UNIVERSITY OF ARKANSAS | College of Education & Health Professions
Education Reform

WORKING PAPER SERIES

Does Private Schooling Improve International Test Scores? An Instrumental Variables Fixed Effects Analysis of the Impact of Private Schooling On PISA Scores

Corey A. DeAngelis

M. Danish Shakeel

January 17, 2017

EDRE Working Paper 2017-02

Does Private Schooling Improve International Test Scores? An Instrumental Variables Fixed Effects Analysis of the Impact of Private Schooling On PISA Scores

Corey A. DeAngelis
Department of Education Reform,
University of Arkansas
cadeange@uark.edu

M. Danish Shakeel
Department of Education Reform,
University of Arkansas
mdshakee@uark.edu

January 17, 2017

Acknowledgements
The content of the report is solely the responsibility of the authors and does not necessarily represent the views of the University of Arkansas. Corresponding author is Corey A. DeAngelis, cadeange@email.uark.edu.

Abstract

We estimate the effect of private schooling on Program for International Student Assessment (PISA) scores of 62 countries across the globe from 2000 to 2012. We employ time and country-fixed effects regression models and also use the short-run demand for schooling within a country and year as a new instrument for private share of schooling enrollment. We find evidence to suggest that increased private schooling leads to improved PISA scores around the world. Specifically, our preferred model finds that a ten percentage point increase in the private share of schooling enrollment is associated with a 28% standard deviation increase in math, a 24% standard deviation increase in reading, and a 18% standard deviation increase in science.

Keywords: private school; school choice; PISA; instrumental variables; 2SLS

Introduction

United States President-elect Donald Trump has called for a twenty-billion-dollar increase in federal funding of private school choice programs for the nation. If the proposed policy takes place in the U.S., many other nation-states may follow suit. What impacts would the proposed policy have within the U.S. and abroad? While many private school choice advocates believe that competitive forces would enhance educational quality while minimizing costs (Friedman & Friedman, 1990; Neal, 2000), critics claim that the education sector may not behave like other industries (Gutmann & Ben-Porath, 1987).

For instance, if families have the ability to choose their educational product, and they do not have the information required to make informed decisions, they may choose schools that actually harm their children in the short-run. Additionally, since individual interests may differ from social interests, families may not choose an educational product that is effective at inculcating math, reading, and science skills (Boyles, 2004; Saltman, 2000). If families do not value these skills which are measured by standardized assessments, we may expect that access to private schools would reduce overall test scores.

However, if individual families choose educational products that improve standardized test scores, we might expect to observe improved Program for International Student Assessment (PISA) scores resulting from increases in access to private schooling. In theory, a deviation from the public schooling monopoly on public funding within education systems around the world could increase educational quality through enhanced competitive pressures for schools to improve (Hoxby, 2007; Chubb & Moe, 2011; Smith, 1776).

Literature Review

The evidence on how private school choice impacts standardized test scores is abundant and clear. Shakeel, Anderson, and Wolf (2016) perform a meta-analysis and systematic review of the evidence from 19 experimental studies and find that private school voucher programs around the world produce small positive impacts on student achievement. They also find that the results are typically larger for reading scores, programs outside of the United States, and publicly-funded programs. In the United States, all experimental evaluations of private school voucher programs produced null to positive results. The only exceptions: Mills and Wolf (2016) and Abdulkadiroglu, Pathak, and Walters (2015) found that the Louisiana Scholarship Program had negative impacts on student achievement for its first two years.

Internationally, the private school choice evaluations have found slightly larger positive impacts on student achievement. Muralidharan and Sundararaman's (2015) experiment found that access to private school choice in India improved test scores by around 0.23 standard deviations overall. Tooley and Dixon (2005) also found that access to private schooling was associated with benefits for disadvantaged children around the world. Additionally, Shafiq and Myers (2014) found that access to private school vouchers in Sweden was associated with a slight increase in the students' civic attitudes between 1999 and 2009.

