACCEPTED MANUSCRIPT

## PRELIMINARY INFORMATION

Private Education Provision and Public Finance : The Netherlands

Accepted for publication in

Education Economics

To be published by Taylor and Francis

**THE FINAL PUBLISHED VERSION OF THIS ARTICLE  
WILL BE AVAILABLE ON THE PUBLISHER'S PLATFORM**

This Author Accepted Manuscript is copyrighted by the World Bank and published by Taylor and Francis. It is posted here by agreement between them. Changes resulting from the publishing process—such as editing, corrections, structural formatting, and other quality control mechanisms—may not be reflected in this version of the text.

This Author Accepted Manuscript is under embargo for external use and is made available for internal World Bank use only. It is not for distribution outside the World Bank.

# **PRIVATE EDUCATION PROVISION AND PUBLIC FINANCE: THE NETHERLANDS**

HARRY ANTHONY PATRINOS\*

WORLD BANK

**ABSTRACT:** One of the key features of the Dutch education system is freedom of education – freedom to establish schools and organize teaching. Almost 70 percent of schools in the Netherlands are administered by private school boards, and all schools are government funded equally. This allows school choice. Using an instrument to identify private school attendance, it is shown that the Dutch system promotes academic performance. The Instrumental Variables results show that private school attendance is associated with higher test scores. Private school size effects in math, reading and science achievement are 0.19, 0.31 and 0.21.

JEL Classification Codes: I72, I22, L33

Keywords: School choice, vouchers, education, human capital

---

\* I have benefited greatly from discussions with and comments from Husein Abdul-Hamid, Eric Bettinger, Wim Bos, Cypriaan Brom, Eamonn Butler, Erik Canton, A. Clement, H. Davids, Frans de Vijlder, AnneBert Dijkstra, Henri Geerling, Martyn Haeser, Sjoerd Karsten, Geeta Kingdon, Gwang-Jo Kim, Michael Latham, Henry Levin, Jesse Levin, Daniel Levy, Neil McIntosh, Hessel Oosterbeek, Tjeerd Plomp, George Psacharopoulos, Jo Ritzen, Ton Rolvink, Chris Sakellariou, R. Schouten, J.W. Schraven, Christine Teelken, Roelien Timmerman, R. van der Horst, J. van Dommelen, Nico van Zuylen, Ayesha Vawda, Richard Venniker, Adrie Visscher, Dinand Webbink, and participants at seminars at the American Economic Association, the World Bank, and the National Center on School Choice, Vanderbilt University. I thank Vicente Garcia-Moreno for able research assistance. Support from the World Bank's Human Development Network Professional Development Grant is gratefully acknowledged. I thank the editors and anonymous referees for comments. The views expressed here are those of the author and should not be attributed to the World Bank Group. [hpatrinos@worldbank.org](mailto:hpatrinos@worldbank.org).

## **INTRODUCTION**

One of the key features of the Dutch education system is freedom of education – freedom to establish schools, determine the principles on which the school is based, and organize classroom teaching. In fact, the Netherlands has one of the oldest national systems based on school choice in the world. Although all schools in the Netherlands are government funded, most are administered by private school boards. As a result, most children in the Netherlands attend private schools, a trend that has been increasing over the past 150 years. Parents can choose among several schools, and school choice is often promoted by the government as a way to increase competition in the school system. Efficiency increases as public and private schools try to improve their outcomes to develop a good reputation and thus attract more students.

School choice is often promoted as a means of increasing competition in the school system (Friedman 1955). It is believed that competition will lead to efficiency gains as schools – public and private – compete for students and try to improve quality while reducing expenses (Hoxby 2003; Neal 2002). By encouraging more private schools, vouchers will allow school managers to become innovative and thereby bring improvements to the learning process. Public schools, in order to attract the resources that come with students, will need to improve. Thus, school choice will lead to improved learning outcomes and increased efficiency. Opponents claim that under a voucher system private providers will be unaccountable to tax payers and the public. Claims of efficiency gains are also questioned. Further, opponents sometimes claim that choice will lead to privatization, less public (government) control of education, and increased segregation (Ladd 2002). The United States literature on school choice is extensive (see Peterson 2009 for a recent review). The international literature is small, but growing (see Barrera-Osorio and Patrinos 2009 for a recent review).

However, most of the literature has focused on small-scale choice systems (such as in a number of cities in the United States). Denmark's large and mature voucher system has been researched. Andersen (2005), Andersen and Serritzlew (2006), Nannestad (2004) and Rangvid (2008) reach the conclusion that, despite increments in competition, private schools do not perform academically better than public ones. These analyses suffer from weak instruments and non-robust methodologies. For the case of Sweden, Ahlin (2003) estimates the effect of a general school choice reform on student performance. Using a rich set of individual level data, increased school competition is shown to have statistically significant positive effects on student performance in mathematics, but no significant effects in English and Swedish. Interacting school competition with student characteristics, the results indicate that immigrant students and those in need of special education tend to gain more from increased school competition than others, while adverse effects on students from low education families are found in terms of English and Swedish performance. Also for Sweden, Sandström and Bergström (2004) analyze the effects of competition on public schools using data on 28,000 ninth graders. They account for potential endogeneity of the share of students attending independent schools by using instrumental variable estimation. Their findings support the hypothesis that school results in public schools improve due to competition. Research on Chile's universal school choice model has been subject to a high level of scrutiny. The research is controversial, with several early articles presenting data to show that subsidized, private schools obtain higher standardized test scores than do public schools (Rodriguez 1988; Aedo and Larranaga 1994; Aedo 1997). A second batch of studies uses individual level information with large samples (Bravo et al 1999; Carnoy and McEwan 2000; Mizala and Romaguera 2000; Gallegos 2002; Vegas 2002). Several studies advance the previous estimations, with strategies to overcome the problem of self-

selection. Sapelli and Vial (2002, 2004) have taken into account some of the deficiencies of previous studies, especially in terms of lack of control for selection bias, homogenous treatment effects, and assumptions of equal funding for voucher schools. These studies present small average treatment effects but large treatment on the treated effects. They also reject the hypothesis that peer effects explain the positive results. However, Hsieh and Urquiola (2006), using several instruments and over-time data, find no evidence that choice improved average educational outcomes as measured by test scores, repetition rates and years of schooling. They find that the voucher program led to increased sorting, as the *best* public school students left for the private sector. Gallegos (2006) explains that the differences in results can be attributed to changes in the voucher and education systems in the mid-1990s. He uses information on the number of Catholic priests in 1950 and the institution of the voucher system in 1981 as an exogenous determinant of the supply of voucher schools and shows that vouchers increase tests scores. For Colombia's targeted secondary school voucher program, researchers take advantage of a randomized design (Angrist et al 2002, 2006). The Colombian program found that voucher beneficiaries had higher educational attainment: they were 10 percent more likely to finish the 8th grade three years after they won the vouchers, 5 to 6 percent less likely to repeat a grade, they scored 0.2 standard deviations higher on achievement tests than non-voucher students, and they were 20 percent more likely to take the college entrance exam than students who had not won a voucher in the lottery.

The Netherlands provides an ideal situation to examine the effects of school choice in a long-standing system. Interestingly, the issue of choice in the Netherlands has been understudied (but see Ritzen et al 1997; Himmler 2007; Dronkers and Avram 2010, 2009; Dronkers and Robert 2008a, b). In the Dutch national school choice system, policy is determined centrally

but the administration and management of schools is decentralized to the school level. The central government exercises ultimate control over both public and private schools. Students from the Netherlands do exceptionally well on international academic achievement tests such as TIMSS and PISA. The country achieves high scores even after controlling for national income and expenditure per student. Thus, the system is not only successful academically but is also cost effective, yielding good results at relatively low cost. The substantial degree of competition in the system is one determinant of its high academic achievement rates. Thus, a large school choice system can promote efficiency and equity without necessarily leading to privatization or to reduced public scrutiny. All this lends credence to the arguments of the proponents of school choice. We contribute to this literature by applying an innovative instrument to control for the endogeneity of private school attendance.

To what extent is student academic achievement in the Netherlands due to school choice? If school choice leads to competition, this can manifest itself in, among other things, schools becoming more effective in managing personnel, teaching students, promoting school efficiency, managing budgets, and involving parents as appropriate. That is, attendance at a private school can lead to superior performance. Given the predominance and growing significance of private schools in the Netherlands, and the ease of entry of new providers, this might be a useful measure of the effect of school choice on outcomes. In fact, Dutch private schools outperform public schools despite 100 years of competition and equal funding to both sectors.

We show that a significant part of the high achievement of Dutch students in international achievement tests is due to the institutional features associated with school choice. We address the selection problem with information on the act of school choice in the Netherlands. We show that when we instrument for school choice, then private school attendance is associated with

higher test scores. Private school size effects in math, reading and science are high and significant, close to 0.2 of a standard deviation in math and science, and almost one-third of a standard deviation in reading.

