Private School Enrollment and Math Achievement (Figure 1)

**Math Scores**
- High scores $> 520$
- Above average scores 500-520
- Below average scores $< 500$

**Private School Enrollment**
- more than 50%
- 21-50%
- 6-20%
- 0-5%

**Source:** Programme for International Student Assessment (PISA) 2003
Proponents of vouchers and other measures that expand access to private schooling often claim that competition from privately operated schools will spur student achievement—and, perhaps, lower costs—in public schools. Critics of such policies, in response, note that the educational benefits of competition are unproven and that student achievement in the public sector could decline as students become segregated along lines of ability, ethnicity, or class.

Scholars have attempted to discern the effects of competition between the public and private sectors within the United States and in other countries, but no study, to our knowledge, has attempted to measure systematically the causal impact of competition by looking at variation across countries. Until now, research has been stymied by the fact that any simplistic statistical correlations between the extent of competition and student achievement that might be found are suspect. Countries where more people choose to invest in private schools may have other attributes, such as higher income or different cultural norms, which could influence student achievement.

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as more income or a greater commitment to education, that lead to higher levels of achievement. If this is the case, any positive correlation between private schooling and student achievement could reflect a country’s income or educational commitment rather than any beneficial effects of competition. Or it may be the case that low-quality public schools increase the demand for private schooling. If so, then it could appear that competition lowered the quality of public schooling when in fact the causal connection was in the opposite direction.

In this study, we solve this conundrum by taking advantage of the historical fact that the amount of competition in education today varies from one country to another for reasons that have little to do with contemporary school quality, or national income, or commitments to education. The extent of private schooling stems in large part from the Catholic Church’s decision in the 19th century to build an alternative system of education wherever they were unable to control the state-run system.

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Nineteenth-century Catholic doctrine strongly opposed Catholic attendance at state-run schools that were not controlled by the Church. In the United States, for example, Catholics perceived government-operated “common schools” to be Protestant-dominated institutions that were only ostensibly nonsectarian. Local parishes responded by establishing separate schools in which children received Catholic-infused instruction. The United States was not the only country where this happened. Catholic school systems developed in many other countries, but their size depended on the percentage of Catholics living in that country during this critical period (see sidebar). (In countries where Catholicism was the state religion, there was no perceived need for private schools, however.) As a result, even today the size of the private education sector—and thus the amount of competition between public and private schools—is related to the size of the Catholic population in 1900.

To connect the historical past to competition’s effect on achievement today requires two analytic steps. We first estimate the statistical relationship between the size of the Catholic population in 1900 and the extent of private schooling today in order to capture only that share of the private sector’s size that can be attributed to 19th-century Catholic policies—policies we assume to be otherwise unrelated to contemporary student achievement. Having estimated this relationship between Catholicity in the past and competition in the present, we then use that estimate to isolate the causal effect of private school competition on the achievement of individual students across 29 countries.

Our results confirm that countries with larger shares of Catholics but without an official Catholic state religion in 1900 have significantly larger shares of privately operated schools in 2003. More important, private school competition attributable to past Catholic policies generates higher student achievement in mathematics, reading, and science today. We also show that competition between the public and private sector positively affects the achievement of students attending public schools. Spending on education is also reduced, suggesting that school systems are more productive if they are more competitive.

PISA 2003
For the information on contemporary student achievement we rely on the well-regarded data sets compiled by the Organisation for Economic Co-operation and Development (OECD) Programme for International Student Assessment.
Catholic Doctrine and Private Schooling

Over the course of the 19th century, Vatican authorities expressed increasing concern over the implications of emerging state-run education systems for the moral and religious training of Catholics. For example, among the propositions included in the *Syllabus Errorum* (*Syllabus of Errors*), a list of commonly held beliefs condemned by Pope Pius IX in 1864, was the notion that “Catholics may approve of the system of educating youth unconnected with Catholic faith and the power of the Church.” Pope Leo XIII, in his 1884 encyclical *Nobilissima Gallorum Gens* (*On the Religious Question in France*), wrote that the Church “has always expressly condemned mixed or neutral schools; over and over again she has warned parents to be ever on their guard in this most essential point.” The *Catholic Encyclopedia*, published during the pontificate of Pope Pius X in 1912 as a summary of official Catholic doctrine, stated that the “State monopoly of education has been considered by the Church to be nothing short of a tyrannical usurpation.”

