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John H. Bishop
Cornell University

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Abstract
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education, school, student, parent, public, private, voucher, teacher, principal

CAHRS / Cornell University
187 Ives Hall
Ithaca, NY 14853-3901 USA
Tel. 607 255-9358
www.ilr.cornell.edu/CAHRS/

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John H. Bishop

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Consortium for Policy Research in Education
and
Center for Advanced Human Resource Studies
New York State School of Industrial and Labor Relations
Cornell University
Ithaca, NY 14853-0952
607/255-2742
jhb5@cornell.edu

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http://www.ilr.cornell.edu/cahrs

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PRIVATIZING EDUCATION: LESSONS FROM CANADA AND EUROPE

Legislative proposals for vouchers for K-12 schooling have come before many legislatures and are a regular part of election year debates. Public support for vouchers is growing. When a representative sample of the population was recently asked "Do you favor or oppose allowing students and parents to choose a private school to attend at public expense?" 44 percent said yes up from 24 percent in 1993. A tax credit has even more support. When asked "Proposals are being made in a number of states to provide a tax credit that would allow parents who send their children to private or church related schools to recover part of the tuition paid. Would you favor or oppose this proposal in your state?", 73 percent of public school parents said they favored it. Only 24 percent opposed it (Rose and Gallup 1998). This is a policy idea whose time may soon come.

There are five complementary arguments for voucher funding of schools.

1. Competition for Students: Voucher funding forces schools to become more responsive to parents wishes. Since parents preferences are diverse, schools will become more diverse. Voucher advocates claim that parents will tend to select schools with more qualified teachers and higher graduation standards and this will result in improved academic achievement (Fels, 1997). Opponents argue that parents are poorly informed about the academic quality of schools and that most will select schools on non-academic criteria—eg. religion, school disciplinary environment, extra-curricular activities, sports programs—not academic criteria. They point out that "by a 2-1 margin (60% to 28%) respondents in the 1996 Phi Delta Kappa/Gallup poll said that, if forced to choose, they would prefer their sons or daughters to make C grades and be active in extracurricular activities rather than make A grades and not be active"(Rose, Gallup and Elam 1997).
2. Entrepreneurship: Voucher funding allows teachers and principals who are dissatisfied with the way existing schools operate to create their own school reflecting their unique vision. Many schools would seek to fill a niche and not try to satisfy all tastes. They could specify up front what the school would provide and what was expected of students and parents and let those who like the school's approach to choose it.
3. Competition for Teachers and a more flexible employment relationship: Advocates argue that vouchers will create a more competitive teacher labor market. Teachers unions will be weakened and the authority of principals will be strengthened. Talented teachers will be better rewarded (thereby induced to remain in the profession) and incompetent teachers will be forced to leave the profession. Opponents are aghast at the prospect of weakened tenure protection

and will fight to retain such protections at voucher funded schools. Countries that fund schools through voucher like systems often negotiate pay, tenure protections and conditions of work at the national level and sometimes leave headmasters with little discretionary power over their teachers.

4. Avoiding the Dead Hand of Bureaucracy: Vouchers will increase the size of the private school sector. John Chubb and Terry Moe (1990) argue that privately run schools will always be more effective than public schools because they are not subject to the bureaucratic controls and tight regulation that public schools are. Opponents point out that publicly funded organizations will have to be regulated to avoid fraud and assure that higher order values (such as curriculum, racial integration, non-discrimination) are served. This may take away the source of their greater effectiveness.
5. Bring Morality and Religion back into the Schools: Advocates argue that faith based institutions are better at teaching values and good behavior than secular institutions. This is important function of schools and success in teaching values like honesty, hard work and dependability carries over into the academic realm. Opponents point out that religious organizations also sometimes teach intolerance and pseudo science such as creationism.

Opponents argue that a growing private school sector would weaken local voter support of publicly funded schools causing them to be under funded. To avoid this, the per pupil funding levels of the two types of school would have to be tied together, something that most of the voucher experiments underway in the U.S. do not do. In a voucher system, parents dissatisfied with the a school would simply "Exit" rather than "voice" their concern and run for PTA president or school board. Another fear is that the best students would use choice to avoid having to share classrooms with lower achieving students from low-income backgrounds. Proponents of vouchers point out that without subsidies the private sector has already captured 11 percent of the market and tracking already allows the smartest high school students to spend little time with low achieving students. The deleterious effects of the flight to private schools on voter support for public schools may already be a reality. Tying the fortunes of the two sectors together and facilitating the expansion of the private school sector might generate a stronger pro-education coalition and help both types of schools improve.

Both sides of the debate have plausible *a priori* arguments for their position. The issues of fact and causality that are debated by the two camps can be settled scientifically only by empirical evidence. It is time to take a careful look at how such systems work in practice, not just in theory. Isabel Sawhill contribution to this book reviews American experience with voucher schemes. This paper looks at Canadian, Asian and European experience with voucher funding of K-12 education.

Two kinds of questions are addressed: Do private schools outperform public schools? Do countries with large private school sectors have higher levels of average achievement?

Table 1 presents data from the Organization of Economic Cooperation and Development (OECD) and from the International Assessment of Educational Progress (IAEP) on the size and character of the private school sector in 29 countries. A number of European governments pay for private/religious schooling on much the same terms as they pay for schooling provided by state schools. This has resulted in private schools becoming very important in some countries. In 1990, for example, 68.8 percent of Dutch primary school students, 56 percent of Belgian students, 34.5 percent of Spanish students and 15 percent of French students attended independently run private schools. More than a quarter of the secondary schools in Japan and Korea are private.

Canada has created a very interesting alternative to public subsidy of independent private schools. In four provinces—Alberta, Newfoundland, Ontario and Saskatchawan—there is a Catholic school system (and in Newfoundland a Protestant system as well) that is overseen by school boards elected by members of the religious faith. The schools run by these religious school boards compete for students with schools run by secular school boards and educate over 15 percent of the nation's students.

The paper will proceed as follows. The first section of the paper describes the governance, funding and structure of compulsory schooling in a number of the European countries that fund private schools (ie. schools run by non-governmental organizations) on much the same basis as public schools. The second section of the paper compares the character and effectiveness of private and public schools in the 15 industrialized nations that participated in the 1991 International Assessment of Educational Progress. The third section of the paper compares the character and effectiveness of public and non-public schools in Canada. The final section of the paper makes use of the variation in institutional and governance arrangements across 30 countries that participated in the Third International Mathematics and Science Study (TIMSS) and the IEA Reading Study to test the effects that a large private school sector has on national average achievement levels in reading, mathematics and science.

I. Choice and Privatization: Schooling in Belgium, Britain, France and the Netherlands

Private schools differ across national boundaries at least as much as public schools differ. They differ because they have evolved in unique historical, cultural and institutional environments. Their character is influenced by the number and size of religious communities, anti-clerical political movements, the existence of curriculum-based external exit exams, the traditions and qualifications

of the teaching profession, the regulatory and funding environment, and traditions regarding retention in grade and choice of public school. The relationships between all these variables is extremely complex. Consequently, the paper begins with an effort to give the reader a sense of that complexity by describing the national education systems of four countries—Belgium, Britain, France and the Netherlands--that subsidize some denominational schools on much the same basis as secular state run schools. The discussion is organized around three key system features: competition among schools, curriculum-based external exit examinations and school responses when a student falls behind.

1.1 Competition among Schools

Belgian, British, Dutch, and French schools face a competitive environment that is much more like the one faced by American colleges and universities than the one faced by American primary and secondary schools.

Mixed Choice and Cachement: In France and Britain each public school has its own cachement area but funding is on a per student basis and students from outside the cachement area are admitted if space is available. Since marginal costs of instruction are lower than the per student payment, schools experiencing an increase in applications have an incentive to expand up to the maximum their physical plant can accommodate. Students living in the school's cachement area or with siblings at the school have priority when queues develop. Where students from outside the cachement area are admitted, students are typically selected primarily on a first-come-first-serve basis. Schools retain some discretion, however, so stronger students and well-behaved students are more likely to be accepted. Schools also have the authority to expel misbehaving students, in effect forcing them to find another school to attend.

Pure Voucher Systems: The constitutions of Belgium and the Netherlands guarantee that all persons are free to provide education. Most Belgians are baptized Catholics so schools run by various Catholic organizations educate roughly half of the nation's students. The Catholic schools are generally thought to have higher standards and tend to serve children from more advantaged backgrounds. An additional source of educational diversity is separate school systems maintained by each of the three language communities—Flemish, French and German--in Belgium. Parents may send their child to any school they want. Where queues develop, students are supposed to be accepted by lottery but family pull and the student's record apparently often influences who is admitted. Primary schools and academic secondary schools are comprehensive.

In the Netherlands:

Interference by the authorities is prohibited under the Constitution, except with regard to supervision and to requirements concerning the moral integrity and

> *competence of teachers if and in so far as parliament (and only parliament) decides that such restrictions are desirable….After many years of argument, the equality of public-authority primary education and private primary education was finally acknowledged…in 1917 (Ministry of Education and Science, 1988, p. 4).*

The Dutch are pretty evenly divided between Catholics and Dutch Reform Church, so three parallel systems of education--a locally administered public system, a Catholic system and a Protestant system—have evolved. Primary education is comprehensive. Secondary education is differentiated. There are three types of general secondary school--the VWO, the HAVO and the MAVO--and a system of lower vocational schools, LBO/LEAOs and KVBOs, that prepare students for occupationally specific exams as well as general education exams. The curriculum of the first year of secondary school is supposed to be the same in all schools so that students can transfer between schools at its conclusion. In succeeding years, however, curricula and rigor diverge. Rigor and work loads are greatest at the 6 year VWO's, somewhat less demanding at the 5 year HAVOs and still less demanding in the 4 year MAVOs. Which and how many foreign languages are studied also differ across school types. The LBOs devote considerable time to occupationally specific curricula, so less time is available for academic courses. Advise to parents about which type of school is appropriate for their child is based on the pupil's record in primary school. Parents have the right, however, to select the type of school and which school of that type their child will enter. If, however the student fails two or more of her courses in the first or later years of secondary school, the student must either repeat the grade or transfer to an easier school.

Essential to a competitive environment, of course, is the right of families to send their child to the school of their choice if the child qualifies academically. Political boundaries do not constrain school choice. Barriers to attending a school other than the closest one are low in Belgium and the Netherlands because schools are small and consequently more numerous, population densities are high, public transportation is generally available, opportunities to participate in sports and music are often organized by the community not the school, and centralized funding of schools means that spending per pupil varies little and **money follows the student even when a school in a nearby community is selected.**

Thus, in Belgium and the Netherlands (and to some degree in Britain and France as well) enrollment in the top secondary schools depends primarily on a student's achievement in primary schools, not on her parent's ability to buy a house in a suburb with an excellent high school as in the U.S. This means that parents who want their child to attend and graduate from the best secondary schools must make sure their child studies hard.

1.2—Interaction between School Choice, Private Schools and External Examination Systems

At the end of secondary school, students in most European and Asian countries take national or provincial examinations that assess how well they learned what was taught. Student performance on these examinations influences university attendance and job opportunities.

Nine-tenths of English youth now take the General Certificate of Secondary Education (GCSE) exam at the end of 11th grade and an increasing number take A levels two years later. Scotland also has a system of external examinations. For the United Kingdom as a whole, the ratio of the number of school leavers passing at least one A level (or the Scottish equivalent) to the number of 19 year olds was 23 percent in 1991 (Government Statistical Service 1993, p. 8). Performance on GCSE and A level examinations and the equivalent Scottish exams determine whether one can attend university and which university and program you are admitted to. Grades on the GCSE and A level exams are included on resumes and requested on job applications, so employment opportunities depend on school results as well (Raffe 1984). Completing an A level qualification lowers unemployment rates for 25-34 year olds from 16.9 to 6.9 percent and graduating from university lowers it further to 4.3 percent.