## **THE NETHERLANDS' SCHOOL CHOICE SYSTEM: AN OVERVIEW**

The current Dutch education system, established in 1917, provides an ideal environment through which the impact of school choice can be examined. The “schools to the parents” movement created a system unparalleled elsewhere in which parents have true freedom over education in that they can choose whatever school they wish for their children while the state pays most of the cost. Freedom of education is guaranteed under Article 23 of the Constitution, which ended the state monopoly in education early on in the Netherlands. Along with school choice, all parts of social life were segmented – often referred to as “pillarisation” (*verzuiling*), in the literature – for a period as long as 1870 to 1960 as part of a political compromise (James 1984). Not only were schools organized along political and religious lines, but so too were other aspects, such as political parties, trade unions, business associations, professional groups, sports clubs, and so on, into different blocs based on religious and ideological basis (Roman Catholic, Protestant, liberal and social-democratic). While the segmentation has ended, interestingly enough, schools continue to be oriented in a particular way, despite the fact that Dutch society has changed considerably. Nevertheless, freedom of education in the Netherlands was not originally based so much on principals of equality and liberalism, but rather on freedom of religion, in a more conservative perspective (Patrinos 2002).

Most schools are private, usually managed by a foundation or church. Municipal authorities are the competent local authority for schools in the area. All schools are governed by

a legally recognized authority (school board). The school board is responsible for implementing legislation and regulations in schools. There is, despite school choice and diversity of supply, no significant elite school sector (Karsten et al 1995). It is required that primary and secondary schools receiving public funds must be not-for-profit. Nevertheless, school boards are able to retain surplus earnings. There are a few for-profit schools, representing less than 1 percent of total enrollments (Hirsch 2002), but they are too small to receive government funds.

There is relative ease of entry of new providers. A small number of parents can and do propose to start a school. Government is required to provide initial capital costs and ongoing expenses, while the municipality provides buildings. A small fund for operating expenses that the school may allocate at its discretion among activities such as maintenance, cleaning, heating, libraries and teaching aids also exists. The sum is determined separately by each municipality, which must then give all public and private schools the same per capita amount. The requisite number of parents required to set up a school varies according to population density, from 200 for small municipalities to 337 for The Hague.

Each family is entitled to choose the school – public or private – they want and the state pays. The main impediments to choice are distance, although parents are free to choose a school anywhere in their city of residence or indeed anywhere in the country since there is no catchment area. Public schools must admit all pupils and most pursue non-restrictive admissions policies. A school cannot refuse to admit a child if parents are unable or unwilling to pay. Once it is certain that a child is to be admitted to the school, a written contract must be drawn up between the school and the parents, stating what the parental contribution is to be used for and what will happen if it is not paid in full.



Money follows students and each school receives for each student enrolled a sum equivalent to the per capita cost of public schooling (Patrinos 2002). The school that receives the funds is then entitled to funding that will cover specified amounts of teacher salaries and other expenses. The number of teachers to which a school is entitled depends on its number of students. Private schools can and do supplement this funding by charging ancillary fees; however, this right is severely limited. There is no evidence of refusing at-risk students (Karsten and Meijer 1999). Municipal schools charge small fees during the 12 year compulsory stage of schooling. Schools are fully accountable towards the parents for the use of fees collected. Other private contributions and sponsorship are allowed, but no advertising materials are permitted, and schools may not become dependent on sponsors (Droog 2001; de Vijlder 2001). The central government pays most of the running costs. Limited local government discretion is allowed. Staff costs are funded according to the number of students enrolled, as well as running costs and supplementary staffing. Municipalities organize and pay for minority language teaching. Salaries are based on fixed scales that take into account education and experience. While the freedom to organize teaching means that schools are free to determine how to teach, still the Ministry of Education, Culture and Science does, however, impose a number of statutory standards in relation to the quality of education. These prescribe the subjects to be studied, the attainment targets and the content of national examinations. There are also rules about the number of teaching periods per year, teacher training and teaching qualifications, the rights of parents and pupils to have a say in school matters, and the planning and reporting obligations of schools. As a rule, schools enjoy considerable freedom in the choice of textbooks and materials and in the way they manage their affairs. The Education Inspectorate is charged by the Minister of Education with supervising the manner in which schools fulfill their responsibilities. The

financing procedure is somewhat different at the secondary level. All teacher salaries and building costs are covered directly by the municipality. In addition, municipal and private secondary general schools that are included in the Minister of Education's three-year plan get the same discretionary fund per capita. Since 80-90 percent of all current school expenditures are for teacher salaries, this immediately places the bulk of budgetary decisions in the hands of the central government.

Central standards remain. School discretion is limited only by employment laws; teacher qualifications, pay and conditions; and building standards. Funding mechanisms are designed to control national expenditures. Poor schools try to cut costs by improving efficiency, such as more extensive methods of teaching. The Dutch education system combines centralized education policy with decentralized administration and management of schools. Central control is exercised over both public and private schools. The system is characterized by a large central staff; many school advisory services and coordination bodies; a strong Inspectorate; and stringent regulations.

## **TRENDS AND EFFECTS OF PRIVATE SCHOOL ATTENDANCE**

Most children in the Netherlands attend private schools (Figures 1 and 2) and the trend over the past 150 years is increasing. Most school boards are Catholic or Protestant, but there are also Jewish, Islamic, Hindu and humanist schools in the Netherlands. While 35 percent are public, 29 and 27 percent are Catholic and Protestant (Hupe and Meijs 2000). There are also private non-denominational schools that are run by an association or foundation but are not based on any specific religious or ideological beliefs. Like some public schools, many privately run schools base their teaching on specific educational principles.

Education in the Netherlands is free for the compulsory, first ten years of schooling. At all levels of education, the Dutch government spends at the OECD average (OECD 2009). Education spending as a proportion of GDP is 4.8 percent. Thus, achievement levels are high, while relative costs are low. To deal with disadvantage, a weighted funding formula is used. For every ethnic minority student, a school receives 1.9 times the amount paid for other children. This is extra funding for personnel. Native children from disadvantaged backgrounds receive 1.25 times the amount (Ritzen and others 1997; see Leuven et al. 2007 for an evaluation).

In 1997, the daily newspaper *Trouw* ([www.trouw.nl](http://www.trouw.nl)) went to court for the right to publish education Inspectorate results. When *Trouw* published the results of all schools later that year, the newspaper was sold out in a matter of hours. This demonstrates the significant demand for information on school quality. From then on this newspaper published articles on the quality of schools every year and it also opened a website so that citizens could view this information all year round (<http://www.trouw.nl>). A survey in 1998 reported that 91 percent of respondents believed that Inspectorate reports should be made public. The increased transparency led to drastic changes in the Inspectorate service. The agency decided that it would also publish the results of school inspections itself. The Inspectorate even redefined its task and stated that one of its tasks was to provide citizens with independent and reliable information about the quality of schools (Meijer 2007). The Inspectorate opened a website and first published quantitative information concerning the quality of schools – the so-called Quality Cards – in 1998 (<http://www.kwaliteitskaart.nl>). Approximately 200 inspectors make more than 10,000 visits to schools every year. While observing lessons, the inspectors also assess teaching methods. Every year, the Inspectorate submits around 25 reports, including the annual Education Report, to the Minister, the State Secretaries and the Parliament. The results of the Inspectorate reports can be

used to put schools on notice if quality is poor, and action is taken by the Ministry of Education if schools do not improve. Curiously, it was once believed that parents did not want test data published (Louis and van Velzen 1991).

The Netherlands scores high in international academic achievement tests. For example, in Trends in International Mathematics and Science Study (TIMSS), Netherlands scored near the top in both subjects in 2007, repeating its performance in earlier years, such as 2003, 1999 and 1995. The Netherlands consistently scores in the top ten in math and science. Also, in mathematics and science achievement in the final years of secondary school, carried out by TIMSS in 1995 in 21 countries, the Netherlands was the top performing country. The Netherlands achieves high scores in TIMSS, in comparison to other countries, even when controlling for level of national income (as well as expenditure per student).

In the OECD's Programme for International Student Assessment (PISA), the Netherlands does very well. In all three subjects, math, science and reading, the Netherlands consistently scores above the OECD average. In math, the Netherlands ranks fourth of all participating countries, scoring 0.3 of a standard deviation above the OECD average. In science, the Netherlands ranks 8<sup>th</sup> and in reading 11<sup>th</sup> (see Table 1).