Hanushek, West, and Woessmann (2013) used PISA data to find that autonomy had a positive impact for high-performing countries, but a negative impact for developing countries. While the causal research connecting private schooling and PISA scores has been limited, Hanushek and Woessmann (2010) pointed out their optimism about research on the topic, stating that the outlook for international studies was "clearly bright" since "more than 60 countries" were planning to participate in the 2012 PISA exam.

West and Woessmann (2010) used 2003 PISA data for 29 nation-states and found that countries with higher private share of schooling were associated with improved international test scores. Importantly, they used the percent of Catholics within a country from the year 1900 as an instrument to predict current private share of schooling. While this approach was a decent attempt to remove endogeneity, the instrumental variable is unfortunately correlated with many omitted variables such as current country culture, political structure, economic structure, and, obviously, religion. We are doubtful that this instrument removes the endogeneity problem with the explanatory variable of interest. In fact, the use of the variable may introduce more bias than it eliminates, as indicated by the fact that the IV results are over three times the size of the OLS results.

Our study improves upon West and Woessmann (2010) in two ways. First, we have access to five separate years of data for over 60 nations, so we can use year and country fixed effects in order to compare PISA scores within, rather than across, countries. Second, we use an instrument that is more exogenous to the model than the historical share of Catholic population: the short-run change in the demand for total schooling within a country and year. Additionally, this study is the first to causally link private schooling to the PISA scores that Hanushek and Woessmann (2010) were referring to.

Theory

An increased share of private schooling within a country can increase the quality of education experienced by students through increased competitive pressures, specialization, and an improved match between educator and student.

Since most systems of public schooling operate with a monopoly on public funds, public schools enjoy a great deal of monopoly power in general. In any industry where a producer has extensive monopoly power, quality is held down while prices gravitate upwards. This is because the producer does not have much of an incentive to increase quality and decrease prices. If private schooling is introduced into the system, competitive pressures increase the incentives for both public and private schools to offer the highest-quality education at the lowest cost. Private school choice programs could balance the distribution of power within the school system and families could exercise that power to pressure schools to improve (Egalite, 2013; Figlio & Hart, 2014; Stewart & Wolf, 2014). Additionally, public school officials have an incentive to maximize their budgets, so they are inclined to keep as many students as they can (Niskanen, 1971). Moreover, private school choice programs can introduce price differentiation into the system of schooling. Price differentiation can entice new high quality schooling options to enter the market for education and can also communicate valuable information about what is valued by parents and children (Friedman & Friedman, 1990).

An educational choice system can improve the match between educator and student through education specialization. Since all children are unique, they have diverse interests, learning styles, ability levels and family structures. Providing specialized learning environments that meet the unique needs of children can improve the overall educational experience. The increases in educational quality influenced by the introduction of private schooling within a country can lead to improved standardized test scores for students (Muralidharan and Sundararaman, 2015; Shakeel, Anderson, & Wolf, 2016; Tooley & Dixon, 2005).

Alternatively, private schools may provide a quality education to children by enhancing skills that are not easily measured by standardized assessments like PISA. If private schools are

allocating more resources towards improving skills that are not captured by standardized tests, we may observe a negative effect of private schooling on PISA scores.

Critics of private schooling argue that since parents are not experts in pedagogy or education, they may not make rational decisions when selecting schools for their children. The inability of parents to choose rationally, they argue, may lead to a lower-quality educational experience for children.

Data

We use pooled cross-sectional country-level data from multiple sources for the years of 2000 to 2012. We use data from the World Bank[1] and the United Nations Data Retrieval System[2] for our independent variable of interest, the private share of total schooling enrollment. We also use the World Bank for gross domestic product, population, life expectancy, and total schooling enrollment. We use the New World Encyclopedia[3] to calculate the age of each sovereign state.