The Vatican’s formal pronouncements concerning education constituted binding mandates for Catholic officials at the national level, and the late-19th-century historical record is accordingly filled with evidence of their efforts to construct and maintain independent school systems.

In 1884, the officials of the Catholic Church in the United States convened at the Third Plenary Council of Baltimore and, taking heed of the Vatican’s pronouncements, affirmed the “absolute necessity and the obligation of pastors” to maintain distinctively Catholic schools. It ordered that every parish open such a school within two years and decreed that “parents must send their children to such schools unless the bishop should judge their reason for sending them elsewhere to be sufficient.” Their goal, the council famously declared, was no less than to see “every Catholic child in a Catholic school.” By 1911, there were almost 5,000 parochial schools serving more than 1.27 million students nationwide. Although American Catholic schools have never enrolled more than a small fraction of the national student population, as late as 1980 they accounted for almost 80 percent of enrollment in private elementary and secondary schools (see “Can Catholic Schools Be Saved?” *features*, Spring 2007).

In predominantly Catholic Belgium, after the nation won its independence in 1830, the Church had either maintained its own schools with the support of public funds or exercised strong influence over the curriculum in municipal schools. But, in 1879, the elite-dominated Liberal party banned subsidies for Catholic schools and required all municipalities to establish public schools that would replace religious instruction with secular moral training. Belgian Catholics responded by removing their children from the public schools and erecting their own, parallel system. The share of Belgian elementary school students in Catholic schools rose from 13 percent in 1878 to 61 percent just two years later. In 1884, the Catholic party regained a legislative majority and immediately returned control of schooling to the municipalities, allowing them to adopt or subsidize Catholic private schools within their jurisdiction.

In the neighboring Netherlands, where Catholics made up about one-third of the population, they allied with Calvinists who were equally dissatisfied with the nondenominational instruction available in the state sector in order to secure government funding for privately operated religious schools. In 1878, the Liberal party had adopted new staffing and physical requirements for all schools and established subsidies for municipal schools only. Both changes threatened the continued existence of confessional schools and provoked an intense popular response. By 1888, the Catholics and Calvinists had acquired a majority in the Parliament and the following year they adopted the same 30 percent national subsidy for confessional schools. In 1917, the Dutch Constitution was amended to guarantee equal funding for any school meeting general enrollment and quality standards, without regard to whether the school was publicly or privately operated. The share of Dutch students attending privately operated schools accordingly increased from 25 percent in 1880, to 38 percent in 1910, to 73 percent in 1940.

It is important to note that Protestant Christians in most countries were less resistant to state control of mass education. There were clearly exceptions, such as the Calvinists in the Netherlands, who rejected the lowest-common-denominator Protestantism available in state schools and joined forces with the Catholics in advocating for public subsidies for their own schools. As a general rule, however, the less centralized Protestant denominations lacked formal doctrines mandating that schooling be under their exclusive control and were more willing to pursue their educational goals within the framework created by state-run systems.
(PISA) in 2003. Working closely with official government agencies, PISA gathered information on the mathematical, scientific, and reading literacy of nationally representative student populations in all 30 OECD countries. The term “literacy” signifies that the PISA measured not only the students’ knowledge of math, reading, and science, but also their ability to use that knowledge to meet real-life challenges. In 2003, PISA made a special effort to measure math literacy, allocating 70 percent of testing time to questions in this subject. PISA assessed the achievement of 15-year-old students in each country, regardless of the grade they attended. This means that, in most participating countries, PISA tested students nearing the end of compulsory schooling.