## **ASSESSING THE IMPACT OF PRIVATE SCHOOL CHOICE IN THE NETHERLANDS**

Previous research has found that confessional schools perform better than public schools (see, for example, Dijkstra et al 2001). Despite the fact that there is no elite school sector, there is some evidence of higher quality in private schools, especially Catholic and Protestant secondary schools (Dronkers 1995). A careful analysis of school performance in the Netherlands shows that Catholic schools do out-perform other schools, especially public schools (Levin

2002). The superior performance holds even after controlling for educational practices and selection. The results show that Catholic schools do perform better, while schooling choice is available and affordable for the majority of families.

To what extent is this high achievement due to the institutional features associated with school choice? School choice leads to competition which can manifest itself in schools firing ineffective teachers for instance; or through schools using achievement data to evaluate teachers. School autonomy can also lead to schools taking a more direct role in establishing teachers' salary increases among other school functions. In addition, parents may be more involved in discussions on budget formulation at the school level. Another variable that might help explain superior performance is attendance at a private school. Given the predominance and growing significance of private schools in the Netherlands, and the ease of entry of new providers, this might be a useful measure of the effect of school choice on outcomes. In the Netherlands, on average, private schools perform slightly better than public schools – despite 100 years of competition and equal funding to both sectors – and all perform significantly above the OECD mean. Figure 3 shows the slight advantage of private schools in PISA 2006.

### **Data and Coverage**

In the analysis that follows, we use data from the OECD's Program for International Student Assessment (PISA), a student assessment jointly developed by participating countries to assess and compare student achievement based on a standardized and highly reliable framework. The detailed description of assessment framework, cautious procedures of translation and supervision of country specific implementations, and finally careful calibration of student scores based on response items and collected background variables, supports the view that PISA is a

valid framework for assessing student achievement. The survey is realized as representative to the population of interest in a two-stage stratified sample with random sampling of schools and within each school. Survey weights reflect the different probabilities of schools and students to be sampled. The domains of reading, mathematical and scientific literacy are covered not merely in terms of mastery of the school curriculum, but in terms of important knowledge and skills needed in adult life, particularly in the labor market (OECD 2007).

Table 2 presents descriptive statistics. Most schools in the Netherlands PISA 2006 sample are private. Most schools can fire a teacher, which is not unexpected since most schools are private, but in the Netherlands almost all schools can fire teachers. Achievement data is used to evaluate teachers in most schools, with almost three-quarters saying that it is so. Also evident is the high degree of school-based management in the Netherlands, as more than 80 percent of schools report that they can set teacher salary increases. Few schools directly involve parents in school budget decisions, at only 9 percent overall. Teachers in the Netherlands are certified, and few schools are located in rural areas. By the age of 12 Dutch children are tracked into different types of high schools. Slightly more than half of 15 year-olds in the PISA sample in 2006 were attending HAVO (*hoger algemeen voortgezet onderwijs*) – higher general education – or VWO (*voorbereidend wetenschappelijk onderwijs*) – preparatory education. Both prepare them for university education. Slightly less than half are in VMBO (*voorbereidend middelbaar beroepsonderwijs*) – middle-level applied education, which combines vocational training with theoretical knowledge; but it is not a terminal degree, as VMBO students can take the university entrance examination.

In terms of differences between public and private schools, there is a slightly higher probability that public schools can fire teachers in the Netherlands, and parental involvement in

school budget decisions is higher in public schools. Religion is an important factor considered by parents when choosing schools. The student-teacher ratio is slightly lower in private schools. Private school students have mothers who are relatively less educated. Only 26 percent of the mothers of private school students have a university education, while more than 33 percent of the mothers of public school students have a university education mother. More private school students are in vocational schools, at 51 percent, compared to public school students, at only 43 percent.

### **Measuring the Effects of Private School Choice on Achievement**

Controlling for a series of institutional, school, student and family characteristics, and running a series of regressions using Generalized Least Squares (GLS), it turns out that private school attendance is a positive and significant explanatory variable, though the effect is small (Table 3). Private school attendance increases test scores in math by 9 points, by 10 points in reading, and by 6 points in science. Given the PISA scale – mean OECD score of 500 and standard deviation of 100 points – these are small size effects.

However, other institutional variables have a strong effect, such as firing teachers, especially in science, though the effect is negative in reading. The effect varies from 7 points in math to 24 points in science. However, most schools report that they can fire teachers in the Netherlands. Assessment is important in the Netherlands and many schools use achievement information to assess progress. This has a small but positive and significant effect on outcomes, about the same size effect as private school attendance. The same goes for parental involvement in budget preparation. Overall, 7 to 13 points increase is associated with parental involvement. Therefore, the GLS analysis suggests that institutional factors are important, about the same

effect as private school attendance, in determining achievement in the Netherlands. It is important to bear in mind however that the GLS results are correlations, and not causal relationships. We turn now to the identification problem.

### **Identification**

Private school attendance is associated with self-selection in the Netherlands given universal school choice, so one cannot attribute from the regression results that private schools contribute to the increase in test scores. There are two main channels through which a school choice program can increase learning outcomes: the mechanism it uses to sort students and the across-school competition it creates. For the first channel, choice programs may allow a better fit between parental preferences and schools. Presumably, families will enroll their children in high-performing schools, either leaving or not applying to low-performing schools. This allocation mechanism will induce students to improve educational outcomes because they will be in better schools. For the second channel, choice may induce competition for students across schools. Low-performing schools will be forced to increase their quality in order to retain and attract students who will otherwise enroll in better schools (Hoxby 2003; Neal 2002).

The average learning outcome then will depend on the average outcomes of students who stay in the low-performing schools (expellers) and those who move to the high-performing schools (receivers) (Nechyba 1999, 2000; Epple and Romano 1998). On top of this sorting mechanism of students, competition across schools will tend to increase the quality of education. Again, schools will compete for students which may lead to improved learning outcomes. Final outcomes will depend on the net effect of these margins.



The typical estimation of the effect of a choice program on learning outcomes will have the form:

$$Y_{i,j,t} = \beta_0 + \beta_1 * X_{i,t} + \beta_2 * Z_{j,t} + \beta_3 * D_{i,j,t} + \varepsilon_{i,j,t} \quad (1)$$

where  $Y_{i,t}$  is any variable capturing learning outcomes such as standardized test score for individual  $i$  in school  $j$  at time  $t$ ;  $X_{i,t}$  are a set of socioeconomic characteristics of the individual;  $Z_{j,t}$  are characteristics of the school such as teachers;  $D_{i,j,t}$  is a dummy variable indicating whether the individual is a beneficiary of choice or not;  $\varepsilon_{i,j,t}$  comprises all unobservable characteristics of the school and individual that can affect learning outcomes.

The fundamental problem in estimating the impact of choice programs with equation (1) is selection bias—students and schools self-select into the program. Under these conditions, a comparison between students who participate and those who do not confounds the effects of the program, with the initial differences in characteristics between participants and non-participants. For example, it is possible to expect that better informed households are more likely to actively choose schools. Students from these households may perform differently than less active choosers. Therefore, any observed final educational outcomes not only comprise the results from the choice program but also the inherent differences in characteristics of the families or students. Besides students self-selecting into the program, schools may also self-select into the program or select students, reinforcing the problem of identifying impacts. An evaluation of the choice program with this behavior may thus confound the impact of the program with the differences in the characteristics of the schools. Therefore, a simple comparison between students in schools with the program and without the program may pick up not only the differences in the educational outcomes due to the voucher program, but also the differences in the characteristics of the two groups of schools. In the Netherlands, fortunately for the purposes

of evaluation, schools do not select nor reject students and all schools are part of the choice program, so we do not have this sort of problem in the Netherlands.

In short, the main objective of this type of estimation is to identify  $\beta_3$ . If the program does not assign the students randomly, then it is very likely that the unobservable characteristics are correlated with the dummy that indicates whether or not the individual receives the program. In this case,  $E(\varepsilon_{i,j,t} / D_{i,j,t}) \neq 0$ , and ordinary least squares (OLS) estimators are biased. This can be described as a problem of causality. If  $D$  is determined with self-selected individuals, and the most able ones are participating in the program, then  $D$  can be causing  $Y$ . On the other hand,  $Y$  as indicative of ability can be *causing*  $D$ , in the sense that more able individuals are choosing to be in the program. Therefore, the causality direction is unclear. Another perspective of the problem is to see bias as the consequence of omitted variables. In this case  $\varepsilon_{i,j,t}$  captures all the unobservable variables at the school and individual level that affect  $Y$ . If it were possible to control for all the variables such as  $E(\varepsilon_{i,j,t} / D_{i,j,t}) = 0$ , then least squares regression would be unbiased. In other words, if we can control for all the key variables that determine participation in the program, estimates by least squares will be unbiased. The direction of the bias in simple comparisons between students with vouchers and other students is not clear.