In France 71 percent of the age group took a *Baccalaureat* exam in 1992 and 51 percent passed. Thirty-eight percent of the *Baccalaureats* awarded were *Bac Technologique or Bac Professionel* (ie. in vocational lines) (Ministere de L'Education Nationale 1993). This is a major accomplishment, for Bac exams are set to a very high standard.[i] The job market prizes young people who have passed the Bac. There are alternative lower level examined qualifications for employment such as the *Brevet d'Enseignment Professionnel* (BEP) and the *Certificat d'Aptitude Professionelle* (CAP), but the *Baccalaureat* confers greater access to preferred jobs. In 1987, unemployment rates for 15 to 24 year olds were 37 percent for those without a diploma, 18 percent for those with a Bac and 10 percent for universty graduates.

The Dutch Ministry of Education also sets examinations for each type of school that influence access to postsecondary education and job opportunities.[ii] In both France and the Netherlands questions and answers are published in national newspapers and available on video text. The published exams signal the standards that students and teachers must aim for.

In this regard Belgium is an exception. It has no externally set exit examinations. The teachers at each school write their own examinations. Obtaining the Certificate of Higher Secondary Education is all that is needed to enter University in almost any field. As in France, however, failure rates are extremely high, particularly in the more popular better paid lines of study.

Consequently, students who want to complete a university education must develop a solid foundation in secondary school.

In the European and Asian countries that have curriculum-based external exit examinations, the record of each school in the external examinations (the numbers passing or getting high grades) is published in local and national newspapers. Recent reforms in England and Scotland, for example, have resulted in schools publishing annual reports which contain the grades received by last year's students in each examined subject. These reports are sent to parents of current and prospective students. Exhibit 1 offers an example of one such report.

The school's reputation in the community is influenced by the publication of school league tables summarizing these detailed results. Exhibit 2 provides an example of the type of information that is published for every grant maintained school in England. Administrators seeking to strengthen their school's reputation are thus induced to give teaching effectiveness (as assessed by the external exam) first priority.

In 1984, two years after choice became operational in Scotland, 9 percent of pupils entering secondary school nationally (11 to 14 percent in urban areas) attended a school outside their cachement area (Adler and Raab 1988). Scottish parents who made this choice appeared to be behaving rationally for they tended to choose schools which were more effective than the school in their own cachement area. An analysis of school choice in the Fife Education Authority found that the schools chosen by those leaving their cachement area had better examination results at age 16 than would have been predicted given the pupil's initial test scores and social background characteristics and the average SES of pupils at the school.[iii] Consequently, the free choice of schools that prevails in these European nations generates a competitive pressure on schools to excel that doesn't have any counterpart in the U.S. outside cities with magnet schools.

1.3 What Happens When a Student Can't/Doesn't Keep Up?

In Belgium, France and the Netherlands, pupils who fail more than one of their required secondary school courses are generally required to *redoubler*. The American translation of *redoubler* is "to be held back" or "to repeat the grade."[iv] The French word *redoubler* has a more active connotation, similar to the English word, "to redouble." In France, decisions about *redoublement* (repeating a grade) are made by the *Conseil de Class*, made up of the teachers for that class and two student and parents representatives. The teachers' "basic motivation is to help the child himself, to ensure that the pupil is sufficiently well prepared so that he may fully benefit from work at a more demanding level."[v] To them *redoublement* is a form of Mastery Learning, a way of allowing some students extra time to achieve very demanding learning goals.

By British and American standards, *redoublement* rates are very high in Belgium, France and the Netherlands.[vi] In 1990 Dutch *redoublement* rates were 7.5 percent per year in academic lower secondary schools, 5.1 percent per year in LBOs, the vocational lower secondary schools, and 13.3 percent per year in academic upper secondary schools.[vii] French rates of *redoublement* ranged from 6.8 and 11.0 percent per year during the four years of general lower secondary education, ranged from 12.1 to 18.4 percent per year in the three year academic upper secondary schools and averaged 8.4 percent per year in the first two years of vocational upper secondary schools.[viii] As a result, 34 percent of French 19 year olds, 25 percent of Belgian 19 year olds, 42.3 percent of Dutch 19 year olds and 20.7 percent of Spanish 19 year olds are attending secondary school full time compared to only 4.3 percent of British and 6 percent American 19 year olds (OECD,1995, Table .)

For Belgian, Dutch and French teenagers, the threat of having to *redoubler* is a strong incentive to study. When I asked how the students who must redouble feel about it, I was told that they feel **"dishonored."** Since *redoublement* is a public event, parents also feel stigmatized, so they have an incentive to see that their child studies hard.[ix]

In the Netherlands, students who are having difficulty keeping up with the demanding pace of a VWO or HAVO curricula often have a choice: either repeat the year or transfer to a less demanding type of school. At the VWO I visited in the Netherlands, one third of the entering class transfers to a HAVO or a less demanding VWO before the beginning of the third year. VWOs offer a fast paced 6 year university preparation program. Parents who want their child to enter a VWO are generally accommodated even when primary school teachers advise against it. The child's performance in school determines whether the parents' aspirations are realized or whether a transfer to a less demanding type of school is necessary.

Being forced to transfer to a HAVO or a MAVO does not foreclose university attendance. With good grades at the end of the 5 year HAVO program the student can transfer to a VWO, complete the final two years and then enter university. In addition, numerous vocationally oriented higher education options are open to HAVO and MAVO graduates and transfers to university are feasible with good grades. These alternative routes to university are open; they just take longer.

While other routes to university are possible, pupils who choose the fast track in 7th grade, a VWO or a top Lycee in France or Belgium, do not want to be forced "to get off the train." Students in these three countries are formed into classes that take most subjects together and remain essentially intact for two or more years. This class is one's peer group, the group with whom you spend most of your time. When I asked a Dutch student who, despite long hours of study, had been required to repeat a grade, why she had studied so hard, she responded ***"I***

wanted to stay with my class!" Students do not want to have to repeat the grade because it threatens to sever the friendships they have made in the class. Apparently, trying to keep up academically (ie. accepting the academic goals of the school) is viewed positively by peers because it is an expression of commitment to the group. Those who refuse to study are apparently seen as rejecting the group. In these three countries peer pressure seems to encourage lagging students to study, not discourage them as in the U.S.[x]

II. HOW DO NON-PUBLIC SCHOOLS IN EUROPE DIFFER FROM PUBLIC SCHOOLS ?

2.1 HYPOTHESES TO BE TESTED

The first set of hypotheses relate to the background and character of the families that choose to send their children to nonpublic schools.

H. 1—Nonpublic schools serve a more socially advantaged clientele even when they are free.

H. 2—The parents of students at nonpublic schools spend more time talking with their children about school. Private school students perceive their parents as more interested in their doing well in school.

In their influential 1990 book, John Chubb and Terry Moe argued that bureaucracy and democratic government inevitably result in public schools being less effective than non-public schools that must compete for students and that are, thus, required to survive a market test. This implies the following hypothesis:

H. 3--Nonpublic schools have fewer discipline and absenteeism problems than public schools.

H. 4—Nonpublic schools should give academics greater priority and have higher levels of student achievement even when social background of students is held constant.

H. 5—Nonpublic schools assign more homework than public schools.

H. 6—Students at nonpublic high schools are more likely to watch educational programs on TV even though they watch fewer hours of TV overall.

H. 7—Non-public schools have more qualified teachers, better facilities and allocate more time to the teaching of mathematics and science than public schools.

Bishop (1994, 1996) argues to the contrary that:

> "If American parents and students were allowed to choose their high school, however, the Gresham's law of course selection [easy courses displace rigorous courses because rigor is not well signalled to colleges] might become a Gresham's

> law of school selection....In order for school choice to generate an environment that induces schools to focus on upgrading instruction and improving learning, (1) the skills and competencies of individual graduates must be assessed relative to an external standard that is comparable across schools and (2) individual rewards--eg. access to preferred university programs and better jobs--must be attached to these results. Only then are students and parents encouraged to select schools on the basis of their expected value added, rather than on the basis of reputations that school staff are unable to change by doing a better job of teaching.

The hypothesis that flows from this perspective is:

> H.8--In the absence of curriculum-based exams, students at nonpublic schools will not have higher math and science achievement than students at public schools when the social background of students is held constant. In fact, the priority given to discipline and religious education may result in math and science teaching getting lower priority.

Private schools come in hundreds of different forms and voucher schemes come in hundreds of different flavors. Different schemes will have very different effects and very different costs. Isabel Sawhill argues that vouchers "are a flexible tool that can be bent to a variety of political or substantive purposes (1998, p. 1)." Consequently, it is important to know which types of non-public schools are most effective and how context influences the effectiveness of different types of non-public schools.

> H. 9--Private schools run by non-sectarian organizations will have higher student achievement than independent schools run by religious organizations, even when social background is held constant.
>
> H. 10—When the independence and susceptibility to market pressures are held constant, schools run by religious organizations have better discipline but are less effective at teaching mathematics and science.

The effectiveness of private schools should also depend on whether all students are required to take curriculum-based external exit examinations (CBEEES) at some time during secondary school. Bishop (1997, 1998) has demonstrated that curriculum-based external exit external examinations improve student achievement, even when student characteristics, school resources, curriculum, teacher qualifications and teaching techniques are held constant. They also induce schools to hire more qualified teachers and avoid having them teach outside their specialty. The teachers in provinces with diploma exams assign more homework, give more quizzes, cover more difficult material and are more likely to use best practice teaching methods (eg. Students doing science experiments).

H. 11--Being more sensitive to market pressures, nonpublic schools will respond more radically to an exam system than public schools. Consequently, there will be a positive interaction between curriculum-based exams and non-public schools. The student achievement advantage and teacher quality advantage that private schools have over public schools will be greater in nations/provinces with curriculum-based exit exams.

Advocates of voucher funding of schools argue that competition from the private sector will make public schools more effective. This then implies the following hypothesis that will be tested in Section 4 of the paper:

H. 12—Nations where private schools account for a large share of student enrollment will have generally higher achievement levels than nations with a tiny private school sector when levels of economic development are held constant.

2.2 **The 1991 International Assessment of Educational Progress Data**

The analysis to follow makes use of IAEP data on science and mathematics teaching and achievement from 16 countries.[xi] The sixteen countries included in the analysis are: China, England, France, Hungary, Ireland, Israel, Korea, Emilia Romagna/Northern Italy, Portugal, Scotland, Slovenia, Soviet Union, Spain, Switzerland, Taiwan and the United States. Schools were first sampled, then students within schools. Sampling frames generally excluded separate schools for special education students and often very small schools as well. Israel assessed only its Hebrew speaking schools, The Soviet Union assessed Russian language schools in 14 of the nation's 15 republics. Switzerland's assessed 15 of 26 cantons. A school's likelihood of selection was roughly in proportion to its estimated number of 13 year olds. School non-response rates tended to be very low. They were zero in Hungary, Slovenia, Korea and Taiwan and 3 percent in Israel and the Soviet Union. The countries with high school non-response rates were Switzerland (17 %), Emilia Romagna (18%), Scotland (19%), USA (21%) and England (48%). When sampled schools declined to participate, an alternate was selected from the same stratum (IAEP 1992c).

Random samples of 30 to 34 thirteen year olds were selected from each school. Half were assigned to the mathematics assessment and half assigned to the science assessment. Students also completed a brief questionnaire that asked about books in the home, number of siblings, language usually spoken at home, hours watching TV, hours doing homework, pleasure reading, watching science programs on TV, home availability of mathematics and science resources, attitudes towards math and science and teaching methods used by teachers. The principals of participating schools also completed questionnaires describing school policies, school resources and the qualifications of 8th grade mathematics and science teachers.