Our three dependent variables of interest are from the Program for International Student Assessment (PISA). We use national-level PISA math, reading, and science test scores for 62 countries around the world from 2000 to 2012. Our models use 210 country-year observations for math and science, and 208 country-year observations for reading. These data are publicly-available online at the National Center for Education Statistics website.[4]

[1] http://data.worldbank.org/indicator/SE.SEC.PRIV.ZS
[2] http://data.un.org/Data.aspx?d=UNESCO&f=series%3APRP_1
[3] http://www.newworldencyclopedia.org/entry/List_of_sovereign_states_by_formation_date
[4] http://nces.ed.gov/surveys/pisa/idepisa/dataset.aspx

PISA Assessment

PISA is a standardized assessment, coordinated by the Organization for Economic Cooperation and Development (OECD), examines academic abilities of 15-year-old children around the world. PISA started in 2000 with 32 participating countries and has been done every three years. In 2015, nationally-representative samples of children took the assessment from 70 different countries. The subjects included reading, math, science, problem solving, and financial literacy.

In order for the data from a country to be valid, OECD requires that each nation tests at least 4,500 students from at least 150 different schools. The testing period can be no longer than 42 days, and the response rate must be equal to or greater than 65% of the original sample of schools.[5] At the school level, the response rate must be equal to or greater than 80% of the sampled students. The sampling procedure is stratified systematic sampling with each observation weighted by the inverse of the probability of being sampled.

Until 2015, the test was mostly paper-and-pencil with 17 different examination booklets randomly assigned to students. Each student received only one booklet which had four different clusters of material. Each cluster contained about 30 minutes of material on one of the following: reading, math, science, or financial literacy. About half of the questions were multiple-choice, a fifth were short-response, and about a third were constructed-response.

Although the 2015 PISA results are available, we are unable to use them for our analyses since data from the same time period are not yet available for our explanatory variable of interest or controls.

Methods

[5] As a validity check, Westat analyzes the final list of schools before data are made publicly-available.

We use a time and country fixed effects regression approach of the form:

$$PISA_{it} = \beta_0 + \beta_1 PrivateShare_{it} + \beta_2 GDP_{it} + \beta_3 GovtExpend_{it} + \beta_4 Pop_{it} + \beta_5 Enroll_{it} + \beta_6 LifeExpect_{it} + \beta_7 Mortality_{it} + \beta_8 Age_{it} + \alpha_i + \varepsilon_{it}$$

Where *PISA* is one of the three dependent variables of interest for country *i* at time period *t*. Our three dependent variables of interest are math, reading and science test scores as measured by the international PISA assessment.

PrivateShare is the independent variable of interest, the private school share of total enrollment, for country *i* in time period *t*. We expect that the coefficient of interest, β_1, will be positive since private schooling could increase competitive pressures, which could lead to overall increases in schooling quality within a country, as measured by PISA scores.

We include a set of country-level control variables since certain characteristics of countries may cause them to become better educated as well as increase private-sector schooling. For example, an increase in GDP could lead a country to increase spending on public schooling since it has more wealth. Concurrently, the PISA scores for a country is likely to increase due to an increase in its wealth. *GDP* is the gross domestic product for country *i* in year *t*. *GovtExpend* is the government expenditure as a percent of GDP, *Pop* is the population, *Age* is the age in years, *LifeExpect* is the average life expectancy, *Mortality* is the infant mortality rate, and *Enroll* is the total number of students enrolled in private and public schooling for country *i* in time period *t*. Due to the non-linear relationship between the dependent variables and GDP, population, and enrollment, we also include squares of these terms in our models. Finally, α_i is the set of country-level time-invariant parameters, such as ethnicity, language, and culture, and ε_{it} is the random error term.