The problem of bias in the estimation of equation (1) has multiple solutions. If randomization and regression discontinuity techniques are not an option, then one must opt for other methods, such as instrumental variables, Heckman correction models, difference-in-difference estimators and matching estimators. However, they are all based on strong assumptions (Angrist and Imbens 1995; Athey and Imbens 2006; Heckman 1976; Heckman, Ichimura and Todd 1998; Rosenbaum and Rubin 1983). In the Netherlands, there is no pre-program data, given the long standing nature of the program. There are also no exclusion

criteria, since all families and students have access to all schools, schools do not reject applicants, and there are no top up fees.

Our empirical strategy is to locate a variable that matters for the treatment status or more generally for participation – relevance of the instrument – but that is not correlated with the outcomes of interest given treatment – exclusion restriction. The instrument will control for the endogeneity in the choice variable (enter a private school) that arises from selection on unobservables. In student achievement regressions, school choice is usually instrumented with variables related to the cost of schooling: price of schooling and distance to the school. However, these variables might violate the exclusion restriction if distance is correlated with absences or tardiness – likely to affect learning – or if the price of schooling also depends on the demand for schooling. Another possibility when past (pre-program) data are available is to use lagged (pre-program) values of participation determinants as instruments. However, because past determinants are strongly correlated with current determinants, they are arguably weak instruments (Blundell and Costa Dias 2000; Davidson and MacKinnon 2003). Researchers investigating universal choice programs have used various techniques to create treatment groups. Instrumental variables have been used in the cases of Denmark and Sweden, such as the degree of competition. Others have used school location and find mixed effects across country (Vandenberghe and Robin 2004). Religion has also been used as an instrument. In Chile, Gallegos (2006) used religion and showed that an increase of one in the ratio of voucher-to-public schools increases tests scores by about 0.14 standard deviations. West and Woessmann (2008) argue that nineteenth-century Catholic doctrine strongly opposed state schooling and show that countries with larger shares of Catholics in 1900 (but without a Catholic state religion) tend to have larger shares of privately operated schools today. They show that larger shares of

privately operated schools lead to better student achievement in mathematics, science and reading, and to lower total education spending, even after controlling for current Catholic shares (West and Woessmann 2008; see also Card, Dooley and Payne 2007; Evans and Schwab 1995; Neal 1997; Jepsen 2003; Sander 1996 on the use of Catholic shares as instruments; and see Cohen-Zada 2009 for an alternative instrument that uses historical Catholic share of population as an instrument; but see Altonji, Elder, and Taber (2005) on cautions about using such instruments. Thus, an instrumental variables approach is undertaken to address the causality issue. However a good instrument should be good at predicting choice, but not achievement.

Here we exploit information on the act of school choice in the Netherlands. There is a diversity of providers in the Dutch market. In addition to public schools, managed at the municipal level, the private school sector is composed of religious and secular schools. The religious school sector is dominated by Catholic and Protestant managed schools, but includes other providers as well. In fact, two-thirds of all schools in the Netherlands are private. Moreover, most private schools are religious in nature, at 91 percent; and religious schools make up 59 percent of all schools in the Netherlands. There is evidence that parents are active choosers, basing their decision at times on religion. According to research, more than 50 percent of parents choose schools based on religion (Teelken 1998). This suggests that religion would be a good instrument for private school choice. In the Netherlands, we know that religion is important in the selection of schools. Himmeler (2007) used an Instrumental Variables approach for analyzing school achievement in the Netherlands. He controlled for the possible endogeneity of Catholic school competition to public school quality. He found a positive link between competition intensity and academic achievement in secondary school. Dronkers and Avram (2010) use propensity score matching and find that for the Netherlands and a number of other

countries a substantial advantage in reading achievement among students in publicly funded private schools.

Fortunately, PISA 2006 asks the school principal if parents' endorsement of the instructional or religious philosophy of the school is taken into consideration at the time of admission, meaning that parents express an interest in the religious orientation of the school (see PISA School questionnaire). We shall use this as an instrument for parental preference or choice based on religion. In the Netherlands, according to PISA 2006, 38 percent of parents choose schools based on religion. It appears that religion is a good variable for predicting private school choice, but not a determining factor of academic performance. In an equation of the form:

$$D_{i,j,t} = \beta_0 + \beta_1 RELIGION_{i,t} \quad (2)$$

Where  $D$  is private school attendance,  $Religion$  is a 0,1 dummy variable and if 1, means that parents choose schools based on religion and 0 otherwise, as derived from the PISA questionnaire, it is estimated that  $Religion$  is a good predictor of private school choice:

$$D = 0.54 + 0.37 RELIGION, R-squared = 0.145 \\ (0.03)$$

At the same time,  $Religion$  it is not very much correlated with achievement:

$$Y_{math} = 523.2 + 19.7 RELIGION, R-squared = 0.0124 \\ (4.8)$$

$$Y_{reading} = 497.6 + 24.3 RELIGION, R-squared = 0.0159 \\ (5.1)$$

$$Y_{science} = 517.8 + 18.6 RELIGION, R-squared = 0.0095 \\ (5.4)$$

The variable  $Religion$  therefore is used as an instrument for private school attendance. We estimate the impact of private school attendance using instrumental variables. The IV results

show that private school attendance is associated with higher test scores (Table 4). The true effect of private schools is higher than in the base (GLS) equation. In fact, the true effect is two to three times higher than what one obtains in the GLS regressions. Private school size effects in math, reading and science achievement are 0.19, 0.31 and 0.21, all significant. Given PISA's scaling, this is close to 0.2 of a standard deviation in the case of math and science, and almost one-third of a standard deviation in reading. In other words, these are large effect size effects, indicating that private school attendance contributes to achievement in the Netherlands.

In the case of math outcomes, private school attendance is associated with a significant effect size of 0.19 of a standard deviation. This is higher than what one obtains with GLS. It is also interesting that there is a substantial change in at least one of the institutional variables. That is, the coefficient on firing teachers is reduced to insignificant, while at the same time the private schooling treatment effect increases by double. In reading, the impact of private schooling is much higher in the IV results. In fact, when instrumented private school attendance has a three-time higher effect size than in OLS. In science, when estimated using OLS, private schooling had a small effect. The impact of firing teachers was huge, at over 24 points. However, in the IV results, the firing teachers variable is substantially reduced. At the same time, private schooling increases from a small effect in OLS, to a significant effect in the IV results. The private school effects are large and significant, suggesting that private schools have a positive effect on learning outcomes, even controlling for institutional factors and a host of other controls.

Therefore, one may reject the null hypothesis that private schools have no impact on cognitive ability. The private school effect implies that private schooling is beneficial for improving cognitive ability. The difference between the GLS and IV results further suggests that

private schooling's true impact works through the competition that the Dutch system promotes. Parents are able to choose among a variety of providers, thus ensuring that tastes and preferences are catered to. The competitive funding system promotes innovation, efficiency and excellence. The competition that is created in the Dutch market leads to efficiency gains as schools are able to cater to different markets and parents exercise their choice to find the provider for their children that best fits their needs. Although there are competition effects whereby private school students achieve slightly higher than public school students, nevertheless the system overall boasts high average attainment levels. That is, achievement is high for all groups, with the average score of Dutch students significantly above the OECD average in all three subjects.

The question that remains is why we obtain such a large impact of private schools when the raw differential is so small? In other words, the test score outcomes of public and private schools are almost equal, in absolute terms and in the OLS regressions presented in Table 3. Moreover, choice and competition has existed for almost 100 years. Yet when we control for selection we obtain a positive impact of attending private schools. First, however it should be pointed out that this is not the first paper to obtain this result. Hoxby (1994, 2000) obtains higher IV estimates for private school competition in the United States, Andrabi et al. (2010) get larger private school effects in their IV model than in their OLS model for Pakistan, and Dronkers and Avram (2010, 2009) and Dronkers and Robert (2008a, b) obtains significant and positive effects in the Netherlands only after controlling for selection (albeit in their case using propensity score matching). Hoxby (1994, 2000) claims that the divergence between OLS and IV estimates is due to the fact that the IV estimates reflects only the effect of greater competition from private schools while the OLS estimate also reflects private school enrollment's negative dependence on public school quality. In the Netherlands case I hypothesize that the answer may lie in the fact

that the competition that is created in the market leads to efficiency gains as schools are able to cater to different markets and parents exercise their choice to find the provider for their children that best fits their needs. In fact, the students of private schools come from slightly less well-off families. This is evident in Table 2 which shows that the mothers of private school students are slightly less well educated than the mothers of students in public schools (see also Figure 4). Therefore, a hypothesis is that the true private school effect operates via the value it adds for students from relatively less well-off backgrounds. This would serve to substantiate the argument put forward by others such as Corten and Dronkers (2006) who, in a multi-country study, show that private government-dependent schools are more effective for pupils with less cultural capital.