The student questionnaires provide data on the behavior and attitudes of students and parents and the instructional strategies of teachers. School means on each variable were calculated for the schools with at least 9 students in the school sample and these were the dependent variables analyzed.[xii]

Models were estimated predicting student background and attitudes, student achievement, teacher behavior, teacher quality and school resource allocation variables. These variables were predicted by five dummies for type of governance, a series of dummies for each nation, logarithm of the number of students per grade in the school, a dummy for schools with primary grades, a dummy for schools that include kindergarten through 11th grade in one building and three variables measuring the socio-economic status of the children in the school. The three SES variables were: the log of the mean number of books in the home, the mean number of siblings and the proportion of the school's students whose home language was different from the language of instruction. The governance dummies were as follows: independent nonsectarian school, independent denominational school, independent nonsectarian schools in nations with a CBEEES, independent denominational schools in a nation with a CBEEES and denominationally controlled schools that are an integral part of a national school system that has a CBEEES.

Seventy-one of the 106 IAEP schools in this latter category were parish schools run by the Irish Catholic Church (or in a few cases a Protestant or Muslim church). Local Archbishops (there are 40 in Ireland) appoint the board of governors for the schools in their diocese. The schools are owned by the church, but government closely regulates them and pays almost all current expenses. While parents are allowed to send their children to schools outside their own parish, it is very unusual for them to do so. If queues develop, church members can be given preference, but student behavior and achievement is not supposed to be an admission criterion. If a school wants to expel a student for bad behavior, it must first find him a space at another school. National labor contracts specify teacher wages and working conditions. When complaints arise about the competence of a particular teacher, principals have no formal role in evaluating the teachers performance. The matter is turned over to inspectors employed by the Ministry of Education. These inspectors are spread so thinly, individual schools are seldom visited more than once every few years. As a result, teachers are hardly ever removed for incompetence. While run by non governmental organizations, these schools appear to lack the independence and market sensitivity that plays such a central role in John Chubb and Terry Moe (1990) theorizing about private schools.

2.3 Private/Public Differences in Parent Characteristics and Home Behavior.

The relationship between private school attendance and parental and student characteristics is presented in Table 2. As predicted in H. 1, private school students came from significantly more advantaged families (as indicated by the number of books in the home). The private/public difference in family background is significantly smaller in nations that have CBEEES, but a difference remains. Religious and secular private schools are not different in this respect. Students at independent private schools watch significantly less TV. Probably this is because they are assigned significantly more homework than public schools students (see table 3).

When controls are included for socio-economic status, private school students do not appear to have stronger tastes for learning. They are less likely to own a calculator, do less pleasure reading and are no more likely to watch documentaries on television. In countries without a curriculum-based exam system, there are no significant differences in the frequency of conversations about school with parents, or in student reports of their parents interest in science or parental pressure to do well in mathematics. In addition, student attitudes towards math and science were if anything less favorable.

In countries with CBEEES, by contrast, students at independent non-sectarian schools or schools run by religious school boards were significantly more likely to report their parents wanted them to do well in mathematics.[xiii] Students at schools run by religious school board were also more likely to report their parents talking to them about math class. In other respects, however, home background of private school students in CBEEES nations was not more favorable to education. They were less likely to watch science documentaries on TV, less likely to have parents talk to them about science and less likely to believe math and science were important to get a job. TV watching was more similar to public school students.

2.4 Private/Public Differences in Student Achievement.

Student achievement differences are reported at the top of Table 3. As predicted in H. 3, the principals of independent religiously controlled schools are significantly less likely to report discipline and absenteeism problems. The sample of secular independent schools is too small to yield significant differences. The denominationally run schools that are an integral part of the state system (mainly Irish, Israeli, Korean and English schools) do not report significantly fewer discipline and absenteeism problems than secular state run schools in those nations. This latter finding contradicts H. 9.

In countries without a CBEEES, students at independent private schools do not have higher math and science achievement than public school students when family background is controlled. When, however, a nation has a CBEEE system, private school

students learn significantly more mathematics than public school students. There also appears to be a small positive interaction between diploma exams in science and non-public schools, but the effect is statistically significant only for schools run by religious school boards. These findings mean we must reject H. 4, and accept H. 8 and H. 11. Why do private school students in CBEEES countries learn more? Are teachers more qualified? Is their teaching "better"?

2.5 Private/Public Differences in Teacher and Administrator Behavior.

Private versus public school differences in teacher and administrator behavior are reported in Tables 3 and 4. We begin by examining private/public differences in the countries—Portugal, Spain and the United States—that lack a curriculum-based external exit exam system. First let us look at independent schools run by religious denominations. Teachers are more likely to have majored in the subject they teach, but they are less likely to have taught for more than two years. Teachers have less prep time and an average of 8 more students in their class. They assign significantly more homework. There are no other significant differences in teaching behavior and resource allocation.

At nonsectarian private schools, total time spent in homework is a nonsignificant one hour greater than at public schools. Science teachers at nonsectarian private schools are more likely to use experiments and give fewer quizzes and tests. Math teachers are more likely to have students solve problems in groups. There are no other significant differences.

Private/public differences when a CBEEES is present:

Schools run by religious school boards assign more homework, have higher quality science laboratories, are more likely to have teachers specialize in teaching science and less likely to track students in science. Otherwise they were not significantly different from public schools. In nations with diploma exams, independent denominational schools had larger class sizes but gave their teachers more prep time and were more likely to hire science teachers who had studied the subject in university. They had a similar experience profile as public school teachers. Teaching strategies were no different from those prevailing in the public school sector. Independent nondenominational schools tended to be more different from public schools. They were more likely to have specialists teaching math and science. These teachers assigned more math and science homework, were less likely to do experiments in science class and less likely to have students work in groups to solve math problems.

III. COMPARING CANADIAN PUBLIC AND NONPUBLIC SCHOOLS

Canada is an excellent place to study how the character and effectiveness of non-public schools differ from public schools.

In terms of governance and finance, the Canadian system of elementary and secondary education is quite similar to America's system. Comprehensive schools predominate. As in the U.S., education is a provincial/state responsibility. Localities administer schools and use the property tax to raise their share of the funding. In 1980 localities accounted for 43 percent of the funding in the United States and 28.5 percent in Canada. Funding levels vary less within Canadian provinces than within American states. The average within province coefficient of variation is .09 for Canada and .17 for the United States (McDonald 1993; National Center for Education Statistics 1992)). In some provinces negotiations over teacher salaries occur at the provincial level. Grade retention policies are similar to those in the U.S. These similarities suggest that findings from a study of Canada are more likely to applicable to the United States.

Twenty five percent of the 1338 Canadian schools in the IAEP data employed in this study are nonpublic schools. As in the U.S., most Canadian nonpublic schools were started by religious denominations. Canadian governments are not constitutionally prohibited from subsidizing religious schools, so these institutions receive considerable taxpayer funding in a number of provinces. Indeed in four provinces—Alberta, Newfoundland, Ontario and Saskatchawan—there is a Catholic school system (and in Newfoundland a Protestant system as well) that is overseen by school boards elected by members of the religious faith. The schools run by these religious school boards account for 20.6 percent of the Canadian schools in our sample and four-fifths of all the “nonpublic” schools. The other fifth of the “nonpublic” schools were split pretty evenly between non-sectarian independent schools and sectarian schools controlled by religious denominations. These schools look a lot like American private schools.

Canada is also an excellent place to examine how the character and effectiveness of non-public schools are influenced by the existence of a curriculum-based external examination system covering the private as well as the public sector. Some Canadian provinces have curriculum-based exams; others do not. At the time the data used in this study were collected, 1990-91, Alberta, British Columbia, Newfoundland, Quebec and Francophone New Brunswick had curriculum-based provincial examinations in English, French, mathematics, biology, chemistry, and physics. These exams accounted for 50 percent of the final grade in Alberta, Newfoundland and Quebec and 40 percent in British Columbia. Alberta's examination system was reestablished in 1984, so it was 7 years old when the IAEP data was collected.[xiv]

The other provinces had no curriculum-based provincial examinations in 1990-91. Ontario eliminated them in 1967, Manitoba in 1970 and Nova Scotia in 1972. Nova Scotia substituted multiple-choice norm-referenced achievement tests in reading, language usage, proofreading, mathematics, science and social studies which do not influence student grades. Anglophone New

Brunswick had provincial exams in language arts and mathematics but exam grades were not reported on transcripts or counted in final course grades. They had little credibility and some students failed to expend much effort on them. In Ontario, some local school districts have district level exams for core subjects, but most do not. In any case, one would not expect local district subject exams to have as powerful incentive effects as provincial or national exams.

The analysis proceeds as follows. The data is described in section 3.1. The differences between private and public schools with respect to the behavior of parents, students, teachers and school administrators is presented in section 3.2 and 3.3. I then proceed to an analysis of the determinants of math and science test scores in section 3.4.

3.1 The Canadian IAEP Data

The hypotheses outlined in section 2.1 will be tested in data on the mathematics and science competence of about 40,000 Canadian 13 year olds at 1230 to 1338 different schools. When the Educational Testing Service canvassed countries about participating in the 1991 International Assessment of Educational Progress (IAEP), Canada decided to collect sufficient data to allow valid comparisons between provinces and between the Anglophone and Francophone school systems of the five provinces with dual systems. The Yukon, the Northwest Territories and Prince Edward Island did not participate. Stratified random samples of 105 to 128 secondary schools were selected from the French speaking school systems of Ontario and Quebec and from the English speaking school systems of Alberta, British Columbia, Manitoba, Saskatchewan, Ontario, Quebec, New Brunswick, Nova Scotia and Newfoundland.[xv] A school's likelihood of selection was roughly in proportion to its estimated number of 13 year olds. All French speaking schools in New Brunswick, Saskatchewan and Manitoba were invited to participate. About 20 percent of the schools were religiously controlled and 2 percent were nondenominational.

The dependent variables are identical to those used in the 16 nation study. The data on teacher quality, class size, teacher prep time and school facilities came from a questionnaire completed by the principal. The student questionnaires provide data on the behavior and attitudes of students and parents and the instructional strategies of teachers. As in the 16 nation study, school means on each variable were calculated for the schools with at least 9 students in the school sample and these were the dependent variables analyzed.

The specification was the same for all dependent variables. Twelve variables were used: logarithm of the mean number of books in the home, the mean number of siblings, the proportion of the school's students whose home language was different from the language of instruction, school size (the logarithm of the average number of students in a grade), a dummy for schools that include elementary grades, a dummy for schools that include all grades through year 11 and a

dummy for French speaking school, a dummy for EXAM province. Also included were dummies for three types of "nonpublic" schools: schools run by school boards elected by people of a particular faith (generally Catholic), a dummy for independent religiously controlled schools and a dummy for independent non-sectarian schools. The final two variables in the model were interaction variables: a dummy for independent private schools in diploma exam provinces and a dummy for schools run by a religious school board in diploma exam provinces.

The results are presented in Table 5 and 7. Each row represents a separate regression on data from 1230 to 1338 schools. The means and standard deviations across schools of each dependent variable are presented in columns 2 and 3. Column 1 summarizes the H. 11 hypotheses regarding the effect of curriculum-based examinations on each outcome variable at independent private schools. To the left of the slash, /, is the expected sign (based on a priori reasoning and the literature) of the impact of EXAM on this measure of home or school behavior. A question mark appears here if no hypothesis was generated for this variable. The **+**, **-** and 0's appearing to the right of the slash mark summarize the analysis of IAEP data presented in Table 4 of Bishop (1995). A **+** indicates that the variable had a significant positive effect on test scores at age 13. A **-** implies that the variable had a significant negative effect on test scores at age 13. A zero, 0, indicates no significant relationship. The actual estimated effect for public schools of diploma exams on each outcome is given in columns 4 and 5. The estimated effects of three of the most important control variables—size, school includes elementary grades, and the average number of books in the home—are presented in columns 13, 14 and 15. The R^2 corrected for degrees of freedom is reported in column 16.

3.2—Private/Public Differences in Parent Characteristics and Home Behavior

Table 5 presents regressions predicting the background characteristics and attitudes of the students attending the schools in the sample. We can see in the first row of this table that private school students come from significantly more advantaged families (as indicated by the number of books in the home) . The private/public difference in family background is significantly smaller in provinces that have CBEEES, but a difference remains. Religious and secular independent private schools are not much different in this respect. The students attending schools run by religious school boards, by contrast, are significantly less advantaged than public school students and independent private school students.