Our explanatory variable of interest, private share of total schooling enrollment, may still have an endogeneity issue. For example, an omitted variable measuring the amount of regulation in the schooling industry could create an upward bias on our effects since it is negatively associated with private share of schooling and perhaps also negatively correlated with PISA scores as well, since more regulation could simply reduce teacher autonomy in both private and public sectors. Because of this potential issue, we also employ an instrumental variable year and country-level fixed effects two-stage least squares regression of the form:

$$\text{PrivateShare}_{it} = \lambda_0 + \lambda_1 \text{ChildPop}_{it} + \lambda_2 X_{it} + \alpha_i + \varepsilon_{it} \quad (1)$$

$$\text{PISA}_{it} = \beta_0 + \beta_1 \text{PrivateShare}_{it} + \beta_2 X_{it} + \alpha_i + \varepsilon_{it} \quad (2)$$

Where the second-stage, possibly endogenous explanatory variable of interest, *PrivateShare*, is predicted in the first stage with an exogenous instrument, *ChildPop*, the percent of the total population that is between the ages of 0 and 14 for country *i* in year *t*. The instrument represents an unexpected shock in the demand for schooling overall in the short-run. Since public schools around the world are constitutionally-obligated[6] to provide a free education for all children, public schools will be more likely to absorb this excess demand. On the other hand, private schools will be less likely to respond to short-run shocks in demand since the profit-incentives for school expansion and market entry may not appear quickly enough.

As a result, we expect that the instrument will be strongly negatively correlated to the share of private schooling enrollment within a country and year. The instrument passes the redundancy condition since it does not directly affect our four outcome variables of interest; the amount of children in a given country/year should not directly affect political or economic freedom within a country/year. Furthermore, when we include this instrument in our structural model, we do not find evidence that the instrument is correlated with any of the outcome

[6] http://www.worldpolicycenter.org/policies/is-education-tuition-free/is-primary-education-tuition-free

variables. Lastly, the instrument is exogenous since it is not correlated with any omitted variables that may concern us. For example, an unexpected shock within a country, such as a coup d'état, could increase the need for private schooling within a specific time frame. While a coup could increase private schooling, the relative amount of children within a country and year is not directly related to the likelihood of a coup. We also include all of the same controls from our previous models in vector X.

Since many observable characteristics of countries can be argued as relatively constant over time, we first present results for the country-level fixed-effects models without time-variant controls. Then, we present results based on our preferred model with year and country-level fixed effects. Finally,[7] we present our instrumental variables year and country-level fixed effects results.

Table 1: Descriptive Statistics

	Mean	Standard Deviation	Within Std. Dev.	Minimum	Maximum
PISA Math	468.03	56.43	10.52	292.07	573.47
PISA Reading	466.39	50.83	10.96	284.71	556.02
PISA Science	473.13	51.27	8.98	322.03	563.32
Private Share	13.72	16.88	2.97	0.01	99.08
GDP (Billions)	285.49	1,194.73	319.98	0.01	17,348.07
Govt Expend (% GDP)	17.56	4.25	3.21	6.16	27.55
Population (Millions)	34.09	130.62	6.95	0.01	1,364.27
Enrollment (Millions)	3.41	12.13	1.19	0.00	141.15
Life Expectancy	68.38	9.69	1.85	38	83
Infant Mortality (%)	3.19	2.92	0.73	0.20	14.60
Country Age	135.52	288.82	4.61	3	2672
Child Population (%)	30.53	10.82	1.92	12.94	50.41
OECD	0.18	0.38	0	0	1

Results

[7] Results for OECD and non-OECD subgroups can be found in the Appendix. However, the model for OECD countries faces a substantial power issue. First, only 18% of the original 209 observations are from OECD countries, and there is less variation in private schooling for developed nations.

Year and Country Fixed Effects

Table 2 reports results using country and time fixed effects. Results in this first model indicate that an increase in private share of total schooling enrollment is associated with higher PISA scores for all three subjects.

In particular, Table 2 shows that a ten percentage point increase in the private share of schooling enrollment is associated with a 25-point increase in math, a 14-point increase in reading, and a 13-point increase in science. These results are equivalent to a 44% standard deviation in math, a 28% standard deviation in reading, and a 24% standard deviation in science. These effect sizes are considered small to medium using standards created by Jacob Cohen (1992) and Mark Lipsey (1990). However, for research in education, these effect sizes are exceptionally large (Hill et al., 2008).