Nevertheless, given that the IV coefficients are larger than their GLS counterparts (a result found in the U.S. literature and similar findings with rigorous studies using propensity score matching in the Netherlands), and because religion may be correlated with outcomes, our instrumental variable may be picking up characteristics of households that are systematically correlated with schooling outcomes. Although we do not find any such evidence with observable characteristics, it is nevertheless possible that correlations with unobserved characteristics are important. To assess the magnitude of IV bias, we follow Altonji et al. (2005) and derive a bias corrected IV estimate based on the assumption that the selection on the observables is equal to the selection on unobservables. The formula for deriving the bias in a 2SLS based on the proposition in Altonji et al. (2005) has been set out elsewhere as well (see, for example, Kingdon and Teal (2010) and Andrabi et al. (2010)). Let  $D_i$  be the instrumental variable,  $P_i$  be the private school attendance variable and  $X_i$  be the set of conditioning variables. Let  $D_i^r = D_i - X_i' \pi$  be the residual from the projection of  $D_i$  on  $X_i$ . Let the outcome  $Y_i = \alpha P_i + \pi X_i$



+  $\varepsilon_i$  and  $Proj(P_i|X_i, D_i) = X_i'\beta + \lambda D_i$ . Then, the bias in the IV treatment effect is  $\frac{Cov(D_i^T, \varepsilon_i)}{\lambda Var(D_i^T)}$ .

Following Altonji et al. (2005), we assume that a normalized shift in the index of observables in the outcome equation is associated with an equal shift in the index of unobservables, a bias can be derived from  $\frac{Cov(D_i, X_i\beta)Var(\varepsilon_i)}{\lambda Var(X_i\beta) Var(D_i^T)}$ . In our case we estimate the size of the bias.<sup>1</sup> This produces a bias in the order of 0.06 standard deviations in the case of math achievement, 0.09 in the case of reading achievement, and 0.08 in the case of science achievement. In terms of bias, it suggests that there would have to be a very large shift in unobservables to wipe out all the effect of “private” on test scores. Therefore, private school attendance increases scores somewhat less than the IV estimates presented, but private schooling does have a significant and positive effect. This contrasts with the results from the U.S. literature where the size of the bias is sometimes larger than the IV estimates themselves (Altonji et al. 2005).

The institutional features associated with school choice are important as well. School choice leads to competition which can manifest itself in schools firing ineffective teachers for instance; or through schools using achievement data to evaluate teachers. School autonomy can also lead to schools taking a more direct role in establishing teachers’ salary increases among other school functions. In addition, parents may be more involved in discussions on budget formulation at the school level. We are able to show that attendance at a private school has a positive and significant effect on cognitive ability, controlling for these factors and even after controlling for selection. In other words, the private school advantage is causal. One reason for the positive effect of private schools in the Netherlands may be due to the value-added to students from less well-off families.

---

<sup>1</sup> Full results available upon request.

## CONCLUSIONS

School choice is often promoted as a means of increasing competition in the school system. It is believed that competition will lead to efficiency gains as schools – public and private – compete for students and try to improve quality while reducing expenses. By encouraging more private schools, vouchers will allow school managers to become innovative and thereby bring improvements to the learning process. Public schools, in order to attract the resources that come with students, will need to improve. Thus, school choice will lead to improved learning outcomes and increased efficiency. Opponents claim that under a voucher system private providers will be unaccountable to tax payers and the public. Claims of efficiency gains are also questioned. Further, opponents sometimes claim that choice will lead to privatization, less public (government) control of education, and increased segregation.

One of the key features of the Dutch education system is freedom of education – freedom to establish schools, determine the principles on which the school is based, and organize classroom teaching. School choice is made possible through public finance, making it the oldest publicly financed school choice system in the world. The Dutch version of freedom of education allows parents the opportunity to choose schools, to establish schools, and to organize teaching and to determine the principles of the school. This has resulted in a large number of non-public schools financed by the state. Moreover, parents can typically choose among several schools. Parents have access to a variety of schools, access is not selective, all schools are equally publicly financed, there is ease of entry of providers into the market, and information flows. Most children in the Netherlands attend privately-managed schools and the. Private schools are not for profit and usually managed by a foundation or church.

Studies of the effectiveness of school choice programs suffer from an inability to control for selection and are usually not able to attribute outcomes to the type of school attended. Since most schools in the Netherlands are private and we know that religion is a key factor associated with parental choice of school, we use this fact to create an instrument by which to measure the effectiveness of private schools in the Netherlands.

We are able to show that private schools have a positive and significant impact on school outcomes using the OECD's Program for International Student Assessment (PISA) 2006 data for the Netherlands. Only when we properly account for selection do we show a positive and significant impact. In fact, least squares estimates show a negligible or insignificant effect of private schools. The IV results show that private school attendance is associated with higher test scores. The true effect of private schools is higher than in the base (GLS) equation. The effect size is higher and the private school variable becomes positive and significant in the case of science as well. Private school size effects in math, reading and science achievement are 0.17, 0.28 and 0.18, all significant. Given PISA's scaling, this is close to 0.2 of a standard deviation in the case of math and science, and almost 0.3 of a standard deviation in reading. In other words, these are large effect size effects, indicating that private school choice contributes to achievement in Netherlands. The reasons for an impact, despite the almost equal raw scores in achievement between public and private schools and almost 100 years existence of a system of public finance of private school choice, might have to do with the fact that it is the relatively less well-off that attend private schools in the Netherlands. That is, the mothers of private school students are slightly less well educated than the mothers of students in public schools. Therefore, one possibility is that the true private school effect operates via the value it adds for students from relatively less well-off backgrounds.

This study has contributed to the small but growing international literature on the effectiveness of private schooling. It validates the findings of others, uses an innovative instrument, and confirms that private schools may contribute to schooling achievement gains for students from less wealthy families. It was shown that private schooling can have an impact, while at the same time contributing to overall high levels of achievement. Also, the Dutch education system exhibits a strong central education policy role but decentralized school management. While private schools have a positive impact, public schools also perform very well and all schools are associated with high levels of autonomy – for example, ability to fire teachers, setting of teacher salary increases, using achievement data, allowing parental participation – at the school level. Thus, central government control and school choice in a predominantly private schooling environment is possible, and evidently beneficial in terms of academic achievement. Dutch students perform exceptionally well on international academic achievement tests, whether they are enrolled in public or private schools. Thus, a large school choice system can promote efficiency and equity without necessarily leading to privatization or to reduced public scrutiny – school choice led to heightened demands for information, prompting the education Inspectorate to promote the use of school report cards and wide dissemination of school results.

The Netherlands shows that a large private sector with equal public funding does not necessarily mean decentralization and a weak central role. Choice can coexist with a strong center. Interestingly, as the center has moved away from any direct provision of education services its role in policy making, evaluation, and information dissemination increased. Therefore, the fear of the retreat of the state from matters of importance in education policy with the introduction of market forces is not founded.

## REFERENCES

- Aedo, C. 1997. "Organización Industrial de la Prestación de Servicios Sociales" Working Paper Series R-302. Inter-American Development Bank, Washington, DC.
- Aedo, C. and O. Larrañaga. 1994. "Educación Privada vs. Pública en Chile: Calidad y Sesgo de Selección." Graduate Economics Program, Santiago ILADES, Santiago, Chile, and Georgetown University, Washington, DC. Processed.
- Ahlin, A. 2003. "Does School Competition Matter? Effects of a Large-scale School Choice Reform on Student Performance." Uppsala University Working Paper Series 2.
- Altonji, J.G., T.E. Elder and C.R. Taber. 2005. "An Evaluation of Instrumental Variable Strategies for Estimating the Effects of Catholic Schooling." *Journal of Human Resources* 40(4): 791-821.
- Andersen, S.C. 2005. Selection and competition effects in a large-scale school voucher system. For presentation at the conference EPCS 1005, 31 March to 3 April at University of Durham, Durham, England.
- Andersen, S.C. and S. Serritzlew. 2006. "The Unintended Effects of Private School Competition." *Journal of Public Administration Research and Theory* 17: 335-356.
- Andrabi, T., N. Bau, J. Das and A. Ijaz. 2010. "Are Bad Public Schools Public "Bads"? Test Scores and Civic Values in Public and Private Schools." Draft.
- Barrera-Osorio, F. and H.A. Patrinos. 2009. "An International Perspective on School Vouchers." In M. Berends, M.G. Springer, D. Ballou and H.J. Walberg, eds., *Handbook of Research on School Choice*. New York: Routledge, pp. 339-358.
- Blundell, R. and M. Costa Dias. 2000. "Evaluation Methods for Non-Experimental Data." *Fiscal Studies* 21(4): 427-468.
- Bravo, D., D. Contreras, and C. Sanhueza. 1999. "Rendimiento Educativo, Desigualdad, y Brecha de Desempeño Privado Público: Chile 1982-1997." Department of Economy, University of Chile. Processed.
- Card, D., M. Dooley and A.A. Payne. 2007. "School Competition and Efficiency with Publicly Funded Catholic Schools." Manuscript.
- Carnoy, M. and P. McEwan. 2000. "The Effectiveness and Efficiency of Private Schools in Chile's Voucher System." *Educational Evaluation and Policy Analysis* 22(3): 213-239.
- Cohen-Zada, D. 2009. "An Alternative Instrument for Private School Competition." *Economics of Education Review* 28(1): 29-37.
- Corten, R. and J. Dronkers. 2006. "School Achievement of Pupils from the Lower Strata in Public, Private Government-Dependent and Private Government-Independent Schools: A cross-national test of the Coleman-Hoffer thesis." *Educational Research and Evaluation* 12:179-208.
- Davidson R. and J. MacKinnon. 2003. *Econometric Theory and Methods*. Oxford: Oxford University Press.
- de Vijlder, F.J. 2001. "Choice and Financing of Schools in the Netherlands: The Art of Maintaining an Open System Responsive to Its Changing Environment." Max Groote Expert Center, University of Amsterdam (mimeo).
- Dijkstra, A., J. Dronkers and S. Karsten. 2001. "Private Schools as Public Provision for Education School Choice and Marketization in the Netherlands and Elsewhere in Europe." Columbia University, Teachers College, National Center for the Study of Privatization in Education Occasional Paper No. 20.