Are there other differences between private and public students that are not simply reflecting their different socio-economic (SES) backgrounds? To address that question we need to control for the SES of the student body—average books in the home, average number of siblings and the proportion of students who speak a different language at home than the school's

language of instruction—when posing the question: "**Are non-public school students different from public school students?"** This question is answered for the non diploma exam provinces by the coefficients on the dummy variables for independent religious schools and independent non-denominational schools which are in columns 11 and 12 of Table 5. Column 18 answers this question for students in provinces with diploma exams.[xvi] Surprisingly, once SES is controlled, the students at independent private schools are, in most respects, not significantly different from the public school students. The first exception to this generalization is that students at private schools are more likely to report that their parents want them to do well in mathematics. In exam provinces they also report more conversations with parents about math class. The other exception is that private school students spend a lot less time (3+ hours per week less) watching television. Probably this is because they are assigned significantly more homework than public schools students (see table 7).

Religious vs Secular Elected School Boards: The differences between students at schools run by elected religious school boards and students at conventional public schools in non-exam provinces are reported in columns 10. The students in these schools come from less advantaged families and are less likely to read for pleasure. In other respects, however, math/science resources and attitudes are more favorable than at public schools. Compared to public school students in the same province, students are more likely to report math and science is useful in everyday life and necessary to get a job. They are more likely to have computers and calculators. Parents are more likely to talk to their children about math class and more likely to insist their child do well in math.

The difference between these two types of schools in provinces with diploma exams is reported in column 17. In exam provinces, students at schools run by religious school boards do more pleasure reading, are more likely to watch science documentaries, more likely to believe that math and science are necessary to get a job, and more likely to get help from parents on their math and science homework.

3.3--Private/Public Differences in Student Discipline

The relationship between student discipline and absenteeism and attendance at non-public schools is examined in the bottom panel of Table 6. As predicted in H. 3, principals of independent private schools report significantly fewer discipline and absenteeism problems than the principals of public schools. This is true both in exam provinces and in non-exam provinces. Principals of schools run by religious school boards in non-exam provinces report fewer discipline problems but not significantly fewer absenteeism problems. In exam provinces, the principals of these schools

report roughly the same amount of discipline and absenteeism problems as the principals of public schools.

3.4-- **Private/Public Differences in Student Achievement**

The first row of the top two panels of the table indicates that students at independent schools have dramatically higher achievement in mathematics and modestly higher achievement in science than public school students. Students at schools run by religious school boards have substantially lower achievement levels.

When school type and diploma exam province are controlled in row 2 the effect diminishes somewhat. It continues to diminish when SES and French speaking school are entered as further controls in model 4. In this model independent school students are better than public school students in mathematics but not in science. Religious school board students score about 4 percentage points below public school students.

The preferred model with interactions between diploma exams and non public schools is presented in row 6 of each panel. This allows us to measure student achievement differences between nonpublic and public schools separately for provinces with diploma exam systems and for provinces without such exams. Students in schools run by religious school boards know significantly less math and science than public school students. The achievement differential between the two types of school appears unrelated to whether the province has an examination system. For independent private schools, however, diploma exams matter. Independent private schools have significantly higher math achievement than public schools only in diploma exam provinces as predicted by H. 8. When it comes to science achievement, however, independent school students out perform public school students in non-exam provinces but not in exam provinces.

Thus, the hypothesized (H. 11) positive interactions between exam systems and non public schools occur only for mathematics and for independent schools. Schools run by religious school boards had higher achievement levels in provinces with diploma examinations, but the achievement response to the stronger incentives generated by exams was not larger than the public school response. Independent schools, by contrast, did respond to diploma exams more than public schools. Their math scores went way up, but their science scores fell slightly. As in the 16 nation study, there is support for the hypothesis that independent schools are more sensitive to the incentive effects of diploma exams, but here again the evidence is limited to mathematics not science.

The third panel of Table 6 presents regressions predicting the within-school standard deviation of student achievement. Schools run by religious school boards are no different from

public schools along this dimension. Independent private schools are also no different from public schools in variability of science achievement. For mathematics, however, it depends on whether the school is located in an exam province. In exam provinces, independent private schools have significantly smaller standard deviations of mathematics achievement than public school. Diploma exams appear to not only result in a significant increase in math achievement at independent schools, they also lower the variance of math achievement.

3.5--Private/Public Differences in Administrator Behavior.

Why was mathematics achievement higher at independent private schools in provinces with exam systems? In previous work (Bishop 1997), I have shown that schools in exam provinces hire more qualified teachers, have better science laboratories and allocate more time to teaching math and science. Was this particularly true of the administrators of independent private schools? The top panel of Table 7 presents an analysis of the resource allocation decisions of school administrators. Along most quality dimensions, independent private schools in provinces without exam systems were not significantly different from their public school counterparts. One exception to that generalization was the significantly higher qualifications of their science teachers. Possibly this explains the strong performance of their students in science. They also had larger classes than public schools and their teachers were less experienced. This probably reflects the tighter budgets that result from their limited access to public funding.

The schools in nonexam provinces run by religious school boards, by contrast, were consistently less focused on math and science teaching than public schools. They allocated less time to teaching math and science, hired less qualified teachers, used non specialists to teach the subjects and had poorer science labs.

Things are different in provinces with diploma exams. As suggested by H.11, schools run by religious school boards are significantly more responsive to the incentive effects of external exam systems than public schools. Compared to local public schools, their propensity to hire highly qualified teachers rises dramatically when there are external exams. Science labs are also improved substantially. Exam systems also induce these schools to increase classroom instruction hours by one-third in math and by one-fifth in science. Total hours in the school year do not rise so the increase in time devoted to math and science comes at the expense of something else. Schools run by religious school boards also appear to employ more experienced teachers and give them more preparation time when they are located in province with exam systems. Public schools do not. While the schools controlled by religious school boards are better when they are located in exam provinces, they only return to rough equality with the public schools of the province.

Independent schools also shift their focus towards teaching math and science when they are located in exam provinces. In most respects their response is similar to the public school response. In two respects their response is significantly larger: they became considerably more likely to have specialists teach mathematics and greatly improved their science laboratories.

3.6--Private/Public Differences in Teacher Behavior.

Teachers at independent schools in non-exam provinces assign more homework, give more quizzes and are less likely to have students solve problems in groups than public school teachers. The teachers at independent private schools in diploma exam provinces also assign more homework, give more math quizzes and expect students to spend more time doing math problems on their own. In other respects their teaching strategies are not significantly different from public school teachers.

Teachers at schools run by religious school boards in non exam provinces also assign more homework, are less likely to use a chalk and talk method, less likely to give quizzes and are more likely to have students do experiments in science classes. Teachers at these schools in exam provinces assign more homework, are less likely to give quizzes, more likely do experiments and more likely use chalk and talk in mathematics classes. In other respects they are not significantly different from public school teachers.

IV. The Effect of Private Schools on the Effectiveness of All Schools

Advocates of voucher funding of schools argue that providing subsidies to private schools will make them more effective competitors thus enabling them to force public schools to become more effective as well. Thus a large private school sector might raise average achievement levels even when private school students do not out perform public school students.

The just released TIMSS provides 1994-95 data on math and science achievement for 7th and 8th graders for 39 countries for which data is also available on the private sector share of K-12 school enrollment. The 1990/91 IEA reading study provides data on the literacy of 9th graders in 24 countries. Comparative education studies, government documents and education encyclopedias were reviewed and education ministry officials, embassy personnel and Cornell graduate students from the country were interviewed to determine which of the TIMSS nations have curriculum-based externally-set exit examinations in secondary school and the importance and character of private schools.[xvii] Twenty national school systems were classified as having CBEEES for both subjects in all parts of the country: Austria, Bulgaria, Columbia, Czech Republic, Denmark, England, Finland, Hong Kong, Hungary, Ireland, Israel, Italy, Japan, Korea, Lithuania, the Netherlands, New Zealand, Russia, Scotland, Singapore, Slovak Republic, Slovenia and Thailand. Three countries--France,

Iceland and Romania--had CBEEES in mathematics but not in science. Five countries--Australia, Canada, Germany, Switzerland and the United States--had CBEEES in some provinces but not in others. Norway has regular exit examinations in mathematics, but examines science only every few years. Latvia had an external examination system until very recently, so it was given a .5 on the CBEEES variable. The countries classified as not having a CBEEES in either subject were Belgium (both Flemish and French speaking systems), Cyprus, Greece, Philippines, Portugal, Spain and Sweden.

Does Private School Share have a Linear Effect on Average Achievement Levels:?

The mean 8th grade science and mathematics test scores were regressed on the enrollment share of private schools in compulsory education, the log of the average ratio of the nation's per capita gross domestic product in 1987 and 1990 to the U.S. per capita GDP, a dummy for East Asian nation and a dummy for a CBEEE in the subject. The results presented in Table 8 indicate that countries with large numbers of private schools do not score higher on the TIMSS science or mathematics tests. In addition test scores are significantly higher in more developed nations, East Asian nations and in nations with a CBEEE in the subject.

The analysis of achievement at a particular grade level may be biased, however, by differing policies regarding grade retention, age of school entry and which grade was chosen for assessment. CBEEES, for example, might be associated with high rates of grade retention. Therefore, a preferable dependent variable is a measure of student achievement at some fixed age. The second row of each panel presents estimated models predicting the median test score for each nation's 13 year olds (Beaton et al, 1996a,b, Table 1.5). For countries not included in this table, the 13 year old median was estimated by age adjusting the 7th and 8th grade means.[xviii] Switching to the age constant achievement leaves the estimated impact of the private school share of enrollment on science and mathematics achievement essentially unchanged

Reading: The bottom panel of Table 8 presents an identical analysis of IEA reading achievement data. To avoid the problems of differing school entry ages and grade retention policies, the age standardized reading scores provided in Appendix 2 of Elley (1995) have been used in the analysis. The IEA study defined and measured three different types of reading literacy—narrative, expository and document—and an average of the three scores is the dependent variable. The specification is the same as that used to study science and math achievement. Here the exam variable is an average of the math and science diploma exam dummy variables used in the analysis of TIMSS data. The results are similar as well. Diploma exams and per capita GDP have significant positive effects on reading achievement. Countries

with larger private school enrollment shares appear, ceteris paribus, to have lower reading achievement, though not significantly so.

Is the relationship between Private School Share and Average Achievement Levels Non-Linear?

In the discussion the pros and cons of voucher funding of schools at the beginning of the paper, it was suggested that a small unsubsidized and unregulated private sector may have negative effects on the quality of public schools, but that tying the per pupil funding levels and regulatory environment of the two sectors together might improve quality in both sectors. This suggests that the relationship between private sector share and average achievement levels may at first be negative over some range and then become positive above some threshold.

This can be tested either by adding a " (private school share minus .12)^2" term to the model or by allowing the slope of the relationship between private sector share and achievement to shift at some arbitrary kink point (ie. including a spline). The size of the U.S. private school sector, 11 percent, was selected as the kink point for the spline. This is above the median of the variable and slightly below the mean, which is .139. Both of these models are presented in Table 8. The results are very similar across the three outcome variables. The square term is consistently positive and the linear term consistently negative. The linear term is statistically significant in the reading equation. This suggests that in the neighborhood of the current U.S. private school share, increases in that share will lower achievement. The minimum achievement level is reached at a private share of .52 for science and reading and .33 for mathematics.

