

Cross-National Impacts of Public-Private Partnerships on Equitable Student
Achievement: A Quasi-Experimental Assessment using PISA 2009

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ABSTRACT

Public-private partnerships are being increasingly supported and advocated for, ideologically and financially, as an approach to educational reform in many countries across the world. Proponents suggest that non-state involvement in the education sector has the potential to bolster international Education for All efforts, improve school governance, increase accountability to students and parents, and improve student cognitive outcomes at a lower cost than providing all basic education services through the state.

Although the political support for these partnerships from various financial institutions and reform advocates is extensive, empirical evidence investigating achievement and equity impacts on students is greatly lacking. This dissertation adds a much-needed empirical voice to the debate. I perform a quasi-experimental examination of state education finance and provision practices across 17 countries using data from the Program for International Student Assessment (PISA) 2009.

Using methods of propensity score matching to reduce the private sector selection bias and hierarchical linear modeling to estimate effects, accounting for a nested data structure, I investigate differences in student cognitive outcomes and equity between public and private education sectors. The work addresses three primary questions: (i) to what extent do students in publicly-funded private schools perform differently than students in public schools?, (ii) to what extent is student socioeconomic status associated with achievement differences?, and (iii) to what extent does student achievement depend upon the school-level characteristics of choice, competition, autonomy, and accountability? This third question deals with a prominent model for engaging the private

sector in education, seeking to explain effective education provision through these four key criteria, which are theorized to improve student learning outcomes.

The findings of this study somewhat contradict much of what is currently understood about public-private partnerships in education. Much of the current research shows that public-private partnerships have small performance advantages over traditional public schools. The results of this quasi-experimental empirical assessment provide evidence that, holding student and school socioeconomic indicators constant, students in public schools in a number of countries outperform students in publicly-funded private schools. Where these differences occurred, however, they were small, and in the majority of cases there was no difference in performance between public and private schools.

In terms of student performance, I find no evidence of systemic inequity in either school sector. That is, low-income students appear to perform at equal levels in public and publicly-funded private schools. However, there is broad cross-country evidence of social discrimination in private sector school access. Enrollment in a private dependent school is associated with higher student socioeconomic status in 13 of 17 countries and publicly-funded private schools are more likely to discriminate in admissions by student academic ability.

Keeping these equity findings in mind, I assert that government policy can be used to mitigate inequalities of opportunity through access to public and private school services. This notion entails a more modern view of the state, in which government is not recognized as sole education provider but assumes a larger supervisory capacity focused on regulating learning and guaranteeing equitable educational opportunity.

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LIST OF ABBREVIATIONS

GDP.....Gross domestic product

HKD Hong Kong dollars

HLM.....Hierarchical linear modeling

MDGs.....Millennium Development Goals

PSM..... Propensity score matching

PSA Propensity score analysis

PPP Public-private partnership

USD.....U.S. dollars

CHAPTER ONE: INTRODUCTION

At the 2005 UN World Summit, leaders from 191 of the world's nations committed to ensure access to a free primary education of good quality for all students by 2015. As one of the eight Millennium Development Goals (MDGs), efforts towards achieving universal primary education have been perhaps the most organized aim within the international education community over the past decade. And yet, despite concerted effort, increased technical assistance, and consolidated aid efforts, it appears that come 2015, many countries will continue to face substantial shortcomings in education. These shortcomings include deficiencies in access, quality, and equity, and are catalyzed by perpetually insufficient resources for education.

In 2008, there were 67 million children out of school across the world: roughly 38 million in sub-Saharan Africa and 18 million in Southern Asia (UNESCO, 2011; UNDP, 2011). Of these, the UNESCO Institute for Statistics predicts that 40% will never enroll in school (UIS, 2010). Educational expansion has stalled in the last few years such that, if enrollment continues at its current rate, the number of out-of school children will increase to 72 million by the end of the 2015 Millennium Development Goal period (UNESCO, 2011).

Issues of low quality and inequity persist within many of the world's education systems. As a result, millions of children across many countries finish basic education without adequate reading, writing, and numeracy skills (UNESCO, 2011). In total, roughly 796 million of the world's adults lack basic literacy skills. This has substantial implications for spheres of societal and individual livelihoods including economic productivity, individual empowerment, and societal well-being (Fukuda-Parr & Kumar, 2003).

In low-income countries, educational spending has increased its share in national budgets, with growth from 2.9% in 1999 to 3.8% in 2010 (UNESCO, 2011); however, despite this positive growth, education in many nations still faces large budgetary deficits. Most often, deficiencies in educational quality, particularly in low and lower-middle income nations, are closely tied to educational resource shortages as well as inefficient use of resources (Verspoor, 2006). Education budget concerns have been compounded by the international economic downturn in recent years. UNESCO (2010) estimates that the economic crisis has lowered primary spending per-pupil in sub-Saharan Africa by as much as 10% from 2009 to 2010.¹

Problem Statement and Purpose of the Study

Despite increasing international political will to provide free basic education to all, issues of low quality and inequity persist in many of the world's education systems. Notwithstanding active effort to equalize educational opportunities, student learning often remains strongly tied to socioeconomic status, gender, ethnicity, and location (UNESCO, 2010).

Recent experience has demonstrated the inability of many central governments, particularly those in low-income nations, even with the consistent support of international aid, to meet the demands for successfully providing quality basic education to all children. Some scholars have asserted that reaching quality-education-for-all targets is not possible by means of the state alone (Malik, 2010; Bray, 1996). As such, international development and scholarly communities are researching and pursuing new and innovative approaches to financing and providing basic education. One ascending policy

¹ Governments in sub-Saharan Africa lost approximately US\$160 billion in revenue in 2009 and 2010 combined (UNESCO, 2010).

approach—educational public-private partnerships (PPPs)—is being particularly advocated by organizations such as the World Bank, USAID, UNESCO, and other groups with political and financial interests in achieving Education for All. However, privatization policies in the past have been especially criticized for perpetuating societal inequalities. Thus, as these approaches gain momentum amongst educational development agendas, it is critical that policymakers understand their implications for students of all backgrounds. In particular, any educational strategy that increases private sector activity must consider the potential impacts on at-risk social groups.

This dissertation provides an assessment of public-private partnerships, using data from PISA 2009 to examine the achievement and equity implications of PPP policies across a range of countries. In particular, the dissertation explores the theoretical and empirical justifications for and against non-state involvement in education provision and provides original cross-national research on the achievement impact of delivery-based PPPs (i.e., partnerships which combine public finance with private provision, described further below). The intent is to expand the current knowledge regarding the potential of private sector initiatives to contribute to social and state goals for education.

Research Questions

This dissertation is focused on assessing difference in student achievement amongst selected public-private models of education finance and provision while accounting for wider social implications. Specifically, through this research I answer five key questions:

1. To what extent do students in publicly-funded private schools perform differently than students in public schools on the 2009 cross national PISA exam?
2. To what extent do publicly-funded private schools and public schools differ in terms of student socioeconomic makeup?
3. To what extent is socioeconomic status associated with achievement differences?
4. To what extent do publicly-funded private schools and public schools differ in their levels of school competition, informed choice, autonomy, and accountability?
5. To what extent are these school-level characteristics associated with student achievement differences?

This first question provides an empirical look into the relationship between school sector and student math, reading, and science achievement. The second and third questions are included to assess the social impacts of public-private partnerships. That is to say, what kind of relationships exists between school sector, student socioeconomic status, and student achievement? The fourth and fifth questions are included as an exploration into the dissertation's conceptual framework. This framework is built upon a model for engaging the private sector in education (Lewis and Patrinos, 2011),² which argues that successful public-private partnerships are facilitated by the school-level characteristics of choice, competition, autonomy, and accountability.

I investigate these questions using a data preprocessing approach called propensity score matching (PSM), which statistically matches students in publicly-funded private schools to public school students with similar characteristics. The analytical

² This framework is discussed in more depth later in this chapter.

method, hierarchical linear modeling (HLM), which accounts for the nested data structure, is then used to determine student achievement differences across schools. The individual and school-level characteristics addressed in these questions are included as predictors in two-level models explaining student math, reading, and science achievement as outcomes. Each of these questions is answered at cross-national and national levels of the PISA data. Processes of PSM and HLM are performed on the entire sample of international PISA data as well as on the national samples of 17 selected countries.³

Significance of the Study

This dissertation addresses a relevant issue within current international education policymaking. Having demonstrated the crucial import of education to the well-being of both nations and individuals, and having outlined some of the troubles that face governments particularly regarding the finance of quality education, public-private partnerships become relevant to the discussion as influential organizations, scholars, education decision makers are increasingly asserting the potential of these policies to bolster government efforts.

Specifically, multilateral and bilateral development organizations such as the World Bank, the Asian Development Bank, OECD, and USAID have recently begun to form active agendas advocating for private intervention in national education efforts (OECD, 2004; USAID, 2005). However, because public-private partnerships have not received extensive empirical review, it is crucial to expand understanding of the impacts of this new educational approach. This dissertation does just that, focusing on the impact

³ Argentina, Australia, Austria, Belgium, Chile, Denmark, Hungary, Indonesia, Ireland, Netherlands, Portugal, Slovak Republic, South Korea, Spain, Sweden, Thailand, and Trinidad and Tobago. For an explanation of the country selection process, see chapter three.

of a specific set of public-private interventions (delivery-based PPPs) on educational outcomes.

To get at the heart of these issues, the dissertation utilizes a quasi-experimental research design, using propensity score matching as a means to reduce the selection bias that typically plagues observational studies of public/private achievement. Propensity score analysis uses statistical techniques to mimic the research design of randomized control experiments through an equal balancing of observable characteristics between a treatment group (students in publicly-funded private schools) and a statistically matched control group (students in public schools). The use of these techniques offers the potential to dramatically reduce selection bias for estimating the treatment effects of public-private partnerships (Rosenbaum & Rubin, 1983).

This dissertation also acknowledges, drawing from privatization critics (Apple, 2001), the idea that matters of privatization must consider issues of social equity in congruency with any discussion of school quality or efficiency. Building from this notion, the dissertation recognizes the importance of assessing the effects of PPP strategies on diverse groups of students. Recognizing and accepting the criticisms of educational marketization and privatization, and some of the neoliberal principles which explain their functioning, the empirical goal of this dissertation is not only to ascertain whether PPPs worldwide are successful in improving student achievement, but to also account for the ability of PPPs to enhance efforts of social protection (i.e., equal educational access and outcomes across lines of student social class). Thus, as the opponents of privatization initiatives systematically cite issues of race, class, and gender inequities across such policies, this dissertation addresses the effects across all of these

demographic groups to discuss the social power relationships that are inevitably shaping the impact of PPPs.

This study also utilizes approaches of hierarchical linear modeling (HLM) to account for the hierarchical structure of the PISA data. As a result of natural education characteristics, and enhanced by PISA's multi-stage sampling design, observations are understood to be hierarchical, as students are "nested" within schools, which are "nested" within countries. It is generally the case, that student scores within these nested groups exhibit a certain level of dependence, as they share similar learning experiences from the same teacher and similar resources and environments within schools. This dependence within groups, or "clusters," violates an important assumption of ordinary least squares (OLS) regression and biases OLS estimates. To account for the hierarchical structure of the PISA 2009 data, and to ensure accurate estimation using this hierarchical data, I use HLM to account for heterogeneity between countries, schools, and students. Such techniques allow me to draw conclusions about educational quality and equity across student, school, and country contexts – a result not achievable using OLS procedures – and help to avoid overgeneralizations internationally. In connection with propensity score matching, this approach provides a robust assessment of the impact of PPP policies in individual country, school, and student contexts.

Definition of Key Terms

Within the literatures that address privatization in education, there are often contestations over the use and meaning of key terms. Moreover, in the specific literature on public-private partnerships idiosyncrasies exist in certain definitions, which can cause widely-used terms to carry meanings distinct from traditional use. As such, I provide a

brief discussion of some critical terms in order to establish an initial reference point from which the discussion of public-private partnerships can be clearly guided.

Private

In its most common use, the term “private” carries meaning associated with for-profit ventures. Most often, the term denotes an element of financial gain. In the educational context, this introduces a strong amount of controversy, in part due to the public nature of the benefits of education. Because of the negative connotations associated with the term “private,” some parties interested in advancing non-state activity in education have, at times, used less ideologically charged terms such as “multi-stakeholder partnerships” (Ginsburg, 2012) or “non-state partnerships” (LaRocque, 2011). In this dissertation, I maintain use of the word “private,” but use the term in a context more broadly than the standard for-profit understanding. Throughout the dissertation, I use the word “private” to denote a service provided by any non-state entity which may include, but is not limited to, for-profit and non-profit organizations, businesses, NGOs, faith-based groups, and civil society organizations. Thus, my use of the term *private* refers not specifically to for-profit organizations, but more generally to any non-state entity. This is significant, as reference to public-*private* partnerships entails partnerships between the state and any one of these groups. And as the literature review demonstrates, the for-profit sector in many countries makes up a minority of educational PPPs strategies.

Public

Defining the term “public” is a bit more straightforward. While for some proponents of choice and competition, use of the word “public” may carry negative

connotations, the actual meaning of the word has much less variation. In most contexts, and for the purposes of this dissertation, the term “public” refers to a service provided by the state at any level: central, regional, or local. For example, public education provision refers to schools that are “built, maintained, owned, operated, and administered by the state” (Jimenez et al., 2011, p. 15). In terms of public ownership of schools, teachers are employed by the state and heads of school are government employees.

Public-Private Partnership (PPP)

There are numerous variations on the definition of public-private partnerships. Public-private partnerships are not easy to define because, in a number of ways, they break down the traditional approaches to and understandings of public and private education institutions. Whereas purely private schools are maintained through private provision, finance, and management, partnerships between state and non-state entities share these responsibilities in various combinations (Table 1). Each of the following definitions includes important aspects of PPPs that guide the discussion of this dissertation.