- Dronkers, J. 1995. "The Existence of Parental Choice in the Netherlands." *Educational Policy* 9(3): 227-243.
- Dronkers, J. and S. Avram. 2010. "A cross-national analysis of the relations of school choice and effectiveness differences between private-dependent and public schools." *Educational Research and Evaluation* 16(2): 151-175.
- Dronkers, J. and S. Avram. 2009. "Choice and Effectiveness of Private and Public Schools in Seven Countries. A reanalysis of three Pisa Data Sets." *Zeitschrift für Pädagogik* 55:895-909.
- Dronkers, J. and P. Robert. 2008a. "Differences in Scholastic Achievement of Public, Private Government-Dependent, and Private Independent Schools: A Cross-National Analysis." *Educational Policy* 22:541-577.
- Dronkers, J. and P. Robert. 2008b. "School Choice in the Light of the Effectiveness Differences of Various Types of Public and Private Schools in 19 OECD Countries.: *Journal of School Choice* 2:260-301.
- Droog, M.G.A. 2001. Information Dossier on the Structure of the Education System in the Netherlands 2000. Netherlands Ministry of Education, Science and Culture, EURYDICE Unit.
- Epple, D. and R.E. Romano. 1998 "Competition between Private and Public Schools, Vouchers, and Peer-Group Effects." *American Economic Review* 88(1): 33-62.
- Evans, W.N. and R.M. Schwab. 1995. "Finishing High School and Starting College: Do Catholic Schools Make a Difference?" *Quarterly Journal of Economics* 110(4): 941-974.
- Friedman, M. 1955. "Role of Government in Education," in *Economics and the Public Interest* ed., Robert Solo. New Brunswick, NJ: Rutgers University Press.
- Gallegos, F. 2006. "Voucher-School Competition, Incentives and Outcomes: Evidence from Chile." Massachusetts Institute of Technology, Department of Economics, Cambridge, MA. Processed.
- Gallegos, F. 2002. "Competencia y Resultados Educativos: Teoría y Evidencia para Chile." *Cuadernos de Economía* 39(118): 309-352.
- Himmler, O. 2007. The Effects of School Choice on Academic Achievement in the Netherlands. Georg-August-Universität Göttingen, March
- Hirsch, D. 2002. "School: A Choice of Directions." OECD CERI Working Paper: What Works in Innovation in Education.
- Hoxby, C.M. (ed). 2003. *The Economics of School Choice*. Chicago: University of Chicago Press.
- Hoxby, C.M. 2000. "Does Competition among Public Schools Benefit Students and Taxpayers?" *American Economic Review* 90(5): 1209-1238.
- Hoxby, C.M. 1994. "Do Private Schools Provide Competition for Public Schools?" National Bureau of Economic Research Working Paper NO. 4978.
- Hsieh, C.-T. and M. Urquiola. 2006. "The effects of generalized school choice on achievement and stratification: Evidence from Chile's voucher program." *Journal of Public Economics* 90 (8-9): 1477-1503.
- Hupe P.L. and L.C.P.M. Meijs. 2000. *Hybrid Governance: The impact of the nonprofit sector in the Netherlands*. The Hague: Social and Cultural Planning Office.
- James, E. 1984. "Benefits and Costs of Privatized Public Services: Lessons from the Dutch Educational System." *Comparative Education Review* 28(4):605-64.

- Jepsen, C. 2003. "The Effectiveness of Catholic Primary Schooling." *Journal of Human Resources* 38(4): 928-941.
- Karsten, S., I. Groot and M.A. Ruiz. 1995. "Value Orientations of the Dutch Educational Elite." *Comparative Education Review* 39(4): 508-521.
- Karsten, S. and J. Meijer. 1999. "School-Based Management in the Netherlands: The Education Consequences of Lump-Sum Funding." *Educational Policy* 13(3): 421-439.
- Kingdon, G. and F. Teal. 2010. "Teacher Unions, Teacher Pay and Student Performance in India: A Pupil Fixed Effects Approach." *Journal of Development Economics* 91: 278-288.
- Ladd, H.F. 2002. "School Vouchers: A Critical View." *Journal of Economic Perspectives* 16(4): 3-24.
- Leuven, E., M. Lindahl, H. Oosterbeek and D. Webbink, 2007. "The Effect of Extra Funding for Disadvantaged Pupils on Achievement." *Review of Economics and Statistics* 89(4): 721-736.
- Levin, J.D. 2002. *Essays in the Economics of Education*. PhD Dissertation, University of Amsterdam.
- Louis, K.S. and B.A.M. van Velzen. 1990/1991. "A Look at Choice in the Netherlands." *Education Leadership* (December/January): 66-72.
- Meijer, A.J. 2007. "Publishing public performance results on the Internet: Do stakeholders use the Internet to hold Dutch public service organizations to account?" *Government Information Quarterly* 24(1): 165-185.
- Mizala, A. and P. Romaguera. 2000. "School Performance and Choice: The Chilean Experience." *Journal of Human Resources* 35(2): 392-417.
- Nannestad, P. 2004. Do private schools improve the Quality of Municipal Schooling? The case of Denmark. For presentation at the EPCS Annual Meeting, Berlin, April 15-18, 2004.
- Neal, D. 2002. "How Vouchers Could Change the Market for Education." *Journal of Economic Perspectives* 16(4): 25-44.
- Neal, D. 1997. "The Effects of Catholic Secondary Schooling on Secondary Achievement." *Journal of Labor Economics* 15(1): 98-123.
- Nechyba, T.J. 1999. "School Finance Induced Migration and Stratification Patterns: The Impact of Private School Vouchers." *Journal of Public Economic Theory* 1(1): 5-50.
- Nechyba, T.J. 2000. "Mobility, Targeting, and Private-School Vouchers." *American Economic Review* 90(1): 130-146.
- OECD. 2009. *Education at a Glance*. Paris.
- OECD. 2007. *PISA 2006: Science Competencies for Tomorrow's World*. Paris: OECD.
- Patrinos, H.A. 2002. "Private Education Provision and Public Finance: The Netherlands as a Possible Model," Occasional Paper No. 59, National Center for the Study of Privatization in Education, Teachers College, Columbia University.
- Peterson, P.E. 2009. "Voucher Impacts: Differences between Public and Private Schools." In M. Berends, M.G. Springer, D. Ballou and H.J. Walberg, eds., *Handbook of Research on School Choice*. New York: Routledge, pp. 249-266.
- Rangvid, B.S. 2008. "Private School Diversity in Denmark's National Voucher System." *Scandinavian Journal of Educational Research* 52(4): 331-354.
- Ritzen, J.M.M., J. Van Dommelen and F.J. De Vijlder. 1997. "School Finance and School Choice in the Netherlands." *Economics of Education Review* 16(3):329-335.
- Rodriguez, J. 1988. "School Achievement and Decentralization Policy: The Chilean Case." *Revista de Análisis Económico* 3(1): 75-88.

- Sander, W. 1996. "Catholic Grade Schools and Academic Achievement. *Journal of Human Resources* 31(3): 540-548.
- Sapelli, C. and B. Vial. 2004. "Peer Effects and Relative Performance of Voucher Schools in Chile." Paper presented at the American Economic Association meetings, 3 January 2004, San Diego, CA.
- Sapelli, C. and B. Vial. 2002. "The Performance of Private and Public Schools in the Chilean Voucher System." *Cuadernos de Economía* 39(118): 423-454.
- Teelken, C. 1998. "Market Mechanisms in Education: A Comparative Study of School Choice in the Netherlands, England and Scotland." PhD Dissertation, University of Amsterdam.
- Vandenberghe, V. and S. Robin. 2004. "Evaluating the Effectiveness of Private Education across Countries: A Comparison of Methods. *Labour Economics* 11(4): 487-506.
- Vegas, E. 2002. "School Choice, Student Performance, and Teacher and Student Characteristics: The Chilean Case." Policy Research Working Paper 2833, Washington, DC: The World Bank.
- West, M.R. and L. Woessmann. 2008. "'Every Catholic Child in a Catholic School:' Historical Resistance to State Schooling, Contemporary Private Competition, and Student Achievement across Countries." IZA Discussion Papers 3818, Institute for the Study of Labor (IZA), Bonn, Germany.