The spline model has substantially higher adjusted R squares suggesting that it fits the data much better than the square term model. Two separate slopes are estimated; one for the region below .11, the current U.S. private school enrollment share, and one for the range from .11 to 1.0. The coefficients on the lower range are all significantly negative. They imply that countries that lack any private schools tend to have a more than one grade level equivalent achievement advantage over the U.S. when other things—GDP, Asia and Exam systems—are held constant. The upper region coefficient from the mathematics regression is statistically significant and positive. This may be interpreted as suggesting that a shift to vouchers that substantially increased the number of private schools would improve math achievement but leave reading and science achievement unaffected. Doubling the private sector share to .22 would increase math achievement by a little more than a quarter of a grade level equivalent.

V. Summary and Discussion

At the beginning of the paper I expressed the hope that lessons could be drawn from an examination of other countries educational systems. Before I attempt to meet this obligation, however, the reader needs to be cautioned about the weaknesses of the evidence I have been able to gather. The IAEP data contains information on about middle 3000 schools of which only about 300 are classified as independent. There is tremendous diversity within the private school sector. Environmental factors such as diploma exam systems and regulatory environment that vary across countries are likely to influence private school effectiveness. This makes the small sample size all the more troublesome. An additional problem comes from our inability to employ a value-added specification in the IAEP data and the small number of controls for family background. No claim is made that the controls for family background and tastes that were included in the models solved (as opposed to just reduced) the selection bias problem. Clearly there is a need for the analysis of other large micro data sets such as TIMSS, SIMSS, the IEA reading study and country specific data sets.

The analysis of the country mean achievement level data from TIMSS and the IEA reading study is even more problematic. Sample size is tiny. Results are inevitably sensitive to specification and which countries are included in the regression [the regression samples include every country for which I was able to obtain data on both private school share and student achievement]. How particular types of government aided nonpublic schools should be coded is still another source of uncertainty. The issue being addressed is a system level one, so the unit of analysis is necessarily education systems. This means that data points must generally be nations or, in countries such as Germany, Australia, Canada and the United States that delegate authority over private school subsidies and other education matters to lower levels of government, provinces. Comparisons across metropolitan areas are also useful (Hoxby 1997). This implies that the number of observations is inevitably going to be small. The issues at stake are of enormous importance and policy relevance, so every possible source of variation in private school regime needs to be studied. This paper will hopefully stimulate others to find and analyze other data sets. These caveats imply that “lessons” described below are very tentative in nature. With these caveats in mind, let us now turn to the lessons.

Tentative Lessons

1. Independent Private Schools (both secular and church related) are more successful at teaching mathematics than teaching science.
2. Church involvement in owning and managing schools appears to reduce discipline problems.
3. Secular independent schools also have many fewer discipline problems.

4. If church managed (or religious school board controlled) schools are not required to compete for students and given real independence [i.e. allowed to remove disruptive students and incompetent teachers], they are less effective at teaching mathematics and science than public schools serving students from similar family backgrounds. When family background is controlled, students at independent private schools do not learn more mathematics and science than public school students in countries and provinces that lack curriculum-based external exit examinations (diploma exams).
5. Independent private schools do a much better job of teaching mathematics when they are located in nations or provinces with diploma exams. The evidence for an interaction effect in the teaching of science is mixed.
6. Controlling on family background, students at independent private schools learn more mathematics than public school students when the school is located in a nation or province with diploma exams.
7. There is no linear relationship between the size of the private school sector and national average levels of student achievement in mathematics, science and reading.
8. A small private school sector is associated with significantly lower average levels of achievement. One possible explanation of this result is that private schools siphon off the elite and the result is a loss of political support for public education. An alternative interpretation argues that causation runs in the opposite direction. If unsubsidized private schools are able to get a non-zero market share only where public schools are failing, the same result would be produced.
9. There is evidence that once some threshold is reached, a larger private school enrollment share is associated with greater achievement in mathematics but no change in science and reading achievement.
10. While private schools need to have true independence to be more effective, voucher funding combined with laissez faire regulatory approach is asking for trouble. Discussing Philippines experience with for-profit schools Gonzalez and Cortes (1988) conclude:

    > *The virtual laissez-faire policy toward private schools since 1946 has resulted, even at the tertiary level, in the establishment of many so called diploma mills, whose main function is to turn a profit for their owners* (p. 996).

12. There is more than one way to skin a cat. {ie. achieve a high performing school system}. The ability of parents and students to choose amongst public schools funded through voucher like mechanisms and the independence and authority of the headmasters of these schools may be more important than who owns the school.

13. How schools respond when students fall behind is another critical feature of an educational system. If students are to try hard in middle school, there must be some immediate stakes attached to their effort. Getting into a good college is an effective incentive for only a small minority. The threat of having to repeat a grade may be an effective incentive for these early teens.
14. Private schools receiving public funds will have to be regulated. The key is to regulate in a way that levels the playing field and informs parents about the quality of the school. Regulations should not tie the hands of the school's headmaster in his efforts to build a high quality teaching staff and a school culture that is supportive of learning.
15. A voucher system giving all parents free choice of schools will probably not increase levels of academic achievement if there is no system of curriculum-based external exit examinations that covers the subsidized private sector as well as the public sector. Such a system would signal to parents which schools are doing the best job and focus parental attention on learning rather than discipline and religion. Once tax credits for private schools became law it would be very difficult to require that their students participate in state run diploma exams. Tax credits and vouchers should be offered for private school attendance only if they can be used only at schools that participate in state wide assessment systems.
16. The data published by international agencies, the IEA and education encyclopedias about national education systems are often wrong, misleading or out of date. Users of these data need to cross check a variety of sources and talk with ministry of education officials, educators and former students. Educational systems are unbelievably complex and their essence is often not revealed by the surface characteristics that are reported in compendiums of education statistics.

Table 1--Enrollment Share of Independent Private Schools by Country-- 1990

	OECD Primary	OECD Secondary	Academic Secondar School	Religious	IAEP Secular	Religious Board
Australia	24.9%	---	31.5%			
Austria	3.9%	6.5%	11.0%			
Belgium	56.0%	---	65.0%			
Canada	3.6%	6.7%	4.8%	5.0%	3.3%	19.6%
China	---	---	---	0.0	0.8%	0.0
Cyprus	*2.5%*	*10%*	---			
Denmark	9.7%	17.6%	8.6%			
England	12.0%	9.8%	10.1%	8.6%	8.6%	0.0
Finland	0.9%	3.0%	5.8%			
France	14.8%	21.0%	21.8%	0.9%	0.0	12.7%
Germany	1.8%	7.5%	12.0%			
Greece	6.6%	3.7%	4.1%			
Hong Kong	*93.6%*	*91.7%*	*91.7%*			
Hungary	---	---	---	0.0	0.0	0.0
Iceland	*1.8%*	*1.8%*	*1.8%*			
Ireland	1.6%	---	0.0%	0.0	0.9%	65.7%
Israel	---	---	---	0.0	1.0%	20.0%
Italy	7.5%	4.6%	15.3%	3.2%	0.0	0.0
Japan	0.7%	3.5%	29.5%			
Korea	*1.2%*	*36.1%*	*52.6%*	0.9%	24.5%	5.5%
Netherlands	68.8%	79.9%	72.3%			
New Zealand	2.5%	4.4%	5.5%			
Norway	1.1%	1.2%	11.1%			
Philippines	*4.9%*	*55%*	*55%*			
Portugal	6.5%	9.7%	5.6%	7.5%	2.2%	0.0
Russia	*0*	*0*	*0*			
Scotland	---	---	---	0.0	2.8%	0.0
Singapore	*28.8%*	*28.8%*	---			
Slovenia	*0*	*0*	*0*	0.0	0.0	0.0
Spain	34.5%	35.1%	28.7%	30.2%	2.6%	0.0
Sweden	0.9%	0.8%	3.0%			
Switzerland	2.4%	5.0%	11.7%	0.0	0.0	0.0
Taiwan	---	---	---	0.9%	0.0	0.0
Thailand	*9.0%*	*12.0%*	*7.0%*			
United States	12.0%	9.8%	9.9%	12.0%	1.9%	0.0

Source: Columns 1, 2 and 3 are the private school share of enrollment at each level. They came from Tables 2.2, 2.3 and 2.4 of OECD, Education in OECD Countries-1988-90. Numbers in *Italics* were obtained from an education encyclopedia. Columns 4, 5 and 6 are the proportion of the schools in the IAEP data set that are independent sectarian schools, non-sectarian independent and controlled by school boards elected by members of a religious denomination. OECD considers the Canadian and Irish schools in this final category as public but the French schools coded this way by IAEP to be private. In some nations—eg. Austria and Ireland-- state run schools require students take a religion course.

Table 2--Effects of Private Schools & Curriculum-Based Exit Exams on the Attitudes and Behavior of Students

	Mean	Std Dev	Indep Relig	Indep. Secular	Exam* Relig SchBrd	Exam* Indep. ReligSc	Exam* Indep Secular	log Books Home	Adj. R2 RMSE
Student & Parent Behavior									
Log Avg Books in Home	2.0	.51	.42*** (5.42)	.58*** (2.89)	.27*** (4.48)	-.137 (1.16)	-.395* (1.86)	----	.266 .428
TV-Sch. Avg Hrs/wk	10.8	4.3	-1.6*** (3.63)	-2.25** (1.97)	- .42 (1.22)	.89 (1.32)	2.07* (1.71)	-2.0*** (12.8)	.688 2.42
Read for Fun Index	2.01	.33	-.12*** (2.56)	-.254** (2.18)	.052 (1.45)	-.086 (1.24)	.062 (.50)	.26*** (15.7)	.380 .248
Watch NOVA, Nature	.95	.47	-.033 (.51)	-.145 (.87)	-.051 (.99)	-.182* (1.84)	.049 (.28)	-.041* (1.73)	.572 .354
Have a Calculator	.73	.30	-.08*** (2.95)	-.068 (.94)	.012 (.50)	-.041 (.96)	-.077 (1.01)	.10*** (9.81)	.735 .153
Parents talk with me about Math class	.70	.18	-.006 (.21)	.035 (.50)	.044* (1.88)	-.015 (.34)	-.059 (.73)	.026** (2.42)	.261 .148
Parents talk with me about Science Class	.62	.19	.019 (.66)	-.015 (.20)	.009 (.38)	-.085* (1.93)	.030 (.37)	.06*** (5.99)	.239 .158
Parents wants me to do well in Math	3.32	.31	.041 (.87)	.058 (.48)	.087** (2.33)	.065 (.91)	.096 (.75)	-.012 (.71)	.287 .256
Parents are Interested in Science	1.32	.40	.061 (1.06)	-.122 (.84)	.015 (.32)	-.087 (1.01)	.069 (.44)	.18*** (8.96)	.389 .308
Math "Useful for Solving everyday problems"	1.96	.32	-.107** (2.00)	-.107 (.79)	.004 (.09)	.172** (2.14)	.214 (1.48)	.002 (.12)	.177 .288
Science "Useful in Everyday Life"	2.85	.36	-.078 (1.37)	-.139 (1.03)	.049 (1.18)	-.014 (.17)	.043 (.30)	-.017 (.87)	.346 .286
Math Important to get a Job	2.28	.35	-.028 (.60)	.018 (.15)	-.022 (.61)	-.104 (1.48)	-.139 (1.11)	.021 (1.24)	.474 .251
Science Important to get a Job	1.73	.44	-.078 (1.37)	-.075 (.52)	.110 (2.43)	-.003 (.04)	-.044 (.28)	-.011 (.53)	.514 .308

Source: Analysis of 1991 IAEP data on 1659 to 1741 schools in China, England, France, Hungary, Ireland, Israel, Italy, Korea, Portugal, Scotland, Slovenia, Soviet Union, Switzerland, Spain, Taiwan and the United States. There is data on 106 schools run by religious school boards, 74 independent schools controlled by religious denominations and 48 non-sectarian schools. Control variables not shown included: the mean number of siblings, the proportion of the school's students whose home language was different from the language of instruction, logarithm of the number of students per grade in the school and dummies for country, schools with primary grades and schools that include K through 11th grade in one building.