- “A risk-sharing relationship based upon an agreed aspiration between the public and private (including voluntary) sectors to bring about a desired public policy outcome. More often than not this takes the form of a long-term and flexible relationship, usually underpinned by contract, for the delivery of a publicly funded service.” (Commission on Public-Private Partnerships, 2001).
- “Voluntary and collaborative relationships among various actors in both public (State) and private (non-State) sectors, in which all participants agree to work together to achieve a common goal or undertake specific tasks” (ILO Governing

Body, 2008).

Table 1: Education finance and provision

		Provision	
		Private	Public
Finance	Private	Pure Private schools Home schools Tutoring	Public school user fees Student loans Private philanthropic ventures
	Public	*Vouchers *Charter schools *Contract schools *Private school subsidy programs	Traditional Public schools

Source: Adapted from LaRocque 2011, Patrinos et al. 2009, Sosale 2000.

Note: Shaded cells represent modes of public-private partnership

**Delivery-based PPPs*

- Procurement of “education or education-related services of a defined quantity and quality from private providers at an agreed price for a specific period of time” (Jimenez et al. 2011, p. 12).
- A relationship between state and non-state entities in which the public sector specifies the intended outputs and the private sector takes charge of delivering them (LaRocque, 2011).

In sum, for the purposes of this dissertation, the primary characteristics of public-private partnerships include the following: risk-sharing, long-term relationships and contracts, public specification of goals, and shared public-private responsibility in final outcomes. The remaining terms included in this definitional section are technical terms used to describe specific types of public-private partnerships or characteristics of public-private relationships. Including their definitions here will facilitate discussion throughout the remainder of the dissertation.

Delivery-based PPP

There are various modes of partnership between government and non-government entities used to strengthen education efforts across countries. Delivery-based PPPs are the most common type of PPP initiative and have received the most attention in the literature (LaRocque, 2011). Typical models of delivery-based educational partnerships are outlined through contracts between public and private entities through which the state specifies the desired educational outcomes and contracts with private organizations to provide the required educational services.

Examples of delivery-based PPP initiatives are voucher programs, private school subsidy programs, charter schools, and private management schools.⁴ They can be contrasted with partnerships that combine public operation with private finance (e.g., public school user fees, student loans, and private philanthropic ventures) (see Table 1). Delivery-based PPPs are recognized as having the most potential to combine the benefits of the public and private sectors (e.g., competition and/or choice with accountability and autonomy) (Woessmann, 2006; Patrinos et al., 2009).

The discussion and empirical assessment of PPPs in this dissertation are limited to delivery-based PPPs. Thus, I am excluding PPP modes of public operation/private finance as well as support-service partnerships (e.g. private teacher training or curricular design) and infrastructure partnerships (i.e. private leasing of school facilities or private maintenance of schools), which also bear important functions within many education systems, but are not as exhaustive in their impact on the operation of schools, school leaders, and teachers. The reasoning for this delimitation is founded upon the following:

⁴ These individual programs are discussed in more detail in chapter two.

(i) delivery-based PPPs are currently the most prevalent type of PPP used in wide-scale education reform; (ii) the model for engaging the private sector in education, which is the conceptual framework I employ, assumes existence of contracts between public and private parties, and delivery-based PPPs are the only type of partnership that necessitate such contracts to determine actual school operations, (iii) the literature has suggested models of public finance/private operation to have the greatest potential for improving student performance and equalizing educational opportunities (Schutz and Woessmann, 2007; World Bank, 2003); and (iv) delivery-based PPPs maintain the state responsibility of financing education, which is critical for protecting equity in achievement and access.

Demand-side Intervention

Given some of the social concerns connected to issues of private sector participation in education,⁵ the discussion of PPPs involves particular strategies to account for potential inequitable service provision. One approach of doing this is by demand-side financing, through which funds are targeted to those in greatest need. At times throughout this dissertation, these strategies are also referred to as “means-tested” strategies or “targeted” interventions. Demand-side financing in education is a PPP approach which has the ability to increase educational capacity while maintaining or even reducing expenditures, as funds are used primarily to support those without the means of investing privately. That is to say that demand-side strategies target funds first to those who can’t afford to meet educational costs out-of-pocket. There is some debate surrounding demand-side approaches in education, most of which bring attention to the human rights implications for investment strategies which don’t provide education free to

⁵ These are discussed at length in chapter two.

all (Boissiere, 2004; Woessmann, 2006). Overall, however, demand-side financing offers the ability for the state to maximize funds while protecting interests of efficiency and equity simultaneously (Baum, 2012).

Provision and Operation

I use the ideas of school “provision” and “operation” synonymously throughout this dissertation. In either case, they refer to the management of the school, whether it be public or private. These terms are often used to mark distinctions between public and private responsibilities for funding and running the school. Typical discussions of public and private schools lack any differentiation between the provision and finance of schools. This is a unique contribution of the public-private partnership literature (Malik, 2010). In particular, this literature shows that there are varying outcomes that result from different finance and provision combinations. For example, Woessmann (2006), in an analysis of 2003 PISA data, found that schools which were financed publicly and operated privately (i.e. delivery-based PPPs) had the most positive impact on student achievement, and had particular impact on reducing the SES effect on achievement. It is also important to outline the potential differences in school *ownership*, as in some public finance/private operation models schools are publicly owned (private management schools) and in some they are privately owned (charter schools).

Contracting

Use of the term “contracting” throughout this dissertation refers not to one specific type of PPP, but more broadly to those public-private partnerships in which the state directly contracts with non-state entities for the provision of educational services. Contracting is seen within all types of delivery-based PPPs – vouchers, education service

delivery, and private management. The term is used primarily to bring emphasis to the existence of the contract between public and private parties.

Conceptual Framework

This dissertation is guided by a conceptual model that aims to explain the successful engagement of the private sector in education, as proposed by Lewis and Patrinos (2011). I refer to this throughout the paper as the private sector engagement framework. The framework explains that public-private partnerships are able to impact high performance of schools, teachers, and students by leveraging private sector activity in four crucial spheres: (i) choice, (ii) competition, (iii) accountability, and (iv) autonomy (Table 2). The combination of these four indicators into one single framework is thought-provoking. Apple (1999) suggests that the approaches of competition, markets, and choice are “seemingly contradictory” to principles of accountability, performance objectives, and standards (p. 6). The ability of these to be combined into a single framework and sought after simultaneously, however, demonstrates the ability of PPPs to combine positive aspects of the public and private sectors. This is primarily achievable through the contractual relationship, which allows PPP strategies to foster competition and choice through the private sector while controlling standards and objects through state regulation and quality assurance mechanisms.

Table 2: Lewis and Patrinos--Key conditions for effective reform with non-state providers

Condition	Indicators
Competition	<ul style="list-style-type: none"> • Laws and regulations actively support non-state provision • Processes to encourage market entry are clear, transparent and arbitrated effectively • Rigorous entry standards allow schools to be more autonomous once approved and therefore more able to maximize educational benefits of freedoms • Strong financial incentives encourage good providers to enter the market, including provision for operational and capital expenditure • Government doesn't set tuition standard or cap on tuition • Government doesn't restrict establishment of for-profit schools • Government increases per-student funding to meet specific student needs • Open bidding process
Informed Choice	<ul style="list-style-type: none"> • Admission criteria are non-selective, i.e., not based on academic achievement, family background or student characteristics • There is non-geographical zoning, so families do not have their choice limited by where they live • Inspection reports/performance results are made available to key stakeholders, including the wider public. There are systems in place to disseminate this information to hard-to-reach groups
Accountability	<ul style="list-style-type: none"> • There are clear expectations and standards for every school in the system and a transparent process for ensuring schools know what is expected of them • School/project funding is linked to performance • Where there is serious failure, education authorities intervene swiftly with high-stake sanctions (including school closure) and make arrangements for transition management for students affected • Government sets minimum standards for student learning including time frame • Government sets minimum standards for teacher qualifications and performance • Government requires students to take national exam
Autonomy	<ul style="list-style-type: none"> • Levels of support and challenge are escalated in response to emerging priorities • Market conditions and a regulatory environment allow for additional, high-quality providers to take over failing provision quickly and efficiently • All selection of teachers is not made centrally • Schools are involved in determining when and which teachers are let go • All curriculum decisions are not made centrally • Schools are not restricted by class size • Schools are free to determine wages and salary increases

Source: Adapted from Lewis and Patrinos (2011)

My discussion of the conceptual framework is facilitated by an understanding of principal-agent theory, which explains how public-private partnership models incentivize performance at the school, administrator, and teacher levels (Gauri and Vawda, 2003). The principal-agent framework provides reasoning as to “why” and “how” the components of the private sector engagement framework are able to stimulate success within educational partnerships. In regards to private education initiatives, the principal-agent framework claims that increases in performance result from adequately addressing the “principal-agent dilemma” that exists within education systems (Galal, 2008). This dilemma recognizes that “principals” (policymakers or education leaders) desire particular outcomes, but rely on certain actors or “agents” (school administrators and teachers) to produce these outcomes (Chapman & Miric, 2009).

The principal-agent framework is centered around explaining and somehow influencing the behavior of the most crucial actors in the educational process, namely teachers and administrators. Influencing, in this sense, refers to motivation for high-level performance through particular incentives (Kemmerer, 1990). Galal (2006) suggests that by aligning incentives with desired outcomes (e.g. student achievement), performance can be increased at no extra financial cost. The principal-agent framework asserts that the most effective educational strategies are those that are best able to incentivize high performance from teachers, administrators, and schools. The framework for private sector engagement is founded on the notion that such incentives are best achieved by increasing the levels of school competition, autonomy, accountability, and informed choice. The assumed result is an increase in school and student outcomes.

The incentives at play within education PPPs include the public funds being directed to the private sector, the potential tuition fees coming from increasing numbers of students to private schools, etc. The existence of financial opportunities incentivizes high performance from providers.

I demonstrate this relationship with an example. In Hong Kong, the government's Pre-Primary Education Voucher Scheme (PEVS) provides state funding for every child to attend a pre-primary school in the non-state sector. However, these state-funded vouchers are only offered to schools that meet an established set of standards, which include such criteria as (i) non-profit school status, (ii) restricted tuition fees, (iii) low student-teacher ratios, (iv) open and equitable enrollment policies, and (v) adequate marks on school assessment and quality assurance measures (Li, Wong, and Wang, 2010).

The size of the PEVS program (being potentially universal for all children of kindergarten age) has created substantial incentives for non-state providers. The voucher has continued to increase in value since the beginning of the program, from HKD 13,000 in 2007 to HKD 14,000 in 2009 to HKD 16,000 in 2011, per student. Student participation has increased as well. With 123,600 students receiving vouchers (Education Bureau, 2010) at HKD⁶ 16,000 each, this amounts to roughly HKD 1.98 billion in public funds going to non-profit kindergartens per annum.

As of SY 2010/11, 85% of Hong Kong's 140,500 kindergarten students received a subsidy under the PEVS program. During this same year, 88% of kindergartens (757 of 951) in Hong Kong were participating in the PEVS program. Of these schools, 114 were previously private independent schools that reorganized into non-profit schools in order

⁶ Hong Kong Dollars

to become eligible (Education Bureau, 2010). Clearly, the incentives are considerable if so many schools have been motivated to change from for-profit to non-profit and to raise enrollment and performance standards. In addition to the voucher funds available to eligible schools, further resources are provided for certain underprivileged families.

As the principal-agent framework explains, existence of such incentives gives the “principal” (in this case, the central education authority) power to control desired outcomes from the “agent” (schools). In the case of the Hong Kong PEVS, because of the substantial incentives in play, the state has been able to improve educational outcomes by increasing school accountability. Participating PEVS schools are subject to a regulatory framework, which sets standards for curriculum and quality review (Education Commission of Hong Kong, 2010). The quality review mechanism is a clearly defined set of indicators which guides mandatory external and internal evaluation in the areas of school management and organization, learning and teaching, school ethos and child support, and child development (Education Commission of Hong Kong, 2000). Schools that fail to meet the established quality standards are unable to participate in the PEVS program. Upon losing eligibility, students remaining at these schools will continue to receive PEVS funding, but no future students may be supported until the institution becomes eligible under all performance requirements.

The PEVS program has also increased accountability in regards to the standards for raising teacher and principal qualifications. In a study by Li et al. (2010), 64 percent of teachers responded affirmatively to the statement, *The PEVS has brought you more professional development opportunities*. In reference to accountability in both school outcomes and staff training, there has been some recognized improvements in school

quality, 66 percent of sampled principals and 67 percent of sampled teachers answered *yes* to the statement, *Implementation of the PEVS helps enhance teaching quality of your kindergarten.*

This example provides an application of the private sector engagement framework, explained by principal agent theory, to demonstrate the potential for delivery-based contracts to significantly increase the quality of educational service provision in the non-state sector. In this dissertation, I use the key ideas from these models to guide theoretical discussions. In addition, the primary components of the private sector engagement framework – competition, accountability, autonomy, and informed choice – are empirically tested as part of the research design. In particular, the PISA 2009 dataset includes school-level variables that allow me to compare schools with varying degrees of competition, informed choice, accountability, and autonomy. For example, I identify whether schools face competition with nearby institutions for student enrollment, whether schools have autonomy over hiring and firing teachers, whether school achievement data is used to hold principles accountable for performance, etc. Furthermore, I empirically test these indicators to determine whether differences across the four critical spheres impact student achievement.

Summary and Outline of Upcoming Chapters

This dissertation focuses on the potential of the private sector to contribute to educational efforts of quality, equity, and efficiency as a result of the private sector's ability to raise autonomy, competition, accountability, and informed choice. This chapter has set the issue of public-private partnerships within the context of international Education for All efforts. PPPs represent a potentially innovative strategy for increasing state education capacity, particularly for countries constrained by resource shortages.