**Table 1: PISA 2006 Results**

Math			Science		Reading	
1	Finland	548	Finland	563	Korea	556
2	Hong Kong	547	Hong Kong	542	Finland	547
3	Korea	547	Canada	534	Hong Kong	536
4	<b>Netherlands</b>	531	Estonia	531	Canada	527
5	Switzerland	530	Japan	531	New Zealand	521
6	Canada	527	New Zealand	530	Ireland	517
7	Macao, China	525	Australia	527	Australia	513
8	Liechtenstein	525	<b>Netherlands</b>	525	Liechtenstein	510
9	Japan	523	Liechtenstein	522	Poland	508
10	New Zealand	522	Korea	522	Sweden	507
11	Belgium	520	Slovenia	519	<b>Netherlands</b>	507

Source: OECD 2007

**Table 2: Descriptive Statistics**

	Total		Private		Public	
	Mean	SD	Mean	SD	Mean	SD
Private	0.69	(0.02)				
School can fire teachers	0.99	(0.08)	1.00	(0.00)	0.98	(0.14)
Achievement data used	0.75	(0.43)	0.75	(0.43)	0.76	(0.43)
School sets teacher increase	0.81	(0.39)	0.77	(0.42)	0.89	(0.31)
Parents involved in budget	0.09	(0.28)	0.07	(0.26)	0.13	(0.33)
Religion used to select school	0.40	(0.49)	0.54	(0.50)	0.09	(0.29)
Student-teacher ratio	16.33	(4.20)	16.23	(4.58)	16.55	(3.16)
Class hours	2.89	(1.43)	2.89	(1.44)	2.89	(1.41)
Certified teachers	0.88	(0.19)	0.88	(0.18)	0.90	(0.22)
Rural	0.03	(0.16)	0.03	(0.16)	0.02	(0.15)
SES of school	0.33	(0.02)	0.30	(0.02)	0.39	(0.05)
<i>Type of school:</i> VMBO	0.49	(0.01)	0.51	(0.02)	0.43	(0.04)
HAVO/VWO	0.51	(0.01)	0.49	(0.02)	0.57	(0.04)
<i>Student's grade:</i> 9th	0.43	(0.50)	0.43	(0.50)	0.42	(0.49)
10th	0.53	(0.50)	0.53	(0.50)	0.52	(0.50)
11th	0.01	(0.08)	0.00	(0.07)	0.01	(0.09)
Age	15.72	(0.29)	15.72	(0.28)	15.72	(0.29)
Female	0.50	(0.50)	0.50	(0.50)	0.49	(0.50)
<i>Mother's education:</i> Primary	0.05	(0.22)	0.05	(0.22)	0.05	(0.22)
Lower secondary	0.13	(0.33)	0.13	(0.33)	0.13	(0.34)
Upper secondary	0.52	(0.50)	0.55	(0.50)	0.45	(0.50)
University	0.28	(0.45)	0.26	(0.44)	0.33	(0.47)
<i>Books at home:</i> 11-100	0.42	(0.49)	0.43	(0.49)	0.42	(0.49)
101-500	0.46	(0.50)	0.45	(0.50)	0.46	(0.50)
One or more computer at home	0.99	(0.07)	1.00	(0.06)	0.99	(0.09)
N	3,840		2,665		1,175	

Source: PISA 2006

**Table 3: Determinants of Learning: GLS**

	Math		Reading		Science	
Private	9.6	(1.96)*	10.8	(2.21)*	6.0	(1.90)*
School can fire teachers	7.2	(2.82)**	-16.1	(2.50)*	24.6	(2.08)*
Achievement data used	6.1	(2.49)**	8.6	(3.24)*	5.7	(2.32)*
Schools set teacher increase	-5.5	(3.42)**	-3.8	(3.30)	-5.6	(2.24)*
Parents involved in budget	7.3	(1.96)**	13.5	(3.79)*	11.5	(2.81)*
Student-teacher ratio	0.9	(0.34)*	0.3	(0.67)	1.2	(1.90)*
Class hours	5.6	(0.37)*	4.4	(0.37)*	5.2	(0.32)*
Certified teachers	-2.9	(4.12)	12.8	(6.88)***	13.0	(5.72)**
Rural	18.8	(5.6)*	23.4	(4.34)*	10.3	(4.89)**
SES of school	19.5	(3.61)*	35.7	(4.03)*	36.4	(3.04)*
HAVO/ VWO type school	83.6	(2.67)*	75.8	(3.15)*	78.4	(2.16)*
<i>Student's grade:</i>						
9	30.3	(2.44)*	45.4	(3.28)*	28.5	(3.74)*
10	75.4	(2.72)*	82.2	(3.54)*	66.6	(3.89)*
11	129.4	(5.11)*	123.2	(4.53)*	110.2	(6.49)*
Age	-19.2	(1.81)*	-12.1	(1.96)*	-9.1	(2.06)*
Female	-24.0	(0.95)*	12.0	(1.27)*	-19.0	(1.18)*
<i>Mother's education:</i>						
Primary	24.1	(4.31)*	11.9	(5.33)**	19.9	(5.25)*
Lower secondary	23.0	(3.59)*	11.1	(4.44)*	26.5	(3.75)*
Upper secondary	20.7	(3.13)*	15.2	(4.22)*	26.1	(3.67)*
University	19.9	(3.50)*	9.8	(4.56)**	23.4	(3.90)*
<i>Books at home:</i>						
11–100	14.8	(1.35)*	10.5	(1.39)*	19.4	(1.29)*
101-500	32.1	(1.65)*	22.0	(1.78)*	37.9	(1.45)*
Computers at home	21.6	(5.97)*	12.7	(7.4)	32.5	(6.24)*
Constant	650.7	(30.46)*	529.1	(33.44)*	435.5	(33.11)*
N	3,840		3,840		3,840	
R <sup>2</sup>	0.675		0.597		0.643	

Source: Computed from PISA 2006

Notes: Standard errors in parentheses

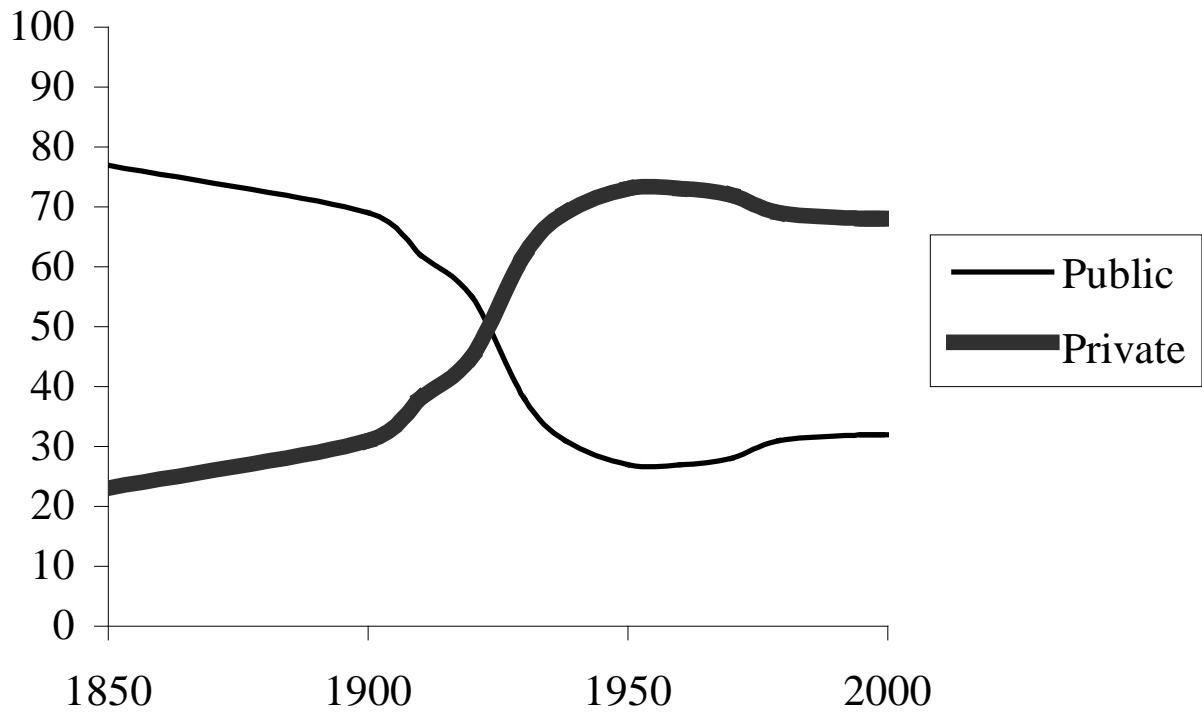
**Table 4: IV Estimation of Determinants of Learning, Netherlands**