Table 3--Effects of Curriculum-Based Exit Exams on the Character and Effectiveness of Private Schools

Administrator Behavior	Mean	Std. Dev	Indep Relig	Indep. Secular	Exam* Relig SchBrd	Exam* Indep. ReligSc	Exam* Indep Secular	log Books Home	Adj. R^2 RMSE
Math Specialist Teacher	.77	.42	.102* (1.73)	-.019 (.12)	.066 (1.45)	.039 (.43)	.256 (1.57)	-.008 (.38)	.414 .325
Science Specialist Teacher	.75	.43	-.010 (.17)	.036 (.23)	.112** (2.36)	.067 (.72)	.185 (1.10)	.016 (.76)	.402 .335
Math Teachers-Math major	.66	.40	.25*** (4.31)	.325 (2.19)	-.038 (.79)	-.164* (1.86)	-.41** (2.61)	.07*** (3.73)	.382 .314
Science Teachers were Science majors	.65	.40	.20*** (3.33)	.133 (.87)	-.062 (1.23)	-.019 (.21)	-.246 (1.50)	.09*** (4.38)	.347 .325
Hrs. Math Instruction	3.66	.82	-.011 (.09)	-.004 (.01)	-.022 (.21)	-.116 (.62)	-.168 (.51)	-.014 (.32)	.403 .658
Hrs Science Instruction	3.53	1.66	.211 (.97)	.272 (.49)	-.122 (.66)	-.193 (.56)	.037 (.06)	.052 (.66)	.545 1.17
Science Lab Quality	2.23	1.00	.113 (.72)	.371 (.91)	.38*** (3.10)	.104 (.44)	-.157 (.36)	.107** (1.96)	.271 .862
Track 8th Grade Math	.25	.43	-.034 (.59)	.071 (.48)	-.011 (.24)	.039 (.45)	-.012 (.08)	.030 (1.52)	.440 .312
Track 8th Grade Science	.14	.35	.024 (.47)	.095 (.71)	-.072* (1.79)	.005 (.07)	-.123 (.86)	-.031 (1.71)	.166 .284
Proportion New Teachers	.13	.12	.085 (2.80)	.055 (1.57)	.032 (2.93)	-.088 (3.93)	.048 (3.00)	-.02*** (3.07)	.187 .111
Prop. Experienced Teachers	.61	.22	-.026 (.73)	-.093 (1.00)	-.002 (.05)	.023 (.41)	.133 (1.34)	.030** (2.34)	.158 .197
Teacher Prep Time	.43	.19	-.053* (1.94)	-.082 (1.16)	.010 (.47)	.136*** (3.25)	.112 (1.48)	.005 (.48)	.393 .150
Class Size	29.5	12.3	8.3*** (6.29)	4.76 (1.40)	.60 (.56)	.08 (.04)	1.94 (.53)	.14 (.29)	.637 7.22

Source: Analysis of 1991 IAEP data on 1659 to 1741 schools in China, England, France, Hungary, Ireland, Israel, Italy, Korea, Portugal, Scotland, Slovenia, Soviet Union, Switzerland, Spain, Taiwan and the United States. Control variables not shown included: the mean number of siblings, the proportion of the school's students whose home language was different from the language of instruction, logarithm of the number of students per grade in the school and dummies for country, schools with primary grades and schools that include K through 11th grade in one building.

Table 4--Effects of Private Schools and Curriculum-Based Exit Exams on Teaching and Achievement

Student Achievement	Mean	Std. Dev	Indep Relig	Indep. Secular	Exam* Relig SchBrd	Exam* Indep. ReligSc	Exam* Indep Secular	log Books Home	Adj. R^2 RMSE
Math--% correct	.514	.176	.000 (.00)	-.039 (.72)	.032* (1.92)	.056* (1.77)	.103* (1.81)	.11*** (12.4)	.560 .113
Science --% correct	.561	.114	-.009 (.58)	-.007 (.17)	.022* (1.82)	.035 (1.47)	.038 (.90)	.07*** (10.6)	.427 .084
Discipline Problems--Principal Report	.98	.74	-.38*** (2.90)	-.41 (1.22)	-.104 (1.02)	.085 (.43)	.313 (.87)	-.12*** (2.70)	.097 .718
Absenteeism Prob.--Principal Report	.77	.75	-.38*** (3.04)	.02 (.06)	-.030 (.30)	-.037 (.19)	-.183 (.53)	-.21*** (4.87)	.178 .692
Teacher Behavior									
Total Homework Time	7.27	2.66	2.0*** (7.19)	1.11 (1.55)	.73*** (3.29)	-1.38*** (3.26)	.003 (.00)	.35*** (3.48)	.618 1.52
Math Homework Time	1.97	.91	.37*** (2.83)	-.054 (.16)	.087 (.85)	-.142 (.72)	.415 (1.18)	.055 (1.18)	.386 .700
Science Homework Time	1.43	1.03	.28*** (3.09)	.136 (.60)	.102 (1.45)	-.277** (2.05)	.170 (.70)	.004 (.13)	.781 .483
Emphasize Whole Number Operations	1.52	.63	.007 (.06)	-.374 (1.39)	-.073 (.83)	.058 (.36)	.121 (.42)	-.092** (2.40)	.176 .570
Math Quiz Index	1.50	.56	-.108 (1.58)	.009 (.05)	.058 (1.07)	.079 (.77)	-.046 (.25)	-.031 (1.28)	.408 .368
Science Quiz Index	1.37	.60	-.003 (.05)	-.313** (2.09)	.048 (1.04)	-.041 (.46)	.197 (1.23)	-.055*** (2.60)	.691 .317
Math Do Problems Alone in class	2.06	.49	-.054 (.89)	.175 (1.13)	.042 (.89)	.003 (.03)	-.284* (1.72)	.10*** (4.62)	.555 .328
Math—Problems Solved in Groups	1.61	.68	-.022 (.22)	.486** (1.98)	-.137 (1.81)	-.199 (1.37)	-.83*** (3.16)	-.062* (1.79)	.397 .521
Science Do Experiments	1.27	.67	-.071 (.85)	.281 (1.32)	-.017 (.25)	-.046 (.36)	-.433* (1.90)	.043 (1.44)	.545 .452
Science Watch Experiments	2.33	.63	-.131 (1.51)	.380* (1.72)	-.023 (.34)	-.120 (.92)	-.85*** (3.60)	.032 (1.02)	.449 .467

Source: Analysis of 1991 IAEP data on 1659 to 1741 schools in China, England, France, Hungary, Ireland, Israel, Italy, Korea, Portugal, Scotland, Slovenia, Soviet Union, Switzerland, Spain, Taiwan and the United States. Control variables not shown included: the mean number of siblings, the proportion of the school's students whose home language was different from the language of instruction, logarithm of the number of students per grade in the school and dummies for country, schools with primary grades and schools that include K through 11th grade in one building.

Table 5--Effect of Canadian Diploma Exams on Parent and Student Behavior and Attitudes-Interaction

	Hyp.	Mean	StdDev Schl	Curric Exam Coef Tstat	Exam*RelScBd Coef Tstat	Exam*IndSch Coef Tstat	RelSch Board	IndRel School	IndNS School	LnNumb inGrade	Elem. School	LnBook in Home	Adj. R2	Comp to Pub in Exam RelSchBd	IndSch
Home Behavior															
TV-Sch. Avg.-Hrs/wk	-/-	14.7	2.85	-.90 (5.2)	1.20 (3.2)	-.83 (1.0)	.26	-2.8***	-2.1**	-.344***	-.54***	-3.000***	.292	1.46***	-3.26***
Read for Fun Index	-/+	1.85	.28	.01 (.6)	.16 (3.6)	.09 (1.0)	-.08***	-.02	-.03	.003	.03	.277***	.140	.08***	.07*
Use Computer for Sch Work	?/+	.40	.24	.01 (.4)	-.19 (5.2)	.03 (.5)	.14***	.07	-.01	-.021**	.04**	.155***	.195	-.05	.06*
Have Calculator	?/+	.88	.13	.04 (4.7)	-.05 (2.4)	-.03 (.6)	.08***	.00	.03	.008	-.02*	.070***	.086	.03*	-.01
Watch Science TV programs	-/+	.97	.38	.02 (.9)	.15 (2.6)	.27 (2.1)	.01	-.28**	-.13	-.043***	-.07**	-.077**	.132	.17***	.07
P. want me to do well--Math	+/+	2.53	.22	.08 (5.0)	-.10 (3.0)	-.01 (.1)	.15***	.06	.17**	.016*	.02	.03*	.106	.04*	.11***
Parent Talk about Math Class	+/?	.62	.17	.04 (3.6)	-.02 (.6)	.12 (2.1)	.04**	-.06	.04	.006	.00	.022	.044	.03	.07***
P. Talk about Science Class	+/?	.47	.17	.05 (4.3)	.03 (1.1)	-.00 (.0)	-.00	-.01	.09	-.006	-.03**	.057***	.055	.03	.04
Help with Math Homework	?/?	.67	.17	.00 (.1)	.01 (.4)	-.01 (.3)	.04**	.01	.07	.023***	.03**	.006	.050	.05***	.03
Help with Science Homework	?/?	.50	.17	.01 (.6)	.07 (2.5)	.05 (.9)	.03	-.09*	-.05	-.015*	-.02	.009	.095	.10***	.02
Parent Attitudes															
P. interested in Science	+/+	1.67	.34	.07 (3.0)	-.07 (1.3)	.03 (.3)	.13***	-.02	.05	.002	-.03	.176***	.059	.06	.04
Student Attitudes															
Math Important to get Job	+/+	2.56	.21	.03 (1.7)	-.11 (3.2)	-.01 (.2)	.15***	-.01	.08	-.004	.03**	.03	.075	.04*	.02
Sci. Important to get Job	+/+	1.93	.33	-.03 (1.2)	-.03 (.5)	-.07 (.6)	.21***	-.00	.07	-.016	-.00	.063**	.140	.19***	.04
Math Useful Solving Everyday problems	+/+	...	.	.04 (1.7)	-.09 (1.9)	.21 (2.0)	.15***	-.16*	.14	-.027	-.02	.112***	.090	.06	.06
Sci. Useful Everyday Life	+/+	1.93	.33	.08 (3.0)	-.10 (1.7)	.07 (.6)	.21***	-.08	.03	-.011	-.03	-.111***	.118	-.18***	.05
School Size															
Ln # Students in 8th Grade	?/-	4.15	1.03	.34 (7.4)	-.33 (3.1)	-.18	(.8)	-.11	-.35*	-.15	.063	-1.15	.031	.548	

Source: Regressions predicting the characteristics of 1366 to 1460 Canadian and American secondary schools. Provinces with external exams included in final course grade were Alberta, British Columbia, Newfoundland, Quebec and the Francophone schools in New Brunswick. Mean school char. based on n gt 8.