This dissertation provides much-needed empirical research regarding the impact of education PPPs on student achievement, as measured by PISA 2009.

Chapter two provides a review of delivery-based PPP programs – vouchers, private management, and education service delivery initiatives – placed within the structure of the private sector engagement framework. Chapter two also addresses concerns and critiques from PPP opponents, particularly relating to issues of privatization and neoliberalism. The primary argument from this literature review is that the contractual relationships between state and non-state actors, which are foundational to delivery-based PPPs, allow the state to protect social interests while leveraging the resources and expertise of the private sector, thus addressing equity, quality, and finance concerns surrounding the provision of education.

CHAPTER TWO: LITERATURE REVIEW

This dissertation is a study of public-private education policies, attempting to better understand these phenomena and whether they offer viable policy options for school systems across the world looking to increase access, quality, equity, and efficiency. This chapter provides an examination of delivery-based private education initiatives in various countries, and discusses the theoretical and empirical justifications for and against public-private partnerships. The discussion is guided by the framework for engaging the private sector in education (Lewis and Patrinos, 2011), which seeks to explain the processes through which PPPs are able to impact desired educational outcomes such as student achievement, equitable access, and financial efficiency.

Within the review of literature, I situate a case in favor of PPPs, referencing the existing empirical research, the conceptual model, and the ideological criticisms against PPPs. The reviewed criticisms include arguments against neoliberalism and privatization. I ultimately conclude, based on the literature reviewed here, that comparisons of PPP strategies to neoliberalism are unwarranted, that the role of the state within such policies differentiates PPPs substantially from traditional privatization initiatives which primarily seek to remove state control, that public-private partnerships can increase quality and efficiency in education, and, perhaps most significantly, that these approaches to educational provision and finance are able to account for social inequities just as well as the traditionally state-controlled public education sector. These distinctions are elucidated in the conceptual framework: choice and competition represent competitive advantage as supported by neoliberal justifications, but introducing accountability brings PPPs closer to the realm of Keynesian state intervention by protecting and ensuring social goals and equitable outcomes.

The Educational Marketplace

The rising importance of education across the world has significantly increased opportunities for private investment. The inability of the state to meet demands for educational opportunities has created market response in the form of growth in non-state service providers (businesses, NGOs, faith-based and civil society organizations) (LaRocque, 2011). In fewer instances, private sector growth has been promoted by the state through legislation and regulation (LaRocque, 2011). In other instances, state regulation prohibits market expansion.

State control over education is justified on myriad grounds, some of which include the existence of externalities (i.e. the “spillover” that benefits society from educational investment), market failures (i.e. poorer families are unable to afford basic education), its role in social cohesion, its establishment as a human right, and its demonstrated economic benefits (Patrinos, 2000; Hanushek, 2002; Colclough, 1996). As the benefits of being educated expand beyond the educated individual to benefit broader society, education has been explained by some as a “quasi-public good,” (Sosale, 2000, p. 1). Some scholars, such as Santosh Mehrotra (1998) have argued that due to the existence of such public externalities, the state should be the primary financier and provider of education, particularly at the primary and secondary levels.

Unfortunately, widespread budgetary constraints limit the reach of public funds and diminish the ability of governments to adequately provide a quality free education for all (Bray, 2008). Even with roughly US\$5.5 billion of bilateral aid being committed to education development assistance per year, there remain substantial shortfalls in bilateral aid to meet Education for All goals (estimated at roughly US\$16 billion in total) (UNESCO, 2005; 2011). This is problematic for a number of reasons, one being the

promise made by the world's nations in The Dakar Framework for Action that "no countries seriously committed to education for all [would] be thwarted in their achievement of this goal by a lack of resources" (UNESCO, 2000).

Private education is traditionally assumed to be associated with socioeconomic inequity, due to the common requirement for private school students to pay out-of-pocket tuition fees. However, a number of recent studies have uncovered the prevalence of private education providers who serve poor and marginalized populations through universally low or progressive tuition rates, means-tested tuition policies, and student scholarships for lower-income students (Tooley, 2004; Tooley & Dixon, 2006; Tooley et al., 2005; Malik, 2010; Salmi, 1998; Watkins, 2000; Postiglione & Tan, 2007; Center for Development Enterprise, 2010). In a number of instances, private schools have been successful amongst education populations that have, in the past, been marginalized by the state-run public education system. As such, in his most recent book, James Tooley (2009) submits that the model found within these private schools for the poor may in fact present the most likely way to achieve quality education for all. Other supporters of educational market strategies assert that public-private partnerships (PPPs) have the ability to simultaneously address issues of access, quality, and equity within education without increasing costs. Recent research supports state partnership with private financiers and service providers as a means of increasing efficiency and quality in education by raising school accountability, autonomy, competition, and student/parent choice (Lewis & Patrinos, 2011). Opponents of privatization, however, argue that such claims represent "empty rhetoric," because decreasing state involvement in education can only agitate the already volatile issues of social inequity within nations (Klees, 1999).

Background on Public-Private Partnerships

In recent years, privatization initiatives have been some of the most intensely-debated policy proposals suggested to address persisting issues of low performance, achievement gaps, budget deficits, and school failure. This has led, in some cases, to private intervention initiatives in the form of increased choice, competition, private school management, and operation. The literature on private education for many years has boasted potential value-added from privatizing educational services (Woessmann, 2006; Patrinos et al., 2009). However, for all of the deficiencies and criticism of the public school system, there is skepticism regarding the ability of the private sector to adequately and equitably meet the needs of students. In particular, critics argue that public-private partnerships are unable to meet the social equity needs of countries.

More recent discussions have included discussions on mixing public and private responsibilities in the realms of education finance and provision. Public-private partnerships are increasingly becoming accepted and even promoted by international organizations and policymakers as viable contributors towards increasing education quality, relevance, access, and cost efficiency (Asian Development Bank, 2010). A number of documented PPP programs have proven successful in reducing the dependence of student achievement on socioeconomic status and allowing poorer families to invest in the education of their children (Patrinos, 2000; Schutz et al., 2007). Many of these partnerships have also been successful in improving education access, increasing efficiency, and raising student achievement (Malik, 2010; Uribe et al. 2006; Barrera-Osorio, 2006).

PPP Types

Types of public and private education are generally divided into two dimensions: finance and provision. The literature on market education defines the typology of PPPs as differentiated by public or private finance and provision (Table 3). It is important to note that even in cases where schools are considered to be “public” or “private,” it is rare for these to be completely exclusionary, particularly in terms of finance. In most public school approaches, for example, there is typically some level of private finance (e.g., school fees, textbooks, uniforms, etc.), albeit small in some instances.

As noted in chapter one, this dissertation delimits the discussion of education partnerships to delivery-based PPPs (i.e. those that combine public finance with private provision). This section provides a brief introduction into the key delivery-based strategies that will be addressed throughout the dissertation: private management of public schools, education service-delivery initiatives, and voucher or voucher-type initiatives. Table 4 provides a brief description and a few examples of each delivery-based PPP).

Table 3: Breakdown of public/private education services

Educational Model	Who Chooses Service	Who Pays for Service	Who Manages Service	Who Employs Staff	Who Provides Infrastructure
Traditional Public Schools	Government	Government	Government	Government	Government
Vouchers	Consumer	Government	Government or non-state sector	Government or non-state sector	Government or non-state sector
Private Management	Government	Government	Non-state sector	Government	Government
Private Operation	Government	Government	Non-state sector	Non-state sector	Government
Education Service Delivery	Government	Government	Non-state sector	Non-state sector	Non-state sector
Pure Private Schools	Consumer	Consumer	Non-state sector	Non-state sector	Non-state sector

Source: Adapted from Patrinos and LaRocque 2009

Table 4: Delivery-based PPP classifications

PPP Type	Definition (Examples in parentheses)
Voucher and voucher-type initiatives	<ul style="list-style-type: none"> • Universal and targeted vouchers. The state provides a voucher to parents who can subsequently purchase public or private education services • Targeted scholarships • Subsidies for private school students
Private management of public schools	<ul style="list-style-type: none"> • The state provides and employs staff while purchasing school management services from private sector providers
Private operation of public schools	<ul style="list-style-type: none"> • The state purchases school management services from private sector providers who employ their own staff
Education service delivery initiatives	<ul style="list-style-type: none"> • The state pays private schools to enroll public students

Source: Adapted from LaRocque 2008, 2011; Patrinos & Sosale 2007. See LaRocque 2011 for a full classification of education PPPs

Private management of public schools. Within private management interventions, the state contracts with private organizations to manage publicly-owned schools. The theoretical justification of private management initiatives is established on the potential for accountability, i.e., the state’s contractual ability to demand certain performance outcomes, and to hold private management responsible for reaching these outcomes, while the management organization is provided with increased levels of autonomy to reach the stated outcomes as they see fit. If adequate competition exists between providers, incentives for performance will be increased as contracts can be terminated based upon demonstrated lack of performance.

In Latin America, there are two well-established programs—Fe Y Alegría schools and Bogotá, Colombia concession schools⁷—which have demonstrated success implementing publicly-funded privately-managed schools. These Latin American cases have provided a number of positive results in favor of private management. Fe Y Alegría (FyA) schools began in Venezuela in 1955, and have since expanded their activity to over 15 countries and 1.2 million students in Latin America. In a 2000 study, Swope and Latorre review the activity of Fe Y Alegría private management schools in nine countries across Latin America: Peru, Bolivia, Venezuela, Nicaragua, Ecuador, Guatemala, Colombia, El Salvador, and Paraguay. The authors find that the FyA schools outperform matched public schools. The FyA schools have 11 percent higher retention rates, lower dropout rates in all but two countries, lower repetition rates in all but three countries, and have achieved these results with a lower overall investment per student than what is found in the public schools. Because these results have been achieved mostly in underperforming school regions, the authors find the Fe Y Alegría program to be an outstanding model of private management for serving underprivileged areas.

In Bogotá, Colombia, a program of private management was initiated in 1999, in what the city calls concession schools. Within this model, the local school board contracts with a private education manager to run 25 schools with roughly 26,000 students for 15 years. Sarmiento et al. (2004) found these concession schools to be outperforming traditional public schools in terms of student achievement. Barrera-Osorio (2006) likewise found empirical evidence that Bogotá's concession schools successfully reduce dropout rates and increase student test scores as compared with public schools.

⁷ Concession schools in Bogotá follow a private management model in which the state contracts with private organizations to provide educational services.

Education service delivery initiatives. Education service delivery strategies entail the public purchase of student access to private schools. In other words, the government will generally pay a per-pupil fee for students to attend private schools. The payment can cover all or partial expenses in the private schools. These interventions can be targeted or universal in nature; in some cases, payments are means-tested, varying by demonstrated student need. Such approaches are typically used as a means of expanding education within overburdened public systems. Cases from numerous countries have demonstrated the ability of this PPP type to contribute to educational expansion without increasing expenditures. Education service delivery differs from voucher-type programs as students are usually unable to select the school of their choice and payments are provided directly to schools rather than students. For schools to be eligible to enroll students under education service delivery contracts, they are required to meet certain criteria determined by the state. The criteria can include, but are not limited to, some of the following factors: the amount of tuition charged to students; school and student performance; and for-profit or non-profit status of the school.

In a 2009 study of an education service delivery program in Côte d'Ivoire, Sakellariou and Patrinos (2009) found that public funds allocated to private schools were “more equitably distributed” than those going to the traditional public system. This demand-side approach to education finance allows the state to direct funds towards education in disadvantaged urban areas. Schutz and Woessmann (2007) find that, across PISA 2003 countries, strategies of providing public funding for private schools reduces student dependence of achievement on socioeconomic status. That is to say, the more evenly spread government resources are to public and private schools, the less student

achievement depends on family background.

The Philippines has used an education service delivery PPP for more than two decades as a means of increasing school access in a constrained secondary education sector. The Education Service Contracting program has grown to be possibly the largest education service delivery program in the world, with nearly half a million grantees in 2009 (Jimenez et al. 2011). This PPP has been quite successful at increasing access to quality instruction for thousands of students; however, the state's approach to offering grants which only cover roughly half of the private school tuition expenses has high costs for the poor (Baum, 2012).

An education service delivery program in Uganda has helped the country move towards universal secondary school access. This private intervention targets funds to students living in rural areas without access to public school services. The program provided financial support for private school tuition costs to roughly 56,000 secondary school students in 2008 (LaRocque, 2011). Only non-state schools with tuition fees below 75,000 Ugandan shillings (US\$32) are eligible to participate.

Voucher programs

Voucher and voucher-type programs are the privatization strategy that have, by far, received the most attention and seen the most research in the PPP literature. Voucher programs are attempts at increasing the opportunity for parents to choose the school that their child will attend. Within voucher systems, students have the choice to attend an available public school or receive a voucher, i.e., a designated amount of money, to attend a private school. Vouchers provide some of the same benefits to the state as found in the education service delivery model. One example of this is that expansion of

education in the private sector is typically more efficient than expansion of public schools. Vouchers can be offered universally, but, in practice, have often been limited to certain populations.

Arguments in Favor of Public-Private Partnerships

The private sector engagement framework, which guides this dissertation maintains generally that increased activity by the private sector in educational exploits can greatly bolster the capacity of the state and facilitate positive education growth. From this approach, some of the potential benefits of public-private partnerships in education are as follows:

- Educational partnerships provide supply-side responses to situations where demand for education is high, yet state resources or capacity to meet demand is insufficient.
- Partnerships allow governments to capitalize on new and specialized skills from the private sector in planning and executing education projects (OECD, 2007; Education International, 2009).
- Increasing private participation in educational provision offers potential for increasing incentives for high performance, which in turn positively impacts efficiency and effectiveness (International Finance Corporation, 2002).
- Partnerships allow governments to respond to restrictions in public sector operation such as salary limitations and civil service restrictions (Education International, 2009).
- Partnerships can offer a means to circumvent corrupt or ineffective state activity (Draxler, 2008).