Table 2: The Effect of Private Schooling on PISA Scores

	Math	Reading	Science
Private Share	**2.513*** **	**1.462***	**1.325****
	(0.000)	**(0.015)**	**(0.009)**
Constant	444.300***	455.356***	459.266***
	(0.000)	(0.000)	(0.000)
R-Squared Within	0.1050	0.1687	0.1077
Countries	64	64	64
N	218	216	218

Note: P-values in parentheses. All models use country and year fixed effects.
* p<0.05, ** p<0.01, *** p<0.001

Year and Country Fixed Effects and Added Controls

Since there are important factors that may significantly vary within countries in a relatively short time period, we include an additional model which controls for many of these factors. Table 3 reports results for our preferred model which includes controls and year and country fixed effects. These results indicate that an increase in private share of schooling enrollment is associated with an increase in PISA scores. However, perhaps because we add in multiple control variables and rely on the statistical power generated by only 206 observations, our standard errors increase relative to the previous model without controls.

Specifically, Table 3 shows that a ten percentage point increase in the private share of schooling enrollment is associated with a 16-point increase in PISA math scores, or about 29% of a standard deviation. In this model, results for reading become marginally statistically significant, while results for science become statistically insignificant with a p-value of 0.101. However, coefficients on all results remain positive. A ten percentage point increase in the private share of schooling enrollment is associated with a 12-point increase in PISA reading scores and an 9-point increase in PISA science scores. This equates to a 24% standard deviation increase in reading and a 18% standard deviation increase in science, however the effect on science is not statistically significant. Again, these effect sizes are quite large for national-level education research.

The control variables behave as expected where significance arises. In particular, it appears that large increases in GDP within a country are positively associated with reading test scores, however this is only considered marginally significant. Perhaps this is because wealth and resources can increase the quality of educational institutions and ultimately the well-being, and test scores, of children. As we would expect, infant mortality rates within a country are significantly negatively related to all three types of PISA scores. This particular variable may be

capturing many unobservable characteristics within a country that are negatively associated with the well-being of the students and educators, such as disease or poverty-level shifts. If students and educators have to deal with these negative shocks, they will probably have less time and ability to focus their efforts on a successful education.

We do not detect many significant effects of the control variables used, perhaps because there is not much variation within a country for these factors. In other words, it may be that many of the control variables can be considered as country-level fixed effects. Furthermore, since these control variables could simply result in a power issue, the previous model without controls may be preferred.

Table 3: The Effect of Private Schooling on PISA Scores

	Math	Reading	Science
Private Share	**1.616***	**1.211**	**0.918**
	(0.016)	**(0.058)**	**(0.101)**
GDP (Billions)	0.002	0.010*	0.003
	(0.725)	(0.042)	(0.504)
GDP^2 (Billions)	-0.000	-0.000	-0.000
	(0.891)	(0.483)	(0.948)
Govt Expend	-1.070	-0.822	-0.167
	(0.250)	(0.356)	(0.830)
Population (Millions)	0.559	-0.627	-1.208
	(0.640)	(0.586)	(0.229)
$Population^2$ (Millions)	-0.001	0.000	0.001
	(0.679)	(0.989)	(0.598)
Enrollment (Millions)	0.005	0.005	-0.002
	(0.547)	(0.537)	(0.732)
$Enrollment^2$ (Millions)	-0.000	-0.000	-0.000
	(0.253)	(0.969)	(0.739)
Life Expectancy	-1.479	-0.467	0.170
	(0.462)	(0.808)	(0.920)
Infant Mortality	-2.661***	-2.373***	-1.301*
	(0.000)	(0.001)	(0.036)
Country Age	-0.364	-0.553	0.044
	(0.542)	(0.335)	(0.930)
Constant	690.103***	690.417***	505.876***
	(0.000)	(0.000)	(0.000)
R-Squared Within	0.2898	0.2974	0.2047
Countries	62	62	62
N	209	207	209