Table 7--Effect of Canadian Diploma Exams on Teacher and School Administrator Behavior-Interaction

	Hyp.	Mean	StdDev Schl	Curric Exam Coef Tstat	Exam*RelScBd Coef Tstat	Exam*IndSch Coef Tstat	RelSch Board	IndRel School	IndNS School	LnNumb inGrade	Elem. School	LnBook in Home	Adj. R2	Comp to Pub in Exam RelSchBd	IndSch
School Admin. Behavior															
Math Specialist Teachers	+/+	.45	.50	.17 (5.6)	.03 (.4)	.30 (2.2)	-.21***	-.13	-.19	.094***	-.21***	.074**	.282	-.18***	.14**
Sci. Specialist Teachers	+/+	.46	.50	.13 (4.3)	.10 (1.5)	.04 (.3)	-.15***	-.03	-.03	.138***	-.18***	.143***	.279	-.05	.02
Took Math Courses-Univ	+/0	.66	.39	.12 (4.4)	.22 (3.7)	.17 (1.4)	-.22***	-.16	-.10	-.026*	-.11***	.071**	.136	.00	.04
Took Sci. Courses-Univ	+/0	.69	.38	.15 (6.0)	.23 (4.0)	-.17 (1.5)	-.27***	.11	.21*	.001	-.08***	.054*	.210	-.05	-.01
Math Class Hours	+/0	3.98	.89	.05 (.8)	1.42 (10.4)	.40 (1.5)	-.57***	-.26	-.47	-.157***	-.27**	-.235***	.194	.87***	-.04
Science Class Hours	+/+	2.92	.82	.02 (.4)	.76 (6.5)	-.09 (.4)	-.70***	.05	-.46*	-.034	-.31***	.007	.159	.06	-.30***
Library Books/Student	?/?	21	21	4.8 (3.1)	-15.3 (4.6)	-2.8 (.4)	4.9**	2.7	15.9**	-11.6***	11.8***	2.7	.170	-10.3***	6.5**
Computers per Student	?/?	.051	.043	.009 (3.2)	-.037 (5.9)	-.004 (.3)	.008*	-.011	-.002	-.027***	-.04***	.003	.214	-.029***	.01*
Science Lab Quality	+/+	1.95	.95	.18 (3.1)	.45 (3.6)	.46 (1.7)	-.30***	-.21	-.02	.139***	-.61***	.048	.281	.15	.34***
Track 8th Gr. Math	+/+	.13	.32	.14 (6.1)	-.19 (3.7)	.18 (1.7)	.03	-.03	-.15	.001	-.07***	-.004	.063	-.16***	.09*
Track 8th Gr. Science	+/0	.06	.23	.03 (1.9)	-.03 (.9)	.14 (1.9)	-.01	-.01	-.09	.004	-.03	-.012	.041	-.04	.09**
w/Class Abil Group-Math	?/-	.22	.42	-.16 (5.7)	.05 (.7)	.21 (1.6)	-.07*	-.16	-.20	.004	.06*	.003	.042	-.03	.03
w/Class Abil Grp-Science	?/0	.10	.30	-.09 (4.1)	.04 (.9)	.19 (1.9)	-.02	-.13	-.21**	-.015	-.03	.003	.012	.02	.02
Propor. Exper. Teachers	+/0	.59	.24	-.04 (2.4)	.06 (1.7)	.14 (1.8)	-.04	-.15**	-.12	.024**	.04**	-.035*	.093	.02	.01
Propor. New Teachers	-/0	.16	.15	.03 (2.9)	-.08 (3.2)	-.14 (2.9)	.04**	.12***	.10**	-.028***	-.00	-.004	.083	-.04**	-.03
Hours in School Year	+/0	946	84	.5 (0.1)	-11 (.8)	-12 (.4)	-13	44*	- 6	-2.4	2.5	4.0	.024	-25**	7
Class Size	-/+	24.8	6.2	-.23 (.6)	.08 (.1)	2.0 (1.2)	3.0***	1.0	4.7***	4.2***	2.1***	.7*	.369	3.1***	4.9***
Teacher Prep Time	+/+	.31	.17	-.01 (1.0)	.04 (1.9)	.11 (2.2)	-.01	-.01	.01	.051***	-.06***	-.013	.225	.04**	.11***
Teacher Behavior															
Total Homework--Hrs/wk	+/?	4.41	1.62	.82 (7.6)	-.84 (3.5)	-.56 (1.1)	1.06***	2.16***	2.93***	.116*	-.02	-.058	.171	.22	1.99***
Math Homework--Hrs/wk	+/+	1.66	.64	.18 (3.9)	.12 (1.2)	-.18 (.8)	.10	.31	.41*	-.024	-.04	.069	.051	.22***	.18*
Science Hmwork--Hrs/wk	+/+	1.04	.47	.15 (4.3)	.11 (1.5)	-.08 (.5)	.10**	.21	.09	-.011	-.12***	.071*	.064	.21***	-.07
Emphas. Whole Num. Oper	-/-	1.68	.49	-.06 (1.8)	-.11 (1.4)	-.20 (1.2)	.03	.02	.03	.019	.13***	-.011	.036	.03	.00
Math Quiz Index	+/-	1.62	.52	.16 (5.4)	-.25 (3.8)	-.47 (3.3)	.02	.44***	.72***	.083***	-.10***	-.070*	.423	-.22***	.14*
Science Quiz Index	+/-	.89	.38	.11 (4.9)	-.05 (.5)	-.20 (1.9)	-.06*	.22**	.198	.002	-.08***	-.034	.242	-.14***	.00
Math Grp Prob Solving	-/-	1.48	.62	-.04 (1.0)	-.02 (.8)	.23 (1.1)	.108	-.37**	-.38	-.077***	.04	-.103*	.144	.08	-.15
Math do Problems Alone	+/+	3.22	.37	.01 (.3)	.10 (1.7)	.25 (2.0)	-.04	-.09	.00	-.018	.01	.044	.067	.06	.20***
Sci. Do Experiments	+/0	1.52	.63	.30 (6.9)	-.05 (1.0)	-.34 (1.7)	.17***	.07	.30	.063**	.04	-.037	.155	.12*	-.16*
Sci. Watch Experiments	+/-	2.42	.47	.12 (3.9)	.15 (2.1)	-.25 (1.6)	.04	.14	.15	.019	-.08**	-.095**	.123	.19***	-.10
Sci Watch Films Index	?/-	.94	.48	-.04 (1.0)	-.02 (.2)	-.11 (.7)	-.05	.05	.17	.064***	.03	.023	.016	-.07	-.01
Math Listen to Teacher	?/-	3.28	.55	.04 (1.6)	.06 (1.0)	-.03 (.2)	.06	.00	.09	-.050***	.01	-.095***	.580	.12***	.02
Sci Listen to Teacher	?/0	2.30	.48	.05 (1.7)	.26 (4.3)	-.07 (.5)	-.19***	.07	-.10	-.034	-.07**	-.031	.370	.07	.08

Source: Regressions predicting the characteristics of 1366 to 1460 Canadian and American secondary schools. Provinces with external exams included in final course grade were Alberta, British Columbia, Newfoundland, Quebec and the Francophone schools in New Brunswick. Mean school char. based on n gt 8.

Table 6
Impact of Curriculum-Based Exams on Math and Science Achievement-Interaction

	Curric Calcul Exam	Exam Comp ReSchBd	Exam Adj IndepSch	French Speakg MATH	RelSch Board	Relig Indep	Indep School	Elemen School	K-11 School	Grade	LnNum inHome	LnBook Sibs	AvNum HmLang	Diff inHome	uter	R2 RelSchBd	IndepSch
Compare Pub in Exam Prov																	
1.					-.068	.168	.122								.1071		
					(7.67)	(7.33)	(5.14)										
2.	.047				-.051	.155	.095	-.041	-.027						.1695		
	(6.37)				(5.75)	(6.96)	(4.11)	(5.01)	(2.10)								
3.	.045			.017	-.054	.157	.089	-.042	-.025						.1717		
	(6.15)			(2.06)	(6.00)	(7.05)	(3.82)	(5.22)	(1.98)								
4.	.052			.072	-.045	.107	.061	-.036	-.001		.141	-.025	.027		.3098		
	(7.39)			(7.13)	(5.29)	(5.14)	(2.74)	(4.86)	(.06)		(14.2)	(3.05)	(1.55)	5.046	-.017	.101	.012	-.047	.085
5.	.004	-.042	-.025										.1754	-.064	.145				
	(5.37)	(.87)	(2.54)	(1.37)	(3.71)	(2.40)	(.09)	(5.21)	(1.99)						(F=21.1)	[F=59.9]			
6.	.048	.012	.092	.074	-.051	.041	-.019	-.035	-.002		.141	-.024	.028			.3119	-.039	.103	
	(5.96)	(.65)	(2.37)	(6.96)	(4.23)	(1.18)	(.46)	(4.72)	(.22)		(14.21)	(2.84)	(1.62)				[F=9.3]	[F=34.7]	
7.	.035	.033	.096	.075	-.070	.042	-.019	-.022	.009	.010	.119	-.016	.032	.195	.045	.3541	-.033	.108	
	(4.41)	(1.87)	(2.56)	(7.12)	(5.86)	(1.25)	(.50)	(2.50)	(.67)	(2.06)	(11.91)	(1.93)	(1.88)	(7.95)	(3.17)	[F=8.5]	[F=39.5]		
SCIENCE																	
1.					-.067	.039	.030									.0920	
					(10.67)	(2.27)	(1.80)										
2.	.026				-.061	.022	.024	-.016	-.001							.1210	
	(4.86)				(9.17)	(1.36)	(1.40)	(2.73)	(.13)								
3.	.031			-.048	-.052	.017	.042	-.011	-.006							.1664	
	(5.77)			(8.32)	(8.01)	(1.07)	(2.49)	(1.83)	(.61)								
4.	.027			.017	-.039	-.020	.014	-.005	.014		.115	-.017	-.061			.3460	
	(5.60)			(2.39)	(6.54)	(2.6)	(.88)	(.99)	(1.71)		(16.6)	(3.04)	(5.05)				
5.	.033	-.006	-.030	-.049	-.050	.038	.067	-.011	-.005							.1659	-.055	.022	
	(5.32)	(.40)	(1.05)	(7.62)	(5.44)	(1.48)	(2.29)	(1.88)	(.057)							[F=30.5]	[F=2.7ns]		

6.	.027	.006	-.048	.018	-.042	.015	.056	-.005	.015		.115	-.019	-.060				.3469	-.035	-.013
	(4.93)	(.51)	(1.78)	(2.47)	(4.97)	(.63)	(1.98)	(1.01)	(1.78)		(16.7)	(3.24)	(4.93)				[F=15.5]		[F=1.1ns]
7.	.029	.010	-.049	.022	-.047	.011	.054	-.012	.008	-.004	.111	-.020	-.061	-.001	.027	.3503	-.037	-.017	
	(5.05)	(.78)	(1.83)	(2.98)	(5.42)	(.45)	(1.93)	(1.80)	(.81)	(1.27)	(15.6)	(3.41)	(5.01)	(.09)	(2.70)	[F=16.2]		[F=1.8ns]	
WITHIN-SCHOOL STANDARD DEVIATION																			
Math	.002	-.008	-.030	-.021	.001	.001	-.008	-.002	-.000	.005	-.003	.004	-.006				.0533	-.009	-.034
	(.44)	(1.00)	(1.77)	(4.27)	(.20)	(.07)	(.46)	(.52)	(.00)	(2.18)	(.67)	(1.03)	(.71)				[F=1.5ns]		[F=17.6]
Sci	-.007	.007	.002	-.011	-.007	.006	-.017	.001	-.006	.000	-.021	.005	.004				.0413	.000	-.003
	(2.56)	(1.11)	(.15)	(2.90)	(1.64)	(.50)	(1.18)	(.17)	(1.13)	(.11)	(5.81)	(1.72)	(.65)				[F=0.0ns]		[F=0.3ns]
PROBLEMS AS PERCEIVED BY PRINCIPAL																			
Discipline	-.073	.253	.200	.229	-.247	-.463	-.326	-.141	-.121	.056	-.276	.006	-.287				.0821		
	(1.50)	(2.31)	(.89)	(3.63)	(3.45)	(2.33)	(5.7)	(2.56)	(1.47)	(1.97)	(5.01)	(.12)	(2.81)						
Absenteeism	.107	.168	-.019	-.127	-.076	-.396	-.328	-.329	-.031	.064	-.404	.096	-.001				.1314	.092	.343
	(2.11)	(1.48)	(.08)	(1.94)	(1.02)	(1.92)	(1.32)	(5.76)	(.36)	(2.18)	(7.11)	(2.02)	(.02)				[F=1.3ns]		[F=11.8]

Notes: The provinces with curriculum-based external exams that counted as part of the course grade were Alberta, British Columbia, Newfoundland, Quebec and the Francophone part of New Brunswick. Within-school standard deviations had means (standard deviations) of .22 (.050) for math and .17 (SD=.040) for science. The school problem indexes range from 0 = "no problem" to 3 for "serious". The means (standard deviations) were .78 (SD=.72) and .82 (SD=.77) for absenteeism.