- PPPs can provide a means for governments to increase educational access, particularly for those previously left out of public service provision (Education International, 2009).

Arguments against Public-Private Partnerships

While my conceptual framework adopts a largely positive view of non-state educational partnerships, there are a number of viable concerns attached to increasing private activity in a traditionally state-run enterprise such as education. In this section, I address some of the more prevalent criticisms, critiques, and arguments against public-private partnerships. In such a conversation, we must acknowledge the arguments levied not only against PPPs specifically, but those also associated with movements of education privatization and government neoliberalism. While PPP advocates might largely refute the labels of privatization and neoliberalism, critics commonly see these issues as intertwined, if not identical. In this chapter, I discuss which of these critiques are and are not appropriate in reference to the PPP literature. In conclusion, I show that the conceptual framework of effective PPPs holds up against the fundamental critiques against privatization and neoliberalism.

PPPs: New Language for Privatization and Neoliberalism?

It is understandable that efforts towards education privatization would be received with considerable resistance, especially concerning education's status as a quasi-public good (Sosale, 2000), which has substantial benefits for the individual and wider society. Moreover, considering education's role as a potential means of dissipating social disparities, the idea of introducing a "profit motive" to the equation, for many, suggests protection of economic rather than academic or social interests in education decision-making (Ball et al., 1994). This is one of the primary concerns associated with

educational privatization: that increasing the private role in education provision will potentially turn the service into a commodity which is bought and traded rather than provided free to all (Gauri, 2003). Patrinos (2012) finds this argument to be “interesting” in the PPP context, as a majority of public-private partnerships “do not allow the for-profit sector to be involved or impose constraints that make it impossible to create a profit” (p. 171). One example of this comes from Hong Kong, where the previously-mentioned Pre-Primary Education Voucher Scheme (PEVS) provides state funding for every child to attend a pre-primary school in the non-state sector. Participating schools receive HKD 16,000 per student; however, in order for schools to be eligible for participation, they must maintain non-profit status, and keep tuition fees under HKD 48,000 per year. To qualify for non-profit status, schools must retain less than five percent of school profits per year (Li, Wong, & Wang, 2010); all additional income is retained for school development purposes.

Notwithstanding evidence that many PPP strategies prohibit for-profit activity on the part of private partners, concerns over the profit motive amongst the socially-driven pursuits of education can be worrisome. It also must be stated, that although Patrinos (2012) notes the prevalence of non-profit PPP activity, this actually contradicts his own framework for effective PPPs, in which limits on school tuition levels or for-profit status are discouraged (Lewis & Patrinos, 2011). However, this is not to say that the framework strives toward an unchecked educational free marketplace. On the contrary, the effective private engagement framework provides the state with sufficient control to protect public interests, but does so in a different manner. In regards to PPPs, Lewis and Patrinos (2011) suggest that free market principles of competition and choice can be coupled with strong

state regulatory policies of accountability and quality assurance, which provide the government with ultimate control over educational outcomes. Moreover, the case of the Hong Kong voucher scheme demonstrates that government control over the terms of PPP contracts allows the state to protect the interests of students over those of private providers. For example, the PEVS voucher program ensures high quality school outcomes through the use of internal and external evaluations, quality assurance mechanisms, teacher training requirements, and means-tested funding to students from lower income families. Thus, any providers which fail to meet the state-defined standards for quality, performance, and affordability are dropped from the program. These policies require schools to serve the needs of the public sector over their own private needs.

Importantly, introduction of these arguments reminds us that discussions of privatization go beyond the sphere of empirical research and evidence and bring to the fore larger issues of international politics and ideology. Education International (2009) finds the core of the PPP debate to be of ideological nature, representing, in part, “the ideological discourse of the last three decades” (p. 23). According to Klees (2012), these three decades have been dominated by a “global neoliberal political economy,” which has spread principles of privatization and liberalization in multiple spheres including education.

Public-private partnerships often come under fire as neoliberal ideology. Assumptions that these strategies are simply the newest form of the neoliberal privatization agenda are understandable, given the involvement of the private sector and considering the value placed on choice and competition. But, are opponents of PPPs correct in lumping these policy strategies together with traditional privatization and

neoliberal approaches? I would assert that such critiques are unwarranted and, in most cases, are used as an ideological strategy of demonizing non-state involvement in education.

The driving theoretical values of neoliberalism are that competitive free markets are the “optimal social institution for the attainment of social welfare” and that minimal government intervention “could lead society to allocate resources efficiently and attain maximum welfare” (Vlachou & Christou, 1999, pp. 3-4). Within such frameworks, the state maintains emphasis on liberalization, deregulation, privatization, market fundamentalism, and minimum intervention (Stiglitz, 2003; Rose, 2003). In the context of education, the singular policy objective that fits this neoliberal description is that of a pure education free market, as advocated by scholars such as Milton Friedman (1997) and Caroline Hoxby (1996), which strives for the debureaucratization of education through universal school choice.

For some detractors of non-state partnerships, PPPs offer innovation only in new language, a potentially more acceptable label than the longstanding term of “privatization,” which many accept as synonymous with neoliberalism. Klees (2012) suggests that the term partnership is used only as a means of “avoiding the negative ethos of privatization” (p. 160). Patrinos (2012), however, directly refutes this notion, suggesting that rather than being policies of privatization, PPPs are actually “an expansion of government control and regulation of the entire education system, public and private (p. 164).” Of course, this stance refers to the control of educational inputs and outputs through the state regulatory practices included in PPP contracts.

I would suggest that the parallels between education PPPs and neoliberalism are inaccurate, although not unexpected. Apple (2001) sees privatization in education as an attempt by the state to shift responsibility for results, and thus blame for existent inequities, from itself to private actors, schools, parents, and children. The PPP response to this notion is that under properly-formed contracts between state and non-state actors, the state maintains accountability for results of performance and equity despite the increased role for private actors in directly providing the services. The whole idea of public-private partnership entails a sharing of risk and responsibility between public and private sectors and that both parties are accountable for results.

By this definition, PPPs fall more in line with the principles of a post-Washington Consensus (Education International, 2009) than with the more neoliberal Washington Consensus. The distinction is characterized by a shift from arguments of “states vs. markets” towards a “complementary relationship between states and markets” (Stiglitz, 1998, p. 76). As such, the construction of public-private partnerships under the private sector engagement framework does not align with neoliberal ideology, as detractors suggest, but is possibly more appropriately defined under Olssen’s (2004) view of the “non-bureaucratic welfare state,”⁸ which entails aspects of decentralization, separation of powers, increased civil-society activity, while maintaining state regulation and control of public services. In this sense, while non-state organizations become the providers of public services, the state assumes “an ethical function of ensuring democratic justice, including the equal distribution of resources and capabilities” (p. 235). This notion

⁸ Although Olssen’s discussion of the non-bureaucratic welfare state is situated in a context of civil-society organizations, describing the devolution of power and responsibility from government to civil-society, the general notions apply quite appropriately to the PPP discussion.

resonates with LaRocque's (2011) view of a necessary changing role for the state from funder and provider of education to funder, enabler, and regulator. According to LaRocque, by no means does this represent "an abdication of state responsibility for education," but rather allows the state to focus its efforts on "ensuring that services are affordable, non-discriminatory, and accessible to all" (p. v). Through such partnerships, the state can address social concerns just as it would under state provision of the service. This is in direct contrast with neoliberal approaches of governance which seek to "abandon the state in preference for individual self-reliance, radical forms of decentralization, or to abandon public goods in favour of privatization and markets" (Olssen, p. 235). Furthermore, this PPP structure accounts for the social concerns of progressives like Klees (1999) and Apple (2001) by protecting rather than abandoning matters of social justice (Olssen, 2004).

This last point—that of social justice issues—is the primary critique levied against privatization initiatives. While some research provides empirical evidence against efficiency and effectiveness in private education strategies (one example of this comes from the 2000 study of McEwan and Carnoy who find mixed achievement results in Chile's voucher schools), the bulk of the education privatization criticism seems to target social inequality issues. Apple (2001), in regards to educational choice and competition, frames the international education context in a space of inequality rather than simply underachievement. As he suggests, the educational problems which face the international education community go beyond matters of school achievement but more importantly include issues of social and cultural power relations. This forms the crux of arguments made by the anti-neoliberals: not that educational choice and competition strategies are

incapable of increasing school access or improving student performance, but that these strategies by and large favor the more privileged social groups and perpetuate social power relations (Whitty et al., 1998). Stated a bit differently, the progressive stance against educational privatization is that it is as likely to reify educational disparities of race, class, and gender as it is to improve opportunity and raise quality (Apple, 2001).

More directly, progressives,⁹ i.e. critics of PPPs, posit that to even present the issue as an empirical question is a mistake, refuting the idea that policy choices are simply technical and rational (Klees, 1999; 2012). According to Klees, educational policy should be about social welfare rather than school efficiency, performance, or even quality, and he suggests that ideologically-based analyses of educational efficiency ignore broader views of education's role in achieving social justice. As progressives see it, neoliberalism and privatization (and in the progressive view these terms are synonymous with PPPs) have discredited important modes of state policy intervention for controlling inequities of race, class, and gender through a delegitimization of government on issues of social justice or greater good (Klees, 1999). However, as I have already demonstrated, the contractual nature of public partnerships with private entities protect the state's role in setting outcomes. PPPs are not an attempt to privatize the entire education industry but rather an effort to combine the competition between providers and increase school accountability through government regulation.

My argument is supported by an array of public-private partnerships which at their very core pursue goals of social protection, some of which have already been discussed in chapters one and two. This is markedly different from the educational choice

⁹ The term "progressive" is used by Klees (1999) himself, referring to those who oppose the neoliberal agenda.

models proposed by scholars such as Hoxby (1996) and Friedman (1997), which aim for universal education free markets. The increased involvement of the state within PPP strategies allows the state to address social justice and school quality issues simultaneously. This fact alone potentially separates PPPs from the neoliberal privatization initiatives, assisting the state in accounting for the inequities of race, class, and gender as illuminated by the progressive scholars (Apple, 1999).

Evidence Regarding the Public Finance/Private Provision Model

Contracting education services to non-state entities can improve efficiency by means of competition and market forces, access to specialized skills, improved accountability, and greater autonomy. Contracting partnerships can also improve quality of delivery and increase access for underserved populations. This section addresses the evidence regarding privatization and PPPs from the components of the private sector engagement model: choice, competition, accountability, and autonomy. I also address the literature which accounts for social justice issues of equity; I refer to this as the social protection literature.

A study by Schutz, West, and Woessmann using 2003 PISA data found that public funding for private schools reduces dependence of achievement on socioeconomic status (2007). Woessmann (2006) uses PISA 2003 data to compare the cross-country performance of students in schools with various mixes of provision and finance provided by public and private entities. The author finds that public funding of schools is positively correlated with student performance in math, science, and reading while public operation is negatively correlated. Students in publicly-funded private schools performed 37.9 PISA test points (1/3 of a standard deviation) higher than students in publicly-funded public schools. This performance difference represents a whole grade level in

achievement. In contrast, students in privately-funded public schools perform 36.6 PISA test points worse than public/public students. The research found no difference between fully private and fully public schools.

Patrinos (2002) examined perhaps the most well-known systemic model of private provision/public finance—school choice strategies in the Netherlands—and found the approach to be successful in narrowing education gaps between socioeconomic groups while better controlling education costs. It does so by providing demand-side financing to support student attendance in private schools. Within this system, despite the high proportion of private provision (roughly 70 percent), the state maintains a strict role in regulating school quality, publishing information on the performance of schools and closing down those who fail to meet student needs. As a result of this increased accountability of schools to students and to the state, the Netherlands has developed an education system which, as Patrinos (2002) affirms, equally serves the poor and wealthy.

A number of documented PPP programs have proven successful in reducing the dependence of student achievement on socioeconomic status and allowing poorer families to invest in the education of their children (Patrinos, 2000; Shutz et al., 2007). Many of these partnerships have also been successful in improving education access, increasing efficiency, and raising student achievement (Malik, 2010; Uribe et al. 2006; Barrera-Osorio, 2006).

Choice and Competition

One of the foundational arguments for educational privatization pertains to free market principles of choice and competition and an assumed increase in school quality (Hoxby, 1996; Friedman, 1955). The private sector engagement framework explains that

successful privatization strategies seek to increase competition between providers, administrators, and teachers through competition. High levels of competition are created through state regulation standards such as tuition fee requirements, non-profit or for profit status of private providers, requirements for certification, bidding processes, ease of entry into the marketplace, etc.

Proponents of education privatization likewise support educational choice for its assumed ability to increase schooling outcomes. Choice policies provide opportunities for parents to choose their child's education institution for religious, financial, social, or other reasons (Levin, 1998). Research finds that increasing the levels of competition and choice in an education system has positive impact on school performance if parents are provided information about relative school quality and have the ability to select a school without constraints of location, price, or other state policy (Brookings Institute, 2010). Unfortunately, as available information or individual capacity for selection is often lacking, school choice models have been shown at times to benefit upper and middle class families. Hastings and Weinstein (2008) explain, however, that by improving the information that is available on relative quality and increasing its dissemination, private school initiatives can reach traditionally marginalized students and lift individuals out of education poverty. To support high levels of choice in the system, according to the private sector engagement framework, the state is advised to regulate a number of crucial policies pertaining to, inter alia, school boundaries, admissions criteria, and access to information on school quality.

Arguments for higher levels of choice and competition within education are typical of what I call the "traditionalist" privatization approaches. Such arguments maintain that

the most effective means of increasing school quality is through increased competition and unencumbered free choice in the educational free market through limited state intervention. Started as the work of economist Milton Friedman as early as the mid 1950s, this non-intervention model argues in favor of private schooling as its increased competition apparently improves efficiency and quality in both the public and private sectors (Friedman, 1997, 1955).