Note: P-values in parentheses. All models include country and year fixed effects.
* p<0.05, ** p<0.01, *** p<0.001

2SLS Regression with Year and Country Fixed Effects

For each of the three regressions, the instrument is strongly associated with the private share of total schooling enrollment. As shown in Table 4B, the coefficient is around -0.86 in the first stage of each model. In other words, a 1 percentage point increase in child share of the total population is associated with a 0.86 percentage point reduction in private schooling. This is evidence to confirm our hypothesis that private schools are less able to absorb short-run demand shocks of students than public schools. The instrument is also redundant since child share of population should not directly influence a nation's standardized test scores within a given year. In fact, when we include this as a control in the structural model, the p-value associated the instrument is above 50 percent for math and reading scores. However, we do find a statistically significant negative relationship between the instrument and reading PISA scores. Although this empirical relationship emerges, it is not intuitively clear why child share of total population should directly affect PISA reading scores.

We present the results for the second stage of the instrumental variables fixed effects regression in Table 4A. The p-value for math jumps above 15 percent and the coefficient is similar to before, which could be an indication that the model is suffering from a lack of power, which is not uncommon for a 2SLS model with a sample size around 200. Conversely, the result for reading becomes more statistically significant while the effect size becomes close to a full standard deviation. The effect for science attenuates to zero. It may be that the instrument is only redundant to the models for math and science. However, intuitively, the instrument is more exogenous to the models than private schooling itself.

Table 4A: The Effect of Private Schooling on PISA Scores (2nd Stage)

	Math	Reading	Science
Private Share	**2.793**	**5.226***	**0.160**
	(0.159)	**(0.014)**	**(0.923)**
Controls	Yes	Yes	Yes
R-Squared Within	0.2730	0.0815	0.1936
Countries	62	62	62
N	209	207	209

Note: P-values in parentheses. All models include country and year fixed effects with all added controls. All results are from the second stage of the IV fixed effects models. * p<0.05, ** p<0.01, *** p<0.001

Table 4B: The Effect of Private Schooling on PISA Scores (1st Stage)

	Private (Math)	Private (Reading)	Private (Science)
Child Share	**-0.854*** **	**-0.862*** **	**-0.854*** **
	(0.000)	**(0.000)**	**(0.000)**
Controls	Yes	Yes	Yes
R-Squared Within	0.4232	0.4235	0.4232
Countries	62	62	62
N	209	207	209

Note: P-values in parentheses. All models include country and year fixed effects with all added controls. All results are from the first stage of the IV fixed effects models. * p<0.05, ** p<0.01, *** p<0.001

Conclusion and Policy Implications

Our preferred model finds that a ten percentage point increase in the private share of schooling enrollment is associated with a 16-point increase in math, a 12-point increase in reading, and a 9-point increase in science. These results are equivalent to a 28% standard deviation increase in math, a 24% standard deviation increase in reading, and a 18% standard deviation increase in science. However, these results are only robust to alternative model specifications for math and reading scores.

Since private schooling can increase scores on international assessments that examine material that society cares about, we should promote policies that increase private schooling

within a country. Specifically, decision-makers should consider expanding access to private schooling through private school choice programs such as vouchers, tuition-tax credit scholarships, and education savings accounts. Each of these programs would expand the share of private schooling and competitive pressures within a country. However, decision-makers must realize that there will obviously be heterogeneous effects across countries.

In order to increase the supply of private schooling options, policy-makers may also consider reducing regulatory costs for private schools to participate in school choice programs. Lastly, we should increase the amount of data available on private schooling around the world, so that researchers could provide more information about differential impacts for subgroups.

References

Abdulkadiroglu, A., Pathak, and Walters. (2015). *School vouchers and student achievement: evidence from the Louisiana Scholarship Program*. National Bureau of Economic Research.