For purposes of this analysis, we constructed a data set that contained pupil-level test scores for about 220,000 students. We also were able to obtain from PISA student reports of their background characteristics and administrator reports on the characteristics of each student’s school, including such things as school resources and whether the school was public or private. All that information was available from 29 of the 30 OECD countries. (France had to be dropped from the analysis because it did not supply any information on the characteristics of its participating schools.)

We defined a school as private if the principal reported that it was managed directly or indirectly by a nongovernment organization (e.g., a church, trade union, business, or other private entity). A public school was defined as one being managed directly or indirectly by a public education authority, government agency, or governing board appointed by government officials or elected by public franchise. We used these definitions to calculate the share of private schools in a country. Throughout our study, this figure serves as our measure of the extent of contemporary private school competition in each country.

The size of the private sector so defined ranges widely across countries. In the Netherlands, more than three-quarters of 15-year-old students attend privately operated schools. Private school shares in Belgium, Ireland, and Korea are also well above one-half. By contrast, the share of students attending privately operated schools in Greece, Iceland, Italy, New Zealand, Norway, Poland, Sweden, and Turkey is below 5 percent. Just over 6 percent of the American 15-year-olds sampled by PISA attended private schools, a figure

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The Legacy of Catholic Resistance (Figure 2)

Countries that had larger Catholic population shares in 1900 have more students enrolled in private schools today.

Note: The y-axis shows 2003 private school enrollment shares, adjusted for all of the control variables in our models except 1900 Catholic population shares. The x-axis shows 1900 Catholic population shares, also adjusted for the control variables, with countries with Catholic governments initially assigned a value of zero. The solid line plots the relationship between the two variables among the 29 countries in our sample.

Source: Authors’ calculations using Programme for International Student Assessment (PISA) 2003, World Christian Encyclopedia, and other international statistical sources.
Doing More with Less (Figure 3)

An increase in private school enrollment shares of 10 percentage points boosts average national test scores in mathematics, science, and reading. It also lowers cumulative education spending through age 15 by 5.6 percent of the average across the OECD countries.

Note: The bars represent the causal effect of an increase in the private school enrollment share among 15-year-olds of 10 percentage points.

SOURCE: Authors’ calculations using Programme for International Student Assessment (PISA) 2003, World Christian Encyclopedia, and other international statistical sources

The impact of competition on student achievement. Specifically, we measure the relationship between Catholic-induced private school competition in a country and the PISA test scores of individual students in math, reading, and science.

In taking this approach, we assume that the density of Catholics in 1900 is not directly related to student achievement today, independent of effects that may occur via school competition. While this assumption cannot be proven, there are good reasons to believe it is well founded. Protestant Christians have historically placed a greater emphasis than have Catholics on the value of education, because Protestants thought individual Bible reading helped one along the road to salvation. Catholics placed greater emphasis on remaining connected to the traditions and practices of the Church. Interestingly enough, in those 22 majority-Christian countries for which data on literacy in 1900 are available, one finds a strong negative association between Catholic population shares and literacy rates. This strong negative correlation exists even after accounting for the lower gross domestic product (GDP) per capita, which is associated with lower literacy rates, in countries with larger Catholic population shares. So to the extent that we find any beneficial effect of Catholic-induced private school competition, its size is probably depressed by cultural values related to Catholicism. In other words, our approach is more likely to yield underestimates than overestimates of competitive effects.

Of course, the historical prevalence of Catholicism could also have had other consequences, apart from a greater reliance on private schooling, that indirectly affect student achievement. For example, the share of Catholics in a country could have an effect on current GDP per capita or education spending per student. We therefore account for the effect of both of these factors in all of our analyses.

In estimating the effect of private school competition on student achievement, we also adjust for the effects of a host of other factors that can affect individual student performance. In addition to the country-level factors of per capita GDP and education spending per student, we include in our analysis information on the presence or absence of external exit exams (which research suggests are associated with higher achievement) and information on whether the country had a Communist government in 1970 (which may have affected both the size of the private sector and achievement). Student and family background characteristics used in the analysis include a student’s gender, immigration status, exposure to early childhood education, the number of books that corresponds closely to official estimates of private enrollment at the secondary level from the U.S. Department of Education (see Figure 1).