The need for private education strategies as established within the choice and competition spheres is based on an assumption of an encumbered, bureaucratized, public school system in crisis. In fact, Friedman (1997) suggests that in the United States, perhaps no activity is as “technically backward” as the education system, being burdened by unionization, bureaucracy, and overall state intervention in the school system (p. 344). According to some scholars such as Forster (2011), the only way to turn around the current culture of educational inadequacy is to “break the government monopoly on schooling” (p. 29). Doing this means severing as much as possible the influence that the government exerts in the education process, limiting government activity primarily to regulation for facilitation of unencumbered free market activity. As such, supporters of strict educational choice strategies—Friedman, Hoxby, Forster—have a vision of an education revolution where the private market has the ability to tap the full potential of education, not only through efficient private provision, but through competition that lifts the quality of public provision as well. Friedman sees a dominant private market as the only means capable of breaking down the current education establishment. The end goal for such scholars is a completely privatized education free market.

Addressing equity from the choice and competition spheres. The choice/competition approach asserts that voucher programs have the ability to best equalize educational experiences across social groups. Traditionalist supporters of educational vouchers claim that the education free market has the potential to close the increasing gap between high and low-skilled labor groups, and thus high and low-income groups. Less traditional privatization scholars disagree, not with vouchers themselves, but with the type of voucher proposed by Friedman. Despite Friedman's acceptance of education as the "only major force in sight" capable of decreasing social disparities, social protectionists claim that privatization as proposed by strict choice adherents only serves to increase problems of social stratification. Instead, their solution calls for increased choice and competition through private interventions that are targeted to underprivileged social groups.

Empirical evidence from the choice/competition literature. For an educational choice strategy to utilize the full capacity of the education market, choice scholars such as Friedman and Hoxby explain that a few certain conditions must be met. The program must (i) provide full funding of educational costs, (ii) allow compensatory funding¹⁰ to follow students to the school of their choice, (iii) allow families to add money on to the amount of the voucher, (iv) be provided universally without restrictions on schools or students included, and (v) provide information on school quality to the public (Hoxby, 2003; Friedman, 1997). According to these scholars, for a voucher scheme to be effective, it must be universal and the value substantial enough to cover the cost of high quality profit-making private schools. This approach is a pure voucher system, where the

¹⁰ Compensatory funding is an extra amount of financial assistance provided to lower-income students.

government does nothing to interfere with the educational market, allowing open competition and choice to drive quality improvements in education.

Given these conditions for successful school choice models, the scholars from this approach refute findings of negative or non-existent voucher effects with arguments of inadequate program design. If a voucher program fails to improve student performance, it is because the conditions weren't adequately met. To them, this is problematic, as the choice programs designed to date in many areas of the world, including the United States, have failed to include most of these conditions, due to compromises between school choice opponents and supporters. Most notably, the majority of voucher programs implemented, rather than being universal in nature, are targeted to underperforming and low-income regions and students. In the United States, there has not been a single program designed which exhibits all of the essential characteristics of the choice strategies that experts say can really lead to a competitive marketplace to tap the full power of an education free market. Not until a voucher scheme is implemented with all of these critical elements, Hoxby and Friedman explain, will we see the true power of educational choice initiatives.

Notwithstanding these apparent shortcomings in policy design, Hoxby identifies a number of voucher programs that have had positive effects on student achievement. Summarizing the results of five different school choice studies, Hoxby (2003) finds that voucher schools provide positive achievement gains in poor, particularly black students. In her study, black students in voucher schools in New York performed 4.3 national percentile rank points better on a national achievement test than similar students in public schools. In Washington D.C., black students in voucher schools performed 9.0 national

percentile rank points better than similar students in public schools. Hoxby interprets her findings to suggest that voucher schools provide superior educational options for poor students.

Hoxby (2003) also finds school choice programs in Milwaukee, Michigan, and Arizona to increase the productivity and student achievement in nearby public schools (a positive externality often associated with increased market competition). During the time of the voucher program, productivity in Milwaukee public schools rose between 0.7 and 1.7 national percentile points per thousand dollars. The program also positively affected student achievement in public schools, with students in choice-affected public schools scoring 5.7, 11.1, and 6.3 national percentile points higher in math, science, and language, respectively.

Results were similar in the Michigan and Arizona cases. In Michigan, competition from charter schools raised achievement in public schools by 1.2 and 1.1 national percentile points in reading and math; in Arizona, these scores rose 2.3 and 2.7 points respectively.

In an empirical assessment of a privately funded voucher program in Charlotte, North Carolina, Greene (2001) found that after one year, voucher students scored 5.9 percentile points higher in math and 6.5 percentile points higher in reading (approximately 0.25 standard deviations) than comparable public school students.

Angrist et al. (2002) utilized an experimental research design to assess the Colombian choice experience. These authors found that vouchers targeted to low-income students raised student test scores, increased completion rates, and decreased repetition rates (Angrist et al., 2002). Results were greater for girls than for boys. Although this

research was focused on a means-tested choice program (typically the approach supported by less strict choice proponents due to its targeted nature), Angrist and colleagues approach the potential benefits of vouchers from a choice/competition perspective. Rather than constrain their findings to targeted voucher schemes, the authors recognize the potential benefits to all for spreading school choice policies. They posit that voucher programs “can be a cost-effective way to increase educational attainment and academic achievement” (Angrist et al. 2002, p. 1556).

In a 2011 study, Greg Forster summarizes the literature that has empirically addressed the issue of school choice, primarily through voucher programs, in the United States. Forster explains that there are 10 studies that have been performed looking at the impact of US voucher programs on participating students using random assignment methods. Of these 10 studies, 6 find a positive impact of vouchers on all participating student groups, 3 find positive impacts on some student groups, and 1 finds no impact of vouchers (Krueger & Zhu, 2004). However, Forster suggests that this study suffers from result-changing methodological problems, as the researchers added a number of cases with missing data, and failed to control for student baseline scores. For these reasons, the validity of these results have been disputed in the literature (for an example, see Howell and Peterson, 2004).

Forster (2011) likewise references 19 empirical studies that have assessed the impact of vouchers on public schools in the United States. He provides data from these studies, demonstrating that 18 of them find vouchers to improve public school. This resonates with the statistically systematic review of the research performed by Levin and Belfield (2003). Their data, as subsequently reported, provide a statistical review of the

school choice literature. Also similar to the findings of Levin and Belfield, Forster recognizes that while nearly all of these studies have shown statistically significant results in favor of school choice, the size of the effect is modest. This means that while there are achievement differences between school choice students and students in other schools, these differences are small.

Discussion of the choice/competition approach. Critics of universal school choice strategies discount the normative stances taken by the choice scholars regarding increased privatization. While the positive effect of the voucher programs empirically assessed in the United States mostly show positive results for participating students and nearby public schools, researchers on different sides disagree as to how these findings should inform the debate on potential universal voucher programs.¹¹ While most previously-tested voucher programs have been limited in scope, size, and population, universal choice supporters suggest that the impacts of greater choice and competition would create even greater substantial gains in achievement if the education marketplace was more open. Supporters of the school choice model attribute the modest effect of previously implemented voucher strategies to the modest program designs, which limit the size and scope of the policies (Forster, 2011; Hoxby, 2003). In order to effectively break down the current model of public education and begin to see significant improvements in performance, these scholars suggest a pure model of school choice, universal in scope.

Conflicts across the spheres of the framework. It is important to note that having complete fulfillment in one sphere of the framework may lead to deficiencies in

¹¹ Part of this stems from the fact that many studies show statistically significant positive impact, but with small effect sizes.

another. For example, allowing complete freedom within the choice and competition spheres would create some conflicts in accountability. Whereas universalizing choice will increase competition and consequently raise accountability of providers to consumers, it diminishes the ability to include accountability of providers to the state. Increases in accountability to the state require some trade offs in autonomy and the educational free market.

In addition, there can be similar trade offs in the applicability of multiple simultaneous PPP strategies in one system. The choice/competition view of effective privatization strategies would discourage approaches of privately managed public schools, as this approach includes too much state involvement. The appropriate choice and competition strategy calls for states to retreat further away from educational activities. Under the choice model, rather than maintaining the organization of public schools through private management, Friedman would call for an all out privatization at all stages of educational ownership, operation, and decision making. In this view, the only acceptable role for government to play in the educational process is as financier and regulator of free educational enterprise. These scholars would disagree with the active role public partners play within the contracting and ownership aspects of private management and likewise would discourage the traditional school boundaries maintained within education service delivery models. Thus, although the choice/competition approach would support the increased levels of autonomy necessary within private management models, they would adamantly disagree with the accountability linking performance to contracts and the state's role in this process. In this light, the analysis

used in this dissertation should provide further insight into the importance of each sphere for various private interventions.

Social Protection: Addressing Equity Amongst Privatization

For many scholars, the traditional arguments in favor of universal school choice are, despite the positive empirical results, troubling. This position is made evident in a statement by John Ambler regarding school choice in Britain, France, and the Netherlands: “the primary negative effect of school choice is its natural tendency to increase the educational gap between the privileged and the underprivileged” (1994, p. 470). As elucidated by Ambler, the issue of increasing privatization within education from this perspective has less to do with empirical evidence of policy effectiveness and more to do with policy equity. As such, this group of scholars, more reticent to support privatization, calls for public-private models to target demand-side services to marginalized groups. These issues are significant for the debate on public-private partnerships, as such strategies seem to be most often attempted as a means of increasing educational access to traditionally marginalized or unreached social groups. In many cases, the circumstances entail an underperforming school or rural population, in search of a solution for improving performance, access, and equity.

Two notable scholars within this approach, Henry Levin and Clive Belfield (2003) call into question the perfect educational marketplace envisioned by choice advocates. These scholars disagree with the claims of Friedman and Hoxby that increasing choice and competition will naturally lead to increased opportunities for those in urban neighborhoods with limited options in terms of quality education. Instead, these scholars support strategies of social protection, acknowledging trade offs between various

outcomes in privatization initiatives, and asserting that aims for complete choice and competition are in opposition with goals for equity (Neal, 2002; Levin and Belfield, 2003). According to this approach, school choice designs such as those proposed by Friedman and Hoxby, striving for free choice and competition-driven efficiency at the expense of equity, should be replaced by targeted choice plans. This is supported by empirical evidence which shows that universal choice systems favor the wealthy and educated over marginalized groups (Witte, 1999). Thus, if adequate levels of social equity are to be met, social protection scholars suggest that programs must be willing to compromise on ideal levels of choice.

While Hoxby (2003) criticizes the school choice strategies adopted thus far in the United States for limiting actual levels of choice and competition, scholars concerned with social protection support the targeted programs of compensatory vouchers over the universal models as per Friedman's design. In addition, this approach supports regulations on admissions, prohibits augmentation of vouchers from private resources, targets eligibility to the educationally at-risk, and addresses transportation and information issues.

Neal (2002) envisions a voucher system with a higher level of state intervention to maintain equity. Indeed, he argues that we could create voucher programs that "yield less overall stratification on income and ability," not through de facto free market equalization, but through government involvement and regulation. Neal suggests that such an approach could maintain much of the efficiency gains of school choice, as competition between schools and providers would still exist, but that it would more equitably distribute these results to the students needing them most.

Empirical evidence in favor of social protection. Levin and Belfield (2003) provide one of the most thorough reviews of the privatization research from the social protection perspective. It is important to note that they take a different approach on the school choice issue than those in the choice and competition spheres, but this is due to equity concerns rather than evidence against empirical school choice effects. In fact, the authors' own research documents the potential positive effects of increased market competition on educational achievement: "evidence from more than 200 tests in 25 separate studies shows that competition does have a beneficial effect on the academic outcomes of students in public schools" (Levin and Belfield, 2003, p. 202). In addition, Levin and Belfield (2003) find that a 1 standard deviation increase in private school enrollments raises public school efficiency by 0.2 standard deviations. However, despite statistically significant results, the authors note that the practical significance of these results (effect size) is modest.

Neal (2002) reports evidence in support of voucher programs from Howell and Peterson (2002). In their study, Howell and Peterson evaluated the impact of privately funded voucher programs in Dayton, Ohio, New York City, and Washington D.C. The researchers found evidence of the voucher program benefiting African-American students in these cities, raising one and two-year math and reading achievement by 3.9 and 6.3 percent, respectively. However, these gains had considerable variation amongst grade levels, and some variation across time.

Increasing choices for students in inner cities who typically lack any quality educational options is clearly a laudable aim. However, Fiske and Ladd (2000) point out that in the New Zealand school choice program, underperforming schools were less able

to provide quality education experiences under vouchers. Given this evidence, Ladd (2002) argues against large-scale universal choice programs, and rather promotes designs that will protect disadvantaged students. She suggests adjusting the financial amount of the voucher based on student and school needs, limiting tuition costs for participating schools, or possibly assigning students to requested schools based on demonstrated need. Likewise, Witte (1998) notes findings from the initial stages of the Milwaukee voucher program which suggest targeted voucher schemes benefit at-risk groups, and as such, future models should aim for targeting funds rather than granting universal eligibility.

Campbell, West, and Peterson (2001) discuss the Children's Scholarship Fund (CSF), a private national voucher program, and find that low-income families had difficulties with tuition shortcomings, transportation problems, and lack of space in schools, and thus, many were unable to use the vouchers.

Summary of Choice and Competition

While the potential benefits of increasing privatization are recognized, some scholars argue that a full-blown education free market will not be reached without severe social costs. Instead, less strict school choice policies favor some levels of free market activity, but controlled partially by state intervention to ensure that at-risk groups benefit most rather than suffer from such practices. Rather than striving after a perfect education marketplace, social protection promotes market regulation to ensure equity. Thus, despite the "reasonably consistent evidence" that choice and competition lead to higher education quality, and that "educational outcomes are higher in more competitive markets" (Belfield and Levin, 2002, p. 294), there are other considerations to take into account. Given data that suggests that competition has the "strongest effects for low-income

students,” the social protection model considers the potential redistributive role that competition may provide for the most at-risk students (Belfield and Levin, 2002, p. 296).