Boyles, D. R. (Ed.). (2004). *Schools or markets?: Commercialism, privatization, and school-business partnerships*. Routledge.

Chubb, J. E., & Moe, T. M. (2011). Politics, markets, and America's schools. *Brookings Institution Press*.

Chudgar, A., & Quin, E. (2012). Relationship between private schooling and achievement: results from rural and urban India. *Economics of Education Review*, 31(4), 376-390.

Cohen, J. (1992). A Power primer. *Psychological Bulletin*, 112(1), 155.

Egalite, A. J. (2013). Measuring competitive effects from school voucher programs: A systematic review. *Journal of School Choice*, 7(4), 443-464.

Figlio, D., & Hart, C. (2014). Competitive effects of means-tested school vouchers. *American Economic Journal*: Applied Economics, 6(1), 133-156.

Friedman, Milton, & Friedman, R. (1990). *Free to choose: A personal statement*. Houghton Mifflin Harcourt.

Gutmann, A., & Ben-Porath, S. (1987). *Democratic education*. John Wiley & Sons, Ltd.

Hanushek, E. A., & Woessmann, L. (2010). The Economics of international differences in educational achievement (No. w15949). National Bureau of Economic Research.

Hanushek, E. A., Link, S., & Woessmann, L. (2013). Does school autonomy make sense everywhere? Panel estimates from PISA. *Journal of Development Economics*, 104, 212-232.

Hill, C. J., Bloom, H. S., Black, A. R., & Lipsey, M. W. (2008). Empirical benchmarks for interpreting effect sizes in research. *Child Development Perspectives*, 2(3), 172-177.

Hoxby, C. M. (Ed.). (2007). *The Economics of school choice*. University of Chicago Press.

Lipsey, M. W. (1990). Design sensitivity: Statistical power for experimental research (Vol. 19). Sage.

Muralidharan, K., & Sundararaman, V. (2015). The Aggregate effect of school choice: Evidence from a two-stage experiment in India. *The Quarterly Journal of Economics*, 130(3), 1011-1066.

Neal, D. (2002). How vouchers could change the market for education. *The Journal of Economic Perspectives*, 16(4), 25-44.

Niskanen, W. A. (1971). *Bureaucracy and representative government*. Transaction Publishers.

Saltman, K. J. (2000). *Collateral damage: Corporatizing public schools--A Threat to democracy*. Rowman & Littlefield.

Shafiq, M. N., & Myers, J. P. (2014). Educational vouchers and social cohesion: A Statistical analysis of student civic attitudes in Sweden, 1999–2009. *American Journal of Education*, 121(1), 111-136.

Smith, A. (1776). *The Wealth of nations*, Book 1. London, Methuen & Co.

Stewart, T., & Wolf, P. J. (2014). *The School choice journey: school vouchers and the empowerment of urban families*. Palgrave Macmillan.

Tooley, J., & Dixon, P. (2005). *Private education is good for the poor: A Study of private schools serving the poor in low-income countries*. Washington, DC: Cato Institute.

West, M. R., & Woessmann, L. (2010). ‘Every catholic child in a catholic school’: Historical resistance to state schooling, contemporary private competition and student achievement across countries. *The Economic Journal*, 120(546), F229-F255.

Appendix

Table A1: Heterogeneous Effects (Year and Country Fixed Effects)

	Math	Reading	Science
Non-OECD	**2.581***	**2.754***	**1.166**
	(0.039)	**(0.021)**	**(0.270)**
OECD	0.576	0.099	0.448
	(0.486)	(0.900)	(0.523)
Controls	Yes	Yes	Yes
R-Squared Within	0.3124	0.3257	0.2120
Countries	62	62	62
N	209	207	209

Note: P-values in parentheses. All models include country and year fixed effects and all added controls. Coefficients are for private schooling in OECD and Non-OECD countries.
* p<0.05, ** p<0.01, *** p<0.001