Estimating Competitive Effects

Recall that our analysis involves two steps. First, we estimate the amount of contemporary private school competition across our 29 countries that can be accounted for by the share of each country’s population that was Catholic in 1900. Where Catholicism was the official state religion, we assign a value of zero for this variable (even though the size of the Catholic population was quite large). That decision is not as odd as it sounds, as we are interested in Catholicism only insofar as it was a factor contributing to the creation of a private sector, something that clearly was not the case in those countries where Catholicism was the state religion and Catholics had no reason to object to the education provided in state-run schools.

The second step uses the connection between past Catholicism and the contemporary size of the private sector to estimate the density of Catholics in 1900 is not directly related to student achievement today, independent of effects that may occur via school competition. While this assumption cannot be proven, there are good reasons to believe it is well founded. Protestant Christians have historically placed a greater emphasis than have Catholics on the value of education, because Protestants thought individual Bible reading helped one along the road to salvation. Catholics placed greater emphasis on remaining connected to the traditions and practices of the Church. Interestingly enough, in those 22 majority-Christian countries for which data on literacy in 1900 are available, one finds a strong negative association between Catholic population shares and literacy rates. This strong negative correlation exists even after accounting for the lower gross domestic product (GDP) per capita, which is associated with lower literacy rates, in countries with larger Catholic population shares. So to the extent that we find any beneficial effect of Catholic-induced private school competition, its size is probably depressed by cultural values related to Catholicism. In other words, our approach is more likely to yield underestimates than overestimates of competitive effects.

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in the home, and parental occupation and work status. Finally, we account for school resources such as class size, availability of materials, teacher certification and preparation, and amount of time for instruction.

Private School Competition and Student Achievement
The first step of our analysis confirmed the existence of a statistically strong relationship between the extent of private school competition in 2003 and a country’s Catholic population in 1900, much as the historical record would suggest. A 10-percentage-point increase in the percentage of Catholics in 1900 is associated with a 4.7-percentage-point increase in the share of students enrolled in privately operated schools in 2003 (see Figure 2). These results support our basic reasoning that as long as Catholics could not be sure that the emerging public school systems of the 19th century would provide education in line with their church’s demands, they tended to resist state schooling and establish their own private schools alongside the state sector. The consequences of historical differences in denominational shares across countries persist to this very day.

The results from the second step of our analysis are equally striking. Let us begin with the results related to student achievement in mathematics, the subject most extensively assessed in PISA 2003. A 10-percentage-point increase in the share of national student enrollment in private schools attributable to a historically larger share of Catholics induces an improvement in PISA math scores of 9.1 percent of a standard deviation (see Figure 3). As a benchmark for interpreting the magnitude of this effect, note that the difference in average mathematics test scores between the two grades with the largest share of 15-year-olds (9th grade and 10th grade) in the PISA study was 22.1 percent of a standard deviation. This “grade-level equivalent” provides a rough idea of how much a typical student learns during one school year. By this metric, our estimate of the effect of a 10-percentage-point increase in private school enrollment is equivalent to 41 percent of a year’s worth of learning in high school.

Because we are able to draw on evidence from a relatively small sample of only 29 countries, the statistical precision of our estimate is not very high. That is, we can say with 95 percent confidence that the effect of a 10-percentage-point increase in the private school share is between 3.9 and 14.2 percent of a standard deviation in test scores. Still, this means we have a very high degree of confidence that the real effect is larger than zero. The bottom line is that students in countries whose larger shares of Catholic population in 1900 induced them to have larger shares of privately operated schools today performed significantly better on the PISA 2003 math test.