Accountability and Autonomy

One of the primary advantages of public-private partnerships is the increased potential for accountability in outcomes. This approach claims that the most effective method of improving educational outcomes is by increasing accountability of “providers to clients, providers to the state, and the state to clients” (Galal, 2006, p. 138). From this perspective, the nature of the state’s role in education changes within delivery-based education PPPs—“from funder and provider to funder and enabler” (LaRocque, 2011). This means that although the state is not itself providing the educational services, it is no less responsible for the outcomes. Its role however shifts from one of provision to one of guarantor of specified outcomes through oversight, regulation, and quality assurance. For example, through accountability of providers to the state, school standards are outlined in contracts and if standards are not met, there are repercussions for school funding or participation in education provision (World Bank, 2006). Especially if there exists adequate competition amongst providers, the state can require high performance standards from private partners.

As previously discussed, the literature on privatizations suggests that by increasing competition education systems have the ability to incentivize high performance from schools (Patrinos, 2002). Contracts which emphasize school-to-state accountability can add contractually defined performance standards to these competition incentives. Such requirements can include factors such as student performance or hiring standards for teachers and staff.

One example of such accountability policies comes from the Bogotá concession school program, wherein the state requires certain academic performance standards from school management companies, and outlines sanctions or dissolution of contracts in the case of failure to meet these requirements (Patrinos, 2002). A number of research studies have demonstrated the importance of accountability in education, and many of those have found student achievement to benefit most when models combine accountability with autonomy (Hanushek & Woessmann, 2007).

As previously discussed, there are some important distinctions to be made between the accountability/autonomy and choice/competition. There are, at times, conflicts that exist amongst these various spheres of private activity. Specifically, we can see conflicts between policies of free market educational choice and state-level accountability policies. However, this is a positive distinction as the delivery-based PPP initiatives discussed in this dissertation also have some distinct differences.

Supporters of educational accountability approaches share some of the skepticism of completely free educational choice markets. Instead, the accountability sphere explains that there needs to be a governing agency to ensure that certain populations are served. This approach recognizes the potential benefits from increasing competition in the educational marketplace, but does not think that these phenomena alone are sufficient to ensure educational quality and equity. The accountability model is focused on the most crucial actors which drive the results of the educational process, namely teachers and administrators. The accountability approach recognizes the importance of the principal-agent relationship (Woessmann et al., 2007; Bruns et al., 2011; Galal, 2008). While the competition within the choice model aims to incentivize performance through consumer-

driven accountability, the accountability model uses accountability to create incentives for private parties and incentivize performance through the principal-agent relationship. Thus theoretically, the accountability model can create many of the benefits of competition through private contracts, while maintaining a focus on at-risk groups.

The choice and competition approaches assume consumer demand to be sufficient to create accountability from educational leaders. The accountability model takes an active role in ensuring certain performance from teachers and administrators. This type of accountability is possible in connection with incentives and consequences provided to schools and teachers. Galal's (2006) explanation of this phenomenon suggests that by aligning incentives with desired outcomes (i.e. student achievement), performance can be increased at no extra financial cost.

While private providers, schools, and teachers are held accountable for their performance and results, this approach maintains that the most effective privatization models are those that provide decision-making freedom for these parties. This notion resonates with the choice/competition approach. One of the most potentially beneficial elements that private models can include is that of autonomy in teacher resourcing. Public school systems are often constrained by inability to determine teacher wages and adequately control teacher recruitment and retention. Private providers often don't face the same restrictions in regards to teachers' unions, centralized pay scales, etc., and thus have the ability to link teacher performance to compensation or future employment (Lewis & Patrinos, 2011).

Within the accountability model, although the particular performance standards are set by a governing body, the schools and school leader retain the autonomy to run their

schools as they see fit. This is particularly important concerning crucial school decision-making. As the importance of the teacher for student performance has been firmly established in the literature, it also becomes important that schools are able to act autonomously when making personnel decisions. Woessmann et al. (2007) has found that “students perform significantly better in schools that have autonomy in process and personnel decisions” (p. 34). From this type of empirical evidence comes the suggestion by authors such as LaRocque (2005) that private management has much more potential to impact student learning if schools have the power to hire, manage, and fire their own teachers.¹²

Within this approach, autonomy and accountability are inseparably connected. Empirical data (Woessmann et al., 2007) shows significant positive interactions between autonomy and accountability, and that the impact of autonomy depends on the levels of accountability in place to ensure performance.

Empirical evidence from the accountability/autonomy literature. The accountability approach maintains that increasing market competition and consumer choice is not sufficient to guarantee school success. Empirical evidence from the accountability/autonomy literature suggests that increasing school accountability and autonomy is also critical for improving student performance.

In a 2007 study looking at the performance of countries on PISA 2003 given various levels of accountability, autonomy, choice, and competition, Woessmann et al. (2007) find that higher levels of choice and competition positively impact student performance. However, they also show the potential of privatization to be even greater

¹² Private management with this level of staffing autonomy is referred to as the *private operation* model.

with increased levels of external accountability (in addition to consumer accountability) and autonomy. These results are strongest within privately operated schools, suggesting that “private schools in particular benefit from the accountability created by external inspection and performance comparisons with other schools” (Woessmann et al., 2007, p. 52). These authors also found schools with staffing autonomy to perform better on average.

In addition, a 2004 study by Hanushek and Raymond compares state variation in math and reading achievement in the National Assessment of Educational Progress (NAEP). The authors find that state accountability systems have a positive effect on achievement growth. These results have particular salience to privatization initiatives, as the public school system is largely constrained in its ability to achieve these results: “Specifically, states that introduced consequential accountability systems early, tended to show more rapid gains in NAEP performance, holding other inputs and policies constant” (Hanushek & Raymond, 2004, p. 19). This phenomenon is explained by the study’s findings that the positive impacts of such accountability approaches “come from attaching consequences such as monetary awards or takeover threats to school performance” (Hanushek & Raymond, 2004, p. 2). The accountability approach resonates with the choice model regarding public school monopoly and bureaucracy. However, the accountability model accepts a role for the state as the regulating agency, while the choice approach seeks to limit the state’s control as much as possible. The evidence from Hanushek and Raymond further shows indirect accountability to be not significantly different from zero. Thus, the consumer accountability included within a

choice model—simply publishing results on the relative quality of schools—is an insufficient incentive approach to impact school outcomes.

According to some within the accountability approach, there doesn't need to be a distinction drawn or choice made exclusively between choice, equity, and accountability. On the contrary, research by Schutz et al. (2007) suggests that accountability, autonomy, and choice can work harmoniously to benefit all students, regardless of previous performance, ethnic group, or income level. And considering these factors within a public funding/private operation model, these authors suggest that accountability, autonomy, and choice are “associated with a strong reduction in the dependence of student achievement on SES” (Schutz et al., 2007, p. 4).

Addressing Teacher Quality through the Principal-Agent Framework

As previously explained, the principal-agent framework addresses the means by which educational “principals,” i.e., decision-makers, incentivize “agents,” i.e., those responsible for producing results, to achieve certain outcomes. This approach recognizes that educational processes involve more than just school inputs and outputs. In particular, the educational process is made up of complex human relationships which form the crux of the schooling experience. Research demonstrates that the human variable most vital to school success is the teacher. And one of the largest deficiencies in the public school system, as explained by principal-agent reasoning, is the inability for public schools to adequately control teacher quality. Research has shown that students with a poor teacher can become proficient in less than 50 percent of the curriculum, while students with a good teacher average one year of progression, and students with great teachers can master the curriculum from 1.5 grade levels (Hanushek and Rivkin, 2010). While the

importance of the teacher is extensively demonstrated, there are few mechanisms in place to allow the principal-agent relationship in education to leverage high performance.

Overall it is difficult for many schools to attract or “create” high quality teachers due to limitations on school human resource autonomy. While teacher hiring is by and large conducted by assessing a teacher’s observable characteristics (teaching experience, university degree, teaching certificate, etc.), extensive research has demonstrated no correlation between these types of characteristics and a teacher’s ability to produce high quality learning (Rivkin et al., 2005).

Scholars from the autonomy approach, using principal-agent reasoning, cite the poor pay structure as one of the potential reasons for inadequate human resource management. Using United States panel data, Hoxby (1996) finds that despite the fact that teachers’ unions increase school inputs, they reduce productivity, creating a negative total effect on student outcomes. Neal (2002), within the social protection model criticizes the current pay structure of the U.S. system where teacher compensation is determined by years of experience rather than any factors of teaching quality. He suggests that large school choice schemes could break down the current bureaucracy and help improve the teaching force. From an accountability/autonomy perspective, scholars would argue that these same results can be achieved within private management models, as private education managers would be granted increasing levels of autonomy to manage human resources. As evidence of this, Hoxby (2002) notes the success that charters and private schools have had in terms of teacher salaries, due to the lack of unions and other bureaucratic policies within these sectors.

Summary of Chapter Two

In conclusion, it is clear that there is an array of evidence resulting from the traditional

privatization literature as well as the newer PPP literature. Much of the literature shows a positive impact of public-private partnerships on student academic achievement, although a significant portion demonstrates small effect sizes. Fewer studies show no impact or negative impact of PPPs on student achievement. As we have reviewed, both from the ideological anti-neoliberalism arguments as well as from the privatization literature, the primary concern relating to PPPs is not a matter of efficiency, performance, or quality, but rather the effect (or lack thereof) of such policies on social inequalities. Opponents of privatization suggest that, at best, only means-tested PPPs are capable of improving the circumstances of students, and, at worst, that public-private partnerships necessarily perpetuate and reinforce social inequality. From the most critical of scholars, the only means capable of improving education for the world's nations is through full state control, finance, and provision. However, taking into account the social concerns of critics, I intend to explore the impact of international PPPs on student performance on the 2009 international PISA exam, particularly attempting to understand the effect of these policies on students across various social groups.

CHAPTER THREE: METHODOLOGY

Public-private partnerships represent a potentially innovative strategy for increasing state education capacity, particularly for countries constrained by resource shortages. This dissertation provides much-needed empirical research regarding the impact of education PPPs on student achievement, as measured by PISA 2009. I focus on the effects of the private sector in contributing to student achievement through increased levels of autonomy, competition, accountability, and informed choice.

In order to assess the impact of PPP efforts across multiple countries, I address the following five research questions:

1. To what extent do students in publicly-funded private schools perform differently than students in public schools on the 2009 cross national PISA exam?
2. To what extent do publicly-funded private schools and public schools differ in terms of student socioeconomic makeup?
3. To what extent is socioeconomic status associated with achievement differences?
4. To what extent do publicly-funded private schools and public schools differ in their levels of school competition, informed choice, autonomy, and accountability?
5. To what extent are these school-level characteristics associated with student achievement differences?

This chapter provides an overview of the research design, data, samples, methods of analysis, and discusses the limitations of the study. I demonstrate the utility of propensity score matching and hierarchical linear modeling in this and other studies of private education initiatives for reducing selection and estimation bias.

Secondary Data Analysis

There are a number of advantages to using large-scale cross-sectional data such as PISA, even over controlled randomized experiments, to study education policy issues. Such large-scale data are often more representative of the national populations of students from which they are drawn, meaning that conclusions can be generalized to much larger cross sections of society. Large-scale data also allow the results of a single study to be used by a far greater number of researchers to test considerably more hypotheses. One of the key difficulties in working with secondary data, however, is working under the constraints of existing variables and operationalized measures. As such, researchers must sometimes form research questions to fit available variables rather than collecting data to answer a particular question (Anderson, Milford, & Ross, 2009).

Programme for International Student Assessment (PISA) 2009

The empirical research in this dissertation attempts to determine the effects of public-private partnerships on student achievement. I utilize achievement data from the cross-national 2009 Programme for International Student Achievement (PISA) exam. This international assessment is an initiative of the OECD, started in 2000, to determine how well students near the end of secondary school are “prepared to meet the challenges of today’s knowledge societies” (OECD, 2009, p. 1). The inclusion of an increasing number of world countries and economies is an attempt to allow for a certain level of international comparison.

The exam assesses 15-year-old students in all of the OECD member countries and certain non-member countries that desire to participate. The 2009 exam included 65 of

the world's economies¹³ representing many of the world's regions (Table 5). The exam has been administered every three years since 2000. It assesses student abilities in reading, math, and science, but rotates the main emphasis of assessment each assessment period. More than 470,000 students participated in the 2009 PISA assessment, representing roughly 26 million students across the 65 PISA countries.

Table 5: List of PISA 2009 countries by region

Western Europe	Southern Europe	Eastern Europe	Northern Europe
Austria Belgium France Germany Liechtenstein* Luxembourg The Netherlands Switzerland	Albania* Croatia* Greece Italy Republic of Montenegro* Portugal Republic of Serbia* Spain	Bulgaria* Czech Republic Hungary Poland Romania* Russian Federation* Slovak Republic Slovenia	Denmark Estonia* Finland Iceland Ireland Lithuania* Latvia* Norway Sweden United Kingdom
Eastern Asia	South East Asia	Western Asia	Central Asia
Hong Kong-China* Japan Macao-China* Shanghai (China)* South Korea Chinese Taipei*	Indonesia* Singapore* Thailand*	Azerbaijan* Dubai (UAE)* Israel* Jordan* Qatar* Turkey	Kazakhstan* Kyrgyz Republic*
North America	South America	Central America	Oceania
Canada United States	Argentina* Brazil* Chile Colombia* Peru* Uruguay	Mexico Panama*	Australia New Zealand
Caribbean	Northern Africa		
Trinidad and Tobago*	Tunisia*		

Source: OECD, 2009. *Non-OECD country

¹³ As evidenced by Table 5: List of PISA 2009 countries by region, PISA includes a handful of world “economies” along with the majority of sovereign countries (e.g., Macao-China, Dubai, Shanghai (China), Hong Kong-China, and Chinese Taipei). I simplify the discussion by referring simply to “countries.”