Table 8: The Effect of the Size of the Private School Sector on Science, Mathematics and Reading Achievement

	Private Share	Private Share LT .11	Private Share GT .11	Square of (Private Share-12)	Diploma Exam	Per Cap GDP 87,90	East Asia	Adj.R^2 RMSE
TIMSS Science-1994								
8th Grade Mean	- 29.3 (1.04)				41.4*** (3.22)	37.2*** (3.49)	20.0 (1.15)	.348 34.6
Median 13 yr olds	- 27.1 (.95)				33.6** (2.57)	46.8*** (4.31)	27.2 (1.53)	.376 35.2
Median 13 yr olds	- 78.4 (1.29)			98.6 (.96)	30.2** (2.32)	46.0*** (4.23)	29.1 (1.62)	.374 35.3
Median 13 yr olds		-329** (2.14)	15.7 (.45)		28.5** (2.23)	50.2*** (4.76)	37.8** (2.12)	.426 33.8
TIMSS Mathematics-1994								
8th Grade Mean	.5 (.01)				37.4** (2.51)	45.2*** (3.95)	59.6*** (3.21)	.426 37.2
Median 13 yr olds	11.9 (.41)				27.0* (1.88)	52.4*** (4.75)	65.0*** (3.64)	.487 35.8
Median 13 yr olds	- 53.4 (.85)			123.7 (1.18)	21.7 (1.45)	51.6*** (4.70)	67.3*** (3.77)	.493 35.6
Median 13 yr olds		-395** (2.60)	67.5** (2.00)		18.3 (1.35)	57.2*** (5.57)	79.1*** (4.60)	.569 32.8
IEA Reading-1990								
Average -- Age Adj.	-26.4 (1.57)				22.8** (2.81)	29.4*** (3.85)	-10.8 (.86)	.637 16.2
Average -- Age Adj.	-73.3** (2.03)			85.7 (1.45)	18.0** (2.11)	28.0*** (3.75)	- 9.5 (.78)	.657 15.7
Average Age Adj.		-212** (2.17)	- 6.2 (.33)		18.0** (2.26)	31.8*** (3.89)	- 2.4 (.19)	.676 15.3

Source: Grade level equivalents are approximately 26 for science, 24 for math and 22 for reading. The TIMSS analysis is based on 39 nations. The IEA Reading data analysis is based on 24 nations. Numbers in parenthesis are T values.

*** indicates the coefficient is significant at the 1 percent level on a two tail test

** indicates the coefficient is significant at the 5 percent level on a two tail test

* indicates the coefficient is significant at the 10 percent level on a two tail test

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Exhibit 1

Warwickshire

KENILWORTH SCHOOL

1991/1992 EXAMINATION RESULTS - SUMMARY REPORT TO PARENTS

1991-92 RESULTS ACHIEVED BY PUPILS AGED 15 *

No. of pupils in school aged 15 * - 183
No. of boys in school aged 15 * - 96
No. of girls in school aged 15 * - 87
No. of pupils in school aged 15* not entered for examinations - 2

GCSE RESULTS (Number of pupils aged 15 *)

SUBJECT	ENTRIES	A	B	C	D	E	F	G	U	N/A
ENGLISH										
Boys	95	12	11	29	14	22	2	4	0	1
Girls	83	16	15	32	13	5	1	1	0	0
Total	178	28	26	61	27	27	3	5	0	1
MATHEMATICS										
Boys	91	8	21	22	9	12	7	4	4	4
Girls	81	8	16	21	13	12	6	1	3	1
Total	172	16	37	43	22	24	13	5	7	5
SCIENCE SINGLE AWARD										
Boys	2	0	0	0	0	1	1	0	0	0
Girls	3	0	1	0	0	1	1	0	0	0
Total	5	0	1	0	0	2	2	0	0	0
SCIENCE DOUBLE AWARD										
Boys	91	52	30	20	28	28	13	1	0	10
Girls	78	42	36	27	33	16	2	0	0	0
Total	169	94	66	47	61	44	15	1	0	10

i. Bac Exams in mathematics, history/geography and French are set and marked by 23 regional *academies.* School based assessments are used for other subjects (Madeus and Kellaghan 1991, p. 17).

ii. The Ministry of Education sets an exam which has both essay and multiple choice components. The multiple choice component which represents half the written paper is graded centrally. With the aid of a marking scheme supplied by the Ministry, the essay component is marked by the student's own teacher and by a teacher from another school. Oral components are administered by the student's teacher.

iii. Analysis of data on out of cachement school selections for the Fife LEA found that the Type B school effect estimates (measures of how well each school does compared to others serving pupils of similar ability and social background) are significantly and substantially higher at the schools selected by parents choosing to leave their cachement area. Douglas J. Willms and Frank Echols, "Alert and Inert Clients: The Scottish Experience of Parental Choice of Schools." Economics of Education Review, Vol 11, No. 4, 1993, 339-350. My summary sentence sounds different from Willms and Echols summary of their own results because they unaccountably base their conclusions on estimates of school effects from models which did not control for the pupil's ability when entering secondary school and which they acknowledge are biased. Luckily they also present results based on correctly specified models with controls for initial ability in Table 3 of the paper.

iv. The Dutch word for *redoubler* is *blyven zitten* (verb) and *zittenblijvers* (noun). The literal translation of this word into English is "to stay in one's seat."

v. H. D. Lewis, The French Education System, p. 3.

vi. Even though some American schools and state systems of education report retaining between 5 and 10 percent of their students each year (Shephard and Smith 1989), household surveys by the Census Bureau indicate that national rates are quite low for students of secondary school age. In October 1991 33.7 percent of 16 year olds were either enrolled below grade 11 or not enrolled. This is only slightly above the 27.8 percent of 11 year olds five years earlier who were below their modal grade, implying that about 8 percent of those at the modal grade at age 11 in 1986 were retained during the next five years. Retention rates are higher in elementary school. Five years earlier, in 1981, 10.6 percent of 6 year olds were in grades below 1st grade, so it appears that 19 percent of the pupils were retained during the first 5 years of primary school (Current Population Survey, School Enrollment, Series P-20, various issues).

vii. Central Bureau Voor De Statistiek, pp. 19, 20 & 29.

viii. Ministere de l'Education Nationale et de la Culture, Reperes and References Statistiques sur les enseignmements et la formation. 1992 Edition, p. 77, 93 & 99. *Redoublement* is not something inflicted only on children from lower class backgrounds. Often high aspirations can be achieved only by *redoublement.* The two Dutch professors with grown children with whom I have discussed this matter both had a child who was required to *redoubler.* In France selective upper secondary schools serving upper middle class

communities have grade repeating rates that are nearly as high as schools serving lower income communities. For example, *Lycee Charlemagne*, an upper secondary school serving one of the richest neighborhoods in Paris, asked 14 percent of its entering class to repeat the year in 1992.

ix. In formal terms the hypothsis is that high goals--ie. high minimum achievement levels necessary for promotion--simultaneously raise both age-standardized performance and retention rates. If there are large differences in goals/standards across countries, a positive correlation between test scores and retention rates can result. Within a country, however, different jurisdictions are likely to have similar goals. In the U.S., student background and learning/teaching effectiveness varies a great deal across jurisdictions, and this will produce a negative correlation between retention rates and age-standardized achievement within the U.S. I am not aware of any empirical studies of the relationship between standards, achievement and retention which take account of the simultaneous character of the system. See Kang (1984) and Costrell (1991) for theoretical analyses.

x. One would not expect the study effort of primary school pupils to be influenced by the prospect of being retained. The hypothesis of significant threat effects applies to students in small secondary schools or large schools organized into classes of 25 or so students who take most subjects together and remain intact from year to year. Since most American students are in large high schools where peer relationships are not tied to taking particular classes, failing two courses does not sever peer relationships the way it does in Europe. Consequently, one would not expect the threat of failing courses to be the powerful motivator that it appears to be in France and the Netherlands. The argument against retention is that it effectively lowers the learning goals being set for the student in subsequent years. Within-school cross-section studies have established that subsequent learning is reduced by retention (Holmes 1989, Reynolds 1992). It also, apparently, increases the risk of dropping out before graduation (Grissom and Shepard 1989). Consequently, it is doubtful that higher retention rates would increase achievement in American secondary schools.

xi Data from Brazil, Jordan and Mozambique were not used because of the low levels of industrialization. Canada participated as 9 different provinces five of which were stratified into separate English speaking and French speaking school systems. The Canadian data is analysed in the next section of the paper.

xii. Some of the schools selected to participate in the IAEP had considerably fewer than 30 age eligible students. In developing the IAEP sampling frame, schools predicted to have only a few age eligible students were combined into larger super schools for purposes of drawing the sample. When one of these schools was selected, the target sample of 30-34 students was distributed among the schools forming the super school (IAEP 1992c). Principal questionnaires were completed in each school, but sometimes the number of student interviews was too small to provide reliable estimates of school means. If the very small schools had been included, the estimated impacts of EXAM would have been slightly larger than the results shown in Table 1, 2 and 3.

xiii The effect of independent religious private schools on TV watching or some other outcome can be calculated by summing coefficients in column 3 and 6. Effects for secular private schools come from summing column 4 and 7. Reports of statistical significance are based on F tests testing the restriction that the sum of these two coefficients is equal to zero. All of the religious school boards in our data were in nations that had a CBEEES system. Consequently, the coefficient on the religious

school board variable represents the effect of this governance structure in the presence of a CBEEES.

[xiv] Three of the provinces that lacked CBEEES in 1991 have now reintroduced them (GAO 1993). Manitoba introduced its 12th grade examination in the winter of 1991 about the time the IAEP exam was being administered to 8th graders in the province. The new examination system was announced in June 1990 only 7 months earlier. This system rotated the subject assessed on a five or six year cycle. Starting in 1996, Manitoba will assess math and language arts every year and require the exams to count for 30 percent of the student's final grade. Starting in 1995, Anglophone, New Brunswick required that exam results account for 30 percent of course grades. Exam results will also soon be included on the transcript and school level results are being published. New Brunswick is planning to extend its end of high school examinations to science. New Brunswick, Nova Scotia and Newfoundland are cooperating in the development of examinations for Biology, Chemistry and Physics.

[xv.] In Canada the highest school refusal rates were for the English speaking schools in Quebec (15 %), the English speaking schools in Saskatchewan (12 %) and the French speaking schools in New Brunswick (12 %). In the rest of the provinces refusal rates were below 7 percent and in many provinces all invited schools participated. When sampled schools declined to participate an alternate was selected from the same stratum (IAEP 1992c).

[xvi] Column 18 is an estimate of the difference between public school students and students at independent private schools in province with exam systems. It is equal to the sum of the exam-province-independent-school interaction coefficient in column 8 and the average of coefficients on the two independent private school dummies in columns 11 and 12. The **'s report the statistical significance of this linear combination of the three variables.

[xvii] Following Madeus and Kelleghan (1991), the university entrance examinations in Greece, Portugal, Spain, Cyprus and the ACT and SAT in the U.S. were not considered to be CBEEES. University entrance exams should have much smaller incentive effects because students headed into work do not take them and teachers can avoid responsibility for their students' exam results by arguing that not everyone is college material or that examiners have set an unreasonably high standard to limit enrollment in higher education. Appendix A of Bishop 1997 provides a bibliography of the documents and individuals consulted when making these classifications. The TIMSS report's information about examination systems does not distinguish between university admissions exams and curriculum-based exit exams, so its classifications are not useful for this exercise.

[xviii] The Philippines, for example, had a math score mean of 399 in 8^{th} grade and a mean of 386 in 7^{th} grade. The mean age of 8^{th} graders was 14 and the mean age of 7^{th} graders was 12.9. The math score for 13.5 year olds was estimated by interpolation between 7^{th} and 8^{th} grade means. Math13.5 = 386 + (399-386)*((13.5-12.9)/(14-12.9)).