As an additional step to address any lingering concerns about Catholicism’s direct influence on student achievement, we conducted both stages of our analysis again, this time accounting for the relationship between contemporary differences in the share of Catholic adherents in a country and student achievement. We found that historical Catholic shares continue to be a strong predictor of the extent of private school competition in a country. In addition, the estimated effect of Catholic-induced private school shares on student achievement increases relative to our first version of the analysis, which did not account for contemporary Catholic adherence. There is now a 12.2 percent of a standard deviation increase in test scores for each 10-percentage-point increase in the private school share in a country. This larger estimate suggests that the true effect may be closer to the upper bound of the interval we identified above.

Why the stronger relationship between private school competition and student achievement? We reason that this...
may be because, in the latter approach, the Catholic-induced school share was reflecting the slightly negative direct effect of contemporary Catholic adherence on student achievement, a relationship that reveals itself in this version of the analysis, although the estimated effect is just shy of statistical significance. Considered together, these results increase our confidence that we are describing a real, causal relationship between private competition and student performance, rather than effects of cultural differences related to religious adherence.

The estimated effects of the private school share on student achievement are somewhat smaller in science and reading than in math, but they remain substantial, positive, and statistically significant (see Figure 2). A change in the historical Catholic population share that produces a 10-percentage-point increase in the extent of contemporary private school competition generates an improvement of about 5.5 percent of a standard deviation in both science and reading—or more than one-fifth of a grade-level equivalent in these subjects.

To gain additional insights, we also re-ran both stages of our analysis while accounting for the average share of funding that private schools receive from the government. The inclusion of this variable hardly affects our results, suggesting that our findings reflect competitive effects stemming from the private operation of schools and not from differences in funding policies.

**Effect on Public School Students**

The previous portions of our study investigated the impact of private competition on student achievement in the educational system as a whole. But what about the effect of private school competition on public schools? To answer this question, we removed all students attending a privately operated school from the sample in each country and analyzed only the academic achievement of students in the public sector.

These results are somewhat more difficult to interpret than our findings above, as they combine the effects from competition with the consequences of student sorting. In other words, some of what we find may be due to high-ability students (and their parents) being more likely to choose private schools, leaving the weaker students in the public sector.

Nonetheless, the results suggest that public school students profit nearly as much from increased private school competition as do a nation’s students as a whole. While our estimates of the effects are somewhat smaller than the estimates for students in both the private and public sectors, the results are not statistically distinguishable. It therefore appears that much of the increased performance of education systems with higher levels of private school competition accrues to students who attend public schools.

**Education Spending**

The analysis so far has been limited to educational outcomes, estimating the effect of private school competition on students’ achievement. In doing so, we have controlled for possible effects of differences in educational inputs such as class sizes, availability of materials, and aggregate expenditure per student in the country. We wondered, though, whether private school competition also affects the input side of the educational process, specifically educational spending per student.

We again used a two-stage process, with the first stage using historical Catholicism to predict the Catholic-induced share of current private school competition in each country. Then, in a second stage, we measured the relationship across countries between the Catholic-induced share of competition and the cumulative educational expenditure per student up to age 15—a measure that includes both public and private spending. We continued to account for a range of country- and student-level characteristics when making these comparisons, but we now excluded measures of school resources that are likely to be affected by spending levels.

Our results show that private school competition, in addition to raising student achievement, substantially reduced the average spending level of the educational system. Changes in historical shares of Catholics in the population that are associated with a 10-percentage-point increase in the private school share today lead to a $3,209 reduction in cumulative spending per student, or 5.6 percent of the average OECD spending level of $56,947 (see Figure 3).

**Conclusion**

Our findings from an international study of 29 countries speak quite clearly. Competition from private schools improves student achievement, and appears to do so for public school as well as private school students. And it produces these benefits while decreasing the total resources devoted to education, as measured by cumulative educational spending per pupil. Under competitive pressures from private schools, the productivity of the school system measured as the ratio between output and input increases by even more than is suggested by looking at educational outcomes alone. Ironically, although Catholics historically placed less emphasis on education than did adherents of many other religions, their resistance to state-run schooling in many countries helped create institutional configurations that continue to spur student achievement.

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