The PISA data are obtained from multiple surveys. On the student end, there are two primary components of the PISA survey: (i) a two-hour assessment of student performance in reading, math, and science; and (ii) a 30-minute survey collecting information about student background and family characteristics such as socioeconomic status, attitudes toward schooling, language background, and other demographic information. Additional information regarding school environment, management, and other school factors is obtained through a 20-minute principal questionnaire. A parent questionnaire is also administered in a small number of countries.

The PISA surveys are developed through a collaborative effort of OECD member countries and implemented by national organizations (OECD, 2006). Experts from participating countries strive to create measures that are psychometrically sound while attempting to remain culturally relevant. Current PISA surveys are developed by an international consortium of independent partners including the Australian Council for Educational Research (ACER), the National Institute for Educational Measurement (CITO) in the Netherlands, WESTAT and the Educational Testing Service (ETS) in the United States, and the National Institute for Educational Policy Research (NIER) in Japan. As a result of including leading educational researchers and psychometricians from across the globe, PISA benefits from some of the most contemporary methods of educational measurement and assessment as informed by current research and theory.

Data is obtained from rigorously designed samples of students, and administration of the surveys is standardized, well documented, and quality controlled (Anderson et al., 2009). The administration of PISA is performed by national project managers monitored

by the PISA governing board and OECD secretariat. Strict guidelines offer a common framework for countries during processes of sampling, data collection and input.

The goal of the exam is not to assess a particular curriculum, but rather to evaluate how students are able to apply the knowledge and skills obtained in school to real-life challenges (OECD, 2009). Although such a large-scale cross-cultural exam is limited in the number of competencies that can be measured, they can nevertheless serve as a useful tool for “revealing some common characteristics of students, schools and education systems that do well” (Schleicher, 2007, p. 350).

The 2009 exam tested the ability of students to read and draw meaning from the types of written materials that students would encounter in their real lives such as personal letters, e-mails, instant messages, blogs, news articles, textbooks, government documents, classified ads, and more. Specifically, the goal is to assess “an individual’s capacity to understand, use and reflect on written texts, in order to achieve one’s goals, to develop one’s knowledge and potential and to participate in society” (OECD, 2006, p. 12).

Using standardized exams as a measure of school quality can be somewhat controversial (Hanushek, 2002), as the cognitive skills demonstrated by students on a test and reflected in test scores are not necessarily a reflection solely of school quality (Hanushek, 2009). Other accepted approaches of assessing education quality come by measuring inputs such as teacher experience, education, and salary; teacher-pupil ratios; education expenditure, etc.

Although international performance on standardized exams may be a crude means of measuring the overall success of school systems with undoubtedly multiple aims,

empirical research by some scholars has nevertheless established the importance of measuring student achievement. Multiple empirical studies have established a strong relationship between achievement on standardized exams and future earnings (Hanushek, 2002; Bishop, 1991; Murnane, Willett and Levy, 1995; Currie and Thomas, 1999; and Murnane, Willett, Duhaldeborde and Tyler, 2000). Hanushek (2009) addresses the PISA and TIMSS exams specifically and finds that high student achievement is a significant predictor of future earnings for individuals. These relationships are of considerable import to country interests in economic growth, as nations with more skilled manpower experience faster growth than lower-skilled populations (Hanushek, 2009). These results demonstrate that while test achievement may not be an exhaustive measure of student cognitive ability or adult “success” in a holistic sense, it may nevertheless be one important measure of school quality.

Critiques of PISA

The PISA exam, however, also faces a notable level of scholarly criticism. Goldstein (2004) calls into question the “comparability” of test results across multiple diverse national and cultural contexts. Dohn (2007) provides a criticism of the conceptual notion of measuring the application of student skills and knowledge to real-life situations, suggesting instead that PISA provides a reliable measurement only of the PISA test situation. Bautier and Rayou (2007) argue that PISA fails to measure what it entails to measure. Gorur (2011) objects to the notion that a high PISA score “is in itself an advantage to the country, rather than an indicator of possible future advantage” (p. 78).

One of the more prevalent arguments against PISA, supported by a number of scholars, is that PISA is deficient in its translations and cultural relevance. Andreas

Schleicher, OECD Deputy Director for Education, responds to this critique by suggesting that the complex task of measuring and comparing competencies across languages and cultures “is a difficult challenge and is being pursued by PISA progressively” (Schleicher, 2007, p. 349). These concerns are lessened somewhat for the science and math sections as these subjects are typically more translatable across cultures. Including all three subjects in the analyses of this study provides an added measure of validity to the interpretation of PISA outcomes.

A primary argument from scholars is the objection not necessarily to the usefulness of international education comparisons, but rather on the assumption held by many that data obtained from such wide-scale assessments represent unbiased and neutral scientific evidence (Gorur, 2011; Decuypere, Simons, & Masschelein, 2011). This critical argument focuses around the “lack of scientific certainty inherent in the construction of facts” (Latour, 2004). In terms of international education assessments, these scholars would suggest that data are not the unbiased scientific tools that they are often assumed to be. Latour (2004) would suggest that notwithstanding methodological and procedural efforts to maintain objectivity in the collection of data and creation of secondary datasets, such information is nonetheless “very partial,” being culturally and socially constructed (p. 232). These arguments are not meant as a call to abandon empirical evidence within educational research, but for a critical examination of “scientific evidence” to be added to renewed efforts of empiricism.

Sampling Methods

The target population for PISA is 15-year-old students in both full-time and part-time educational institutions in participating countries (Goh, 2006). Students outside of

these educational institutions (e.g., school dropouts or students schooled at home) remain outside of this target population.

The PISA exam utilizes a two-stage stratified sampling method rather than a simple random sampling method. Under this sampling design, schools within each participating country are sampled from a complete national list of institutions. From each of these selected schools a simple random sample of students is drawn, typically 35 students (OECD, 2009). For educational surveys, stratified sampling is often preferred to simple random sampling for a number of reasons including (i) cost reduction, (ii) practicality, (iii) and protection of hierarchical data structures. In addition, many countries require certain strata to be over-sampled in order to ensure that certain groups of schools or students are represented in the results. For example, the necessity to represent certain minority groups, urban/rural distinctions, or underrepresented school types or other may be of interest to researchers, policymakers, and survey funders. As such, oversampling and undersampling techniques are used to ensure adequate representation.

This has implications for how the data are to be analyzed, given that most statistical analyses are predicated upon simple random sampling designs, which theoretically produce independent samples. Assuming a simple random sampling design in the case of PISA would result in underestimation of standard errors and thus inflation of type I errors, or over-frequent significant results. In order to create unbiased estimates of population parameters, any statistical analysis on the PISA data needs to include correct sampling weights for all student and school level analyses, including simple calculations of variable means and standard deviations (OECD, 2009).

In the simplest instances, the survey weight is “the inverse of the probability of selection, but is often modified to adjust for nonresponse and poststratification” (Zanutto, 2006, p. 67-91). The weight value assigned to each case equals the number of people that each individual represents in the population (Zanutto, 2006). This is contrasted with non-weighted designs wherein each individual represents a single person in the population.

Methods

This study utilizes a quasi-experimental research design to assess the relationship between school sector and student math, reading, and science scores. The study also investigates the relationship between school-level variables and student scores.

I use hierarchical linear modeling (HLM) to account for the hierarchical structure of the PISA data. As a result of natural education characteristics, enhanced by PISA’s multi-stage sampling design, observations are understood to be hierarchical, as students are “nested” within schools. When students are drawn completely at random from a certain population, they can be treated as independent cases. Simple random samples are more likely to include students from a greater number of schools, thus breaking down some of the nested structure inherent to educational data. The multi-stage sampling design, however, preserves the hierarchical data structure, thus capturing the dependency of students within schools.

It is generally the case that student scores within nested groups exhibit a certain level of dependence, as they share similar learning experiences from the same teacher and similar resources and environments within schools. This dependence within groups (or “clusters”) violates an important assumption of ordinary least squares (OLS) regression and biases OLS estimates. To account for the hierarchical structure of the PISA 2009 data, and to ensure accurate estimation using this hierarchical data, I use HLM to account

for heterogeneity between schools and students. Such techniques also allow me to draw conclusions about educational PPP outcomes across student and school contexts.

HLM analyses will be performed in two stages. The first stage consists of a general cross-country assessment, including students from all countries with publicly-funded private schools. This provides an international sample of roughly 325,000 students. In the second stage, I perform individual country analyses for those countries with samples large enough to support statistically significant findings.¹⁴

Intraclass Correlation Coefficient (ICC)

To determine whether data exhibit substantial within-school dependence, and thus require hierarchical modeling for unbiased estimates, a first step is to compute the intraclass correlation coefficient (ICC). The ICC measures the proportion of between-group variance in the outcome (Raudenbush & Bryk, 2002). If the ICC demonstrates a high proportion of between-group variance, it is advised to use multi-level statistical models rather than single-level models for data analysis. Determining exactly what size intraclass correlations require multi-level modeling has been a matter of debate in the literature. Lee (2000) posits that ICCs smaller than .10 represent trivial level-two variation. Hox (2010) suggests .05, .10, and .15 to be small, medium, and large ICC values, respectively. For the purposes of this dissertation, I use two-level modeling for any countries with ICC greater than .10.

As evident in Table 6, all of the country intraclass correlation coefficients for the combined public and private government-dependent¹⁵ sectors are greater than .10. ICC

¹⁴ The process of country selection is described in greater detail below.

¹⁵ A description of the school sectors in the PISA dataset – public, private government-dependent, private government-independent – is undertaken below.

values range from .186 in Spain (math) to .715 in the Netherlands (science) with a mean in each subject roughly .40. This is considerable between-school variation. The implications for this are that single-level statistical models, which only assess the variance of individual students scores, would miss a substantial portion of information about explained variance in student achievement. From this, it is clear that the use of hierarchical linear models is both appropriate and necessary for accurate interpretation of student achievement differences. As such, I use hierarchical models for all countries.

Table 6: Country intraclass correlation coefficients. Public and private dependent sectors (descending order)

Country	Intraclass Correlation Coefficient			Country	Intraclass Correlation Coefficient		
	Math	Reading	Science		Math	Reading	Science
Netherlands	0.670	0.652	0.715	Trinidad & Tobago	0.666	0.635	0.627
Hungary	0.632	0.673	0.633	Belgium	0.585	0.580	0.601
Argentina	0.550	0.554	0.561	Austria	0.537	0.577	0.577
Indonesia	0.428	0.442	0.397	Slovak Republic	0.416	0.404	0.448
Chile	0.402	0.446	0.354	Thailand	0.392	0.270	0.226
South Korea	0.367	0.297	0.282	Portugal	0.267	0.289	0.242
Ireland	0.241	0.263	0.255	Australia	0.221	0.216	0.216
Sweden	0.216	0.183	0.204	Spain	0.186	0.198	0.191
Denmark	0.168	0.162	0.168				
Mean	0.409	0.402	0.394				

Sampling

As mentioned previously, PISA 2009 includes data from students and schools in 65 countries across the world; however, not all of these countries have data pertaining to all of this dissertation's research questions. Most notable, 22 of the 65 countries have no data from students in publicly-funded private schools (Table 7). Removing these 22

countries leaves 43 with students from both public and publicly-funded private school sectors. For the international analyses (i.e., those in which the full international sample of public and private school students is used), each of these 43 countries is included (n = 311,379). However, for the purposes of the individual country analyses, not all of these 43 countries can be included. Many have too few students or too few schools in each sector to yield statistically significant findings. Using Optimal Design software (Spybrook, Raudenbush, Liu, and Congdon, 2006), I conducted prospective (a-priori) power analysis to determine which countries had large enough student and school sample sizes to potentially produce significant and meaningful results from HLM statistical tests. Through this analysis, I identified 17 countries with sample sizes large enough to obtain significant results at a .05 alpha level, with a .30 effect size and statistical power of .80: Argentina, Australia, Austria, Belgium, Chile, Denmark, Hungary, Indonesia, Ireland, Netherlands, Portugal, Slovak Republic, South Korea, Spain, Sweden, Thailand, and Trinidad and Tobago (Table 7).

Although an effect size of .30 is a relatively small difference, even statistically significant PISA differences of this size can be impactful on a national scale. Hanushek and Woessmann (2010) estimate that an increase of 25 PISA points, or .25 standard deviations, for a single country's students on the PISA exam, if sustained by the country, will result in an increase of 25% national GDP over the lifetime of the students.

An example is provided: If France were to maintain its current levels of PISA performance, the country would be expected to have a GDP of USD 3.64 trillion in 2042. On the other hand, if it improved its cognitive skill outcomes from an average PISA score of 505 to 530, total GDP would be expected to be USD 3.75 trillion in 2042 – an increase

of USD 111 billion – and USD 4.52 trillion in 2090 – an increase of USD 880 billion (Hanushek and Woessmann, 2010). And of course, any additional sustained growth in cognitive outcomes has additive effects on national economic growth. These figures illustrate the importance of even small differences on the PISA exam. As such, I discuss statistically significant differences between groups, even if they seem relatively small in terms of effect size.