	Math		Reading		Science	
Private	18.8	(5.83)*	31.0	(6.25)*	20.6	(4.96)*
School can fire teachers	0.5	(4.77)	-30.1	(4.84)*	14.3	(3.86)*
Achievement data used	5.7	(2.94)**	8.4	(3.37)*	5.4	(2.51)*
Schools set teacher increase	-3.4	(2.83)	-1.0	(3.82)	-3.2	(2.49)
Parents involved in budget	8.7	(4.11)**	16.2	(4.74)*	13.5	(3.54)*
Student-teacher ratio	0.9	(0.36)*	0.2	(0.67)	1.2	(0.42)*
Class hours	5.5	(0.38)*	4.4	(0.37)*	5.1	(0.33)*
Certified teachers	-2.0	(4.78)	15.3	(6.54)*	14.6	(6.47)*
Rural	19.4	(5.60)*	23.6	(5.32)*	10.8	(4.94)**
SES of school	18.7	(3.78)*	36.6	(4.34)*	36.3	(3.37)*
HAVO/ VWO type school	85.1	(2.84)*	76.6	(3.20)*	79.6	(2.33)*
<i>Student's grade:</i>						
9	29.3	(2.65)*	42.0	(3.36)*	26.7	(4.09)*
10	74.3	(2.97)*	78.4	(3.68)*	64.6	(4.26)*
11	129.5	(5.21)*	122.0	(4.72)*	110.1	(6.84)*
Age	-18.9	(1.76)*	-11.7	(1.89)*	-8.9	(1.99)*
Female	-23.9	(0.95)*	12.3	(1.27)*	-18.8	(1.18)*
<i>Mother's education:</i>						
Primary	23.2	(4.26)*	10.2	(5.43)***	18.7	(5.32)*
Lower secondary	21.8	(3.37)*	9.0	(4.59)**	24.5	(3.90)*
Upper secondary	19.5	(3.34)*	12.2	(4.58)*	24.0	(3.91)*
University	19.5	(3.59)*	8.4	(4.67)***	22.5	(3.96)*
<i>Books at home:</i>						
11–100	14.5	(1.30)*	10.4	(1.31)*	19.1	(1.24)*
101-500	31.6	(1.61)*	21.5	(1.71)*	37.5	(1.42)*
Computers at home	19.4	(6.69)*	8.3	(8.20)	29.2	(6.98)*
Constant	647.8	(30.10)*	528.2	(33.35)*	436.2	(33.01)*
N	3,840		3,840		3,840	
R <sup>2</sup>	0.673		0.585		0.638	
Over-identification test	Exactly identified		Exactly identified		Exactly identified	

Source: Computed from PISA 2006

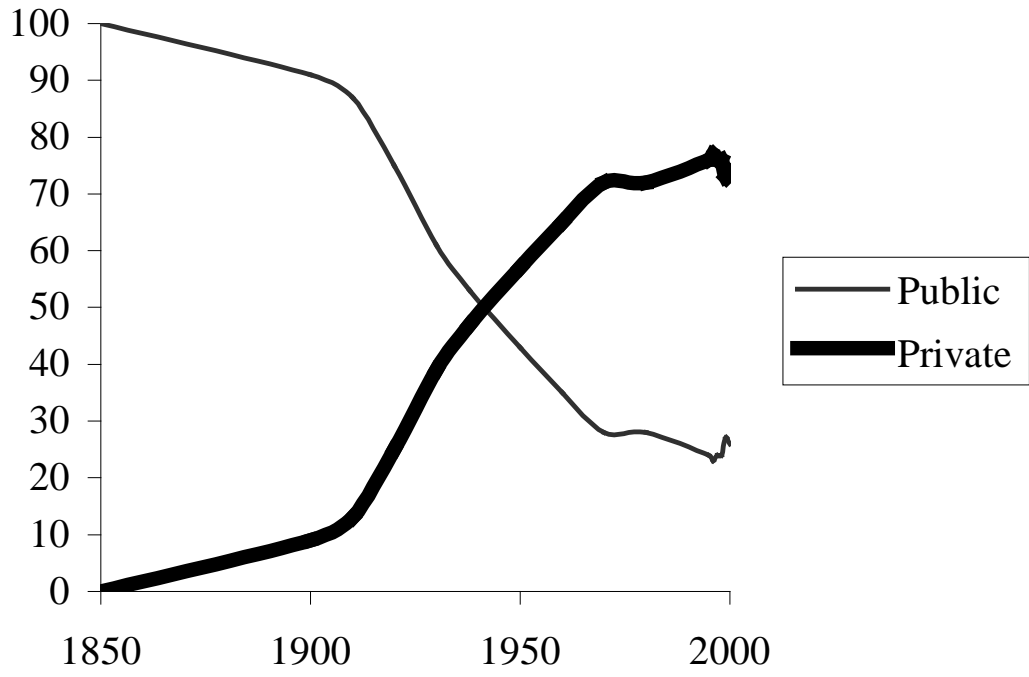
Notes: Standard errors in parentheses

Figure 1: Private and Public Enrollment Shares (%), Primary



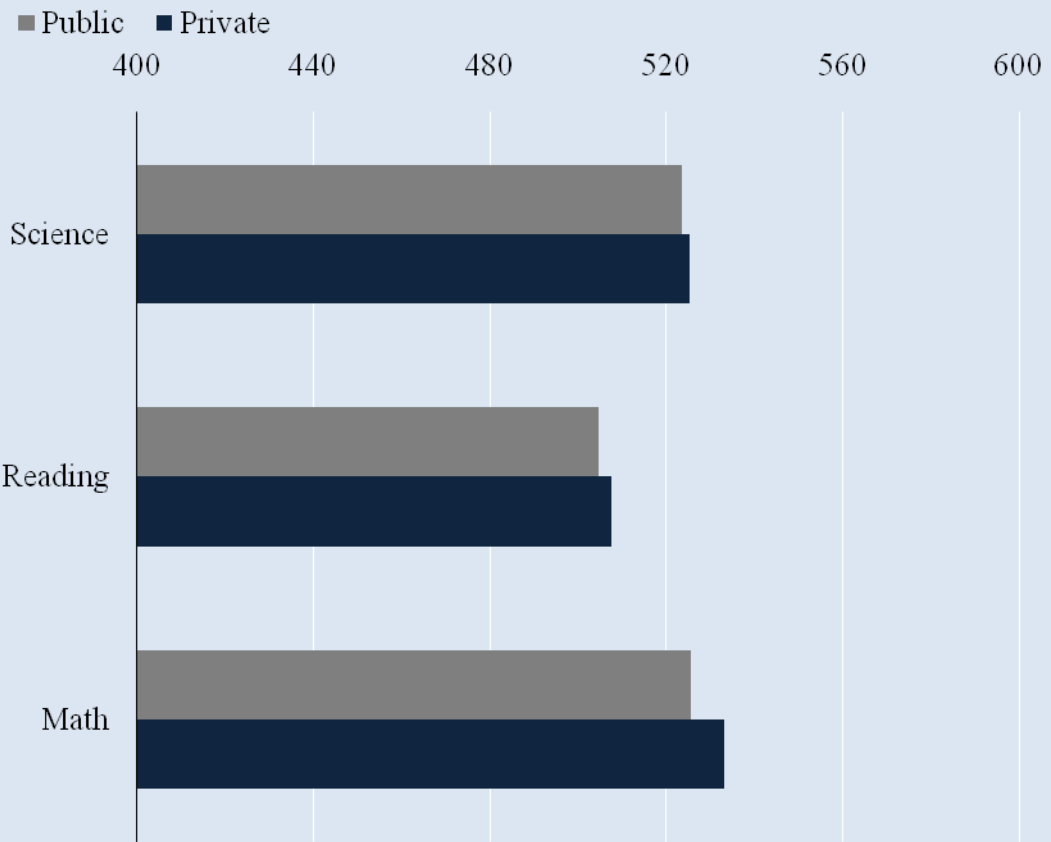
Source: MOE; James 1984; Justesen 2002

Figure 2: Private and Public Enrollment Shares (%), Secondary



Source: MOE; James 1984; Justesen 2002

**Figure 3: PISA Scores, Netherlands, by Type of School**



Source: PISA 2006