Table 7: Number of public and public-private school students by country

Country	Number of Public Students (Schools)	Number of Publicly-Funded Private Students (Schools)	Number of schools needed for effect size .3 with 80% power	Country	Number of Public Students (Schools)	Number of Publicly-Funded Private Students (Schools)	Number of schools needed for effect size .3 with 80% power	Country	Number of Public Students (Schools)	Number of Publicly-Funded Private Students (Schools)	Number of schools needed for effect size .3 with 80% power
Argentina	3,229 (144)	940 (33)	50	Australia	8,715 (218)	3,279 (84)	38	Austria	5,569 (234)	589 (23)	83
Belgium	2,668 (89)	5,111 (166)	38	Brazil	17,101 (812)	96 (4)	198	Canada	21,484 (918)	541 (22)	198
Chile	2,141 (80)	2,174 (70)	29	Chinese Taipei	3,604 (97)	98 (3)	198	Colombia	6,423 (222)	257 (10)	198
Czech Republic	5,481 (234)	223 (13)	198	Denmark	4,798 (231)	777 (38)	75	Estonia	4,600 (168)	92 (4)	198
Finland	5,531 (191)	279 (12)	130	Germany	4,457 (202)	198 (9)	198	Honk Kong-China	318 (10)	4,357 (136)	100
Hungary	4,063 (163)	469 (20)	90	Iceland	3,284 (112)	21 (2)	198	Indonesia	2,761 (85)	766 (35)	42
Ireland	1,474 (57)	1,757 (62)	33	Israel	4,630 (140)	568 (17)	66	Italy	28,593 (987)	973 (44)	198
Japan	4,416 (135)	99 (3)	198	Jordan	5,592 (181)	35 (1)	198	Korea	3,091 (99)	923 (30)	42
Latvia	4,464 (181)	28 (2)	198	Lithuania	4,456 (193)	17 (1)	198	Luxembourg	3,948 (30)	481 (6)	30
Macao-China	238 (3)	4,990 (34)	45	Mexico	34,138 (1332)	36 (3)	198	Netherlands	1,795 (69)	2,647 (104)	35
Norway	4,522 (186)	56 (4)	198	Peru	4,830 (189)	29 (1)	198	Poland	4,582 (166)	91 (5)	198

Country	Number of Public Students (Schools)	Number of Publicly-Funded Private Students (Schools)	Number of schools needed for effect size .3 with 80% power	Country	Number of Public Students (Schools)	Number of Publicly-Funded Private Students (Schools)	Number of schools needed for effect size .3 with 80% power	Country	Number of Public Students (Schools)	Number of Publicly-Funded Private Students (Schools)	Number of schools needed for effect size .3 with 80% power
Portugal	5,616 (185)	432 (17)	100	Qatar	6,051 (88)	16 (2)	198	Shanghai-China	4,599 (137)	34 (1)	198
Slovak Republic	4,212 (172)	343 (17)	100	Slovenia	6,025 (335)	129 (5)	198	Spain	15,336 (512)	8,154 (294)	38
Sweden	4,024 (159)	543 (30)	74	Switzerland	11,260 (399)	162 (7)	198	Thailand	5,421 (204)	609 (20)	74
Trinidad and Tobago	3,789 (120)	441 (18)	74	International Total Sample	269,251 (8,196)	42,128 (1,351)					
<i>Albania</i>	<i>4,201</i>	<i>0</i>		<i>Azerbaijan</i>	<i>4,604</i>	<i>0</i>		<i>Bulgaria</i>	<i>4,445</i>	<i>0</i>	
<i>Croatia</i>	<i>4,923</i>	<i>0</i>		<i>Dubai (UAE)</i>	<i>1,373</i>	<i>0</i>		<i>France</i>	<i>Missing</i>	<i>Missing</i>	
<i>Greece</i>	<i>4,640</i>	<i>0</i>		<i>Kazakhstan</i>	<i>5,271</i>	<i>0</i>		<i>Kyrgyzstan</i>	<i>4,868</i>	<i>0</i>	
<i>Liechtenstein</i>	<i>311</i>	<i>0</i>		<i>Montenegro</i>	<i>4,786</i>	<i>0</i>		<i>New Zealand</i>	<i>4,401</i>	<i>0</i>	
<i>Panama</i>	<i>2,798</i>	<i>0</i>		<i>Romania</i>	<i>4,746</i>	<i>0</i>		<i>Russian Federation</i>	<i>5,296</i>	<i>0</i>	
<i>Serbia</i>	<i>5,390</i>	<i>0</i>		<i>Singapore</i>	<i>5,152</i>	<i>0</i>		<i>Tunisia</i>	<i>4,844</i>	<i>0</i>	
<i>Turkey</i>	<i>4,962</i>	<i>0</i>		<i>Uruguay</i>	<i>4,916</i>	<i>0</i>		<i>United Kingdom</i>	<i>11,095</i>	<i>0</i>	
<i>United States</i>	<i>4,888</i>	<i>0</i>									

Note: Bold represents countries selected for individual analyses. Italics represent countries with zero students in publicly-funded private school

Data and Measures

The PISA testing procedure utilizes a method for estimating a range of a student's abilities rather than a single point estimate of the student's ability (Wu & Adams, 2002). This is known as a plausible values approach. For each student in the PISA dataset, a set of five plausible values is provided to estimate the achievement scores in each content area. This means that every statistical test in relation to student achievement is computed five times, and the average of the results provided (OECD, 2009; Rutkowski & Rutkowski, 2008). Such a process ensures a more accurate estimation of standard errors for each statistic computed.

Dependent variables. The dependent variables of interest in this study are student math, reading, and science scores. Within each subject, the average of five plausible values estimates is used for each student (PV1READ - PV5READ; PV1MATH – PV5 MATH; PV1SCIE – PV5SCIE). PISA reports these scores using a normed scale with an OECD mean of 500 and a standard deviation of 100 (Table 8).

Independent variables. My research questions focus primarily on the relationship between various school-level factors and student performance. These school-level characteristics are represented by a number of different variables.

School sector. The first research question examines the extent to which school sector explains student performance in math, reading, and science. The PISA dataset contains a school type variable (SCHTYPE) with three categories of schools: (i) public schools, (ii) private government-dependent schools, and (iii) private independent schools. This second category – private government-dependent schools – serves as a proxy for schools utilizing public-private partnerships. They are defined as privately managed

schools that receive at least 50% of their total funding from the government. This type of operationalization has precedent in other PPP research (LaRocque, 2011; Fielden & LaRocque, 2008; OECD, 2011). I henceforth refer to this as the *private dependent* sector.

The SCHTYPE variable is used to create a dichotomous school sector indicator with a value of 1 representing a private dependent school and a value of 0 representing a public school. School sector is the primary variable used to compare students in public and publicly-managed private schools.

Table 8: Country PISA math, reading, and science scores with standard deviations (public and private dependent sectors combined, weighted)

Country	Math		Reading		Science	
	Mean	SD	Mean	SD	Mean	SD
Argentina	378.2	90.9	386.9	106.5	390.3	100.5
Australia	505.8	93.7	506.2	98.9	518.6	101.4
Austria	498.0	95.1	473.4	98.9	496.4	100.6
Belgium	517.4	103.8	508.1	101.4	508.7	103.2
Chile	409.5	74.3	438.8	78.8	437.3	77.0
Denmark	503.1	87.3	494.5	83.8	499.1	91.9
Hungary	490.9	91.7	495.1	89.4	503.9	85.8
Ireland	483.4	87.7	488.5	97.0	503.9	98.9
Korea	539.8	90.6	532.2	80.1	532.5	84.1
Netherlands	525.1	89.7	507.4	89.4	520.8	97.2
Portugal	484.1	90.1	486.3	86.1	490.2	82.6
Slovak Republic	497.7	97.0	478.8	90.6	491.3	96.1
Spain	479.9	90.5	478.1	87.4	486.0	87.7
Sweden	494.8	94.0	497.9	98.9	495.5	100.1
Thailand	417.0	79.3	419.7	71.8	424.0	79.8
Trinidad & Tobago	416.1	99.5	417.2	112.1	412.4	108.5
Mean	477.5	90.9	475.6	90.6	481.9	93.5

Competition. The educational privatization literature argues that competition between schools has a positive effect on student performance, and, as such, many private initiatives seek to improve the level of competition between schools. PISA datasets include a measure of school competition. In this competition item (SC05Q01), principals report the level of competition they face from nearby schools for student enrollment. Responses include three ordinal categories: (i) the school does not compete with any other schools for students, (ii) the school competes with one other school for students, and (iii) the school competes with two or more schools for students. This categorical competition variable is used to create two dichotomous dummy variables: (i) the school competes with one other school for students (COMPONE) and (ii) the school competes with two or more schools for students (COMPTWO). The reference group represents no competition with other schools for students. HLM analyses assess the extent to which public and publicly-financed private schools experience different levels of school competition and whether these differences are associated with student performance.

Autonomy. School autonomy is concerned with the extent to which schools and school heads have decision-making authority over their curriculum, budgets, salaries, and employees. As discussed in the review of literature, results from a number of empirical studies suggest that higher levels of school autonomy are positively associated with student achievement (Woessman et al., 2007; Schutz et al., 2007; Rivkin et al., 2005). The PISA school questionnaires include a number of questions regarding school-level autonomy. PISA has combined information from a number of questions on school autonomy into two standardized composite factor measures: RESPRES and RESPCURR.

The RESPRES measure contains information from six items (SC24a - SC24f) relating to school-level autonomy over school resources, budgets, and hiring practices. Specifically, school heads were asked who has considerable responsibility for (i) selecting teachers for hire, (ii) dismissing teachers, (iii) establishing teachers' starting salaries, (iv) determining teachers' salary increases, (v) formulating the school budget, and (vi) deciding on budget allocations within the school.

The RESPCURR measure contains information from four items (SC24h, SC24j, SC24k, SC24l) relating to school-level autonomy over assessment and curriculum: who has considerable responsibility for (i) establishing students assessment policies, (ii) choosing which textbooks are used, (iii) determining course content, and (iv) deciding which courses are offered.

For all of these questions regarding autonomy, school heads were asked to respond by checking as many boxes as appropriate with the following options: (i) principals, (ii) teachers, (iii) school governing board, (iv) regional or local education authority, and (v) national education authority. The RESPRES and RESPCURR measures represent the ratio of the responsibility that principals and teachers have to the responsibility that national, regional or local education authorities have. These measures are standardized to have an OECD mean of 0 and a standard deviation of 1. Higher values indicate more responsibility for schools than local, regional, or national education authorities.

Informed choice. Like the previously discussed school-level characteristics, this dissertation attempts to assess the extent to which increased levels of informed choice are associated with student achievement. The private sector engagement framework, in line

with privatization advocates, suggests that increased levels in this school characteristic are positively related with achievement. There are two primary criteria of this component of the private school engagement framework, namely open enrollment and information dissemination. The first entails that school admissions are not limited by criteria such as geographical boundaries or prior student achievement. The second concerns the assessment and public dissemination of school performance data, to provide parents a means of comparing relative school quality.

Variables used to assess school admissions criteria come from two PISA items. School heads were asked how often (a) residence in a particular area (SC19Q01) and (b) the student's record of academic performance (SC19Q02) are considered when admitting students. The potential responses include "never," "sometimes," and "always." For each of these items I create two dichotomous dummy variables. The variable ICRESAC assigns a value of 1 to schools that always consider residence for admissions and a 0 to schools that do not always consider residence. ICRESSC assigns a value of 1 to schools that sometimes consider residence for admissions. ICPERFAC assigns a value of 1 to schools that always consider student academic performance for admissions and a value of 0 to schools that do not always consider student academic performance. ICPERSC assigns a value of 1 to schools that sometimes consider student academic performance for admissions.

A fifth dichotomous measure of informed choice is included in the HLM analyses – SC22Q01 – that assigns a value of 1 to schools whose principals indicated that their achievement data are posted publicly. A value of 0 is assigned to schools whose achievement data are not posted publicly.

Accountability. In the PPP literature, scholars assert that increased levels of accountability for teachers, principals, and schools have positive effects on student achievement. Items from the principal questionnaires include information on whether there is pressure from parents for schools to meet high academic standards and whether achievement data are used to evaluate principal and teacher performance. The HLM analyses use two dichotomous dummy variables created from the SC18Q01 variable. ACCPRESH assigns a value of 1 to schools whose principals reported high pressure from parents for the school to meet high academic standards. A value of 0 was assigned to schools without high parental pressure. ACCPRESL assigns a value of 1 to schools whose principals reported moderate pressure from parents for school academic standards and a value of 0 to schools without moderate parental pressure.

A third accountability measure – ACCEVAL – combines information from two PISA variables about whether achievement data are used to evaluate principal (SC22Q02) and teacher (SC22Q03) performance. Higher values represent greater incidence of evaluation of teacher and principal performance.

The final school-level variable included in HLM models is a measure of school socioeconomic status (AGGSES). This is an aggregated variable created from the individual student SES variable (this variable – ESCS – is described in more detail below). At the student level, ESCS has an OECD mean of 0 and a standard deviation of 1. Higher values represent higher socioeconomic status. This variable shows whether the effect of school SES composition impacts student achievement differently by school sector.

A cursory examination of the descriptive statistics for these variables provides some initial information on the school-level characteristics for the full international sample of PISA data (Table 9). Across countries, the private dependent school sector includes a higher proportion of schools that compete with one or more other schools than the public school sector: 92% of publicly-funded private schools compete with at least one neighboring school for students as opposed to only 71% of public schools. The difference between sectors in levels of competition with two or more schools is moderate in size, roughly a 20% difference with a Cohen's d of $-.39$.¹⁶

The variables with the largest differences between school sectors are those dealing with autonomy. For the international sample, the private dependent sector exemplifies higher levels of autonomy in school finances and hiring practices as well as curriculum and assessment. These differences are large in size for resource and hiring autonomy ($d = -.82$) and moderate in size for curriculum and assessment autonomy ($d = -.42$). School sectors are equal in their use of achievement data for evaluating principals and teachers ($d = -.02$).

¹⁶ For comparison of independent means, Cohen (1988) proposes an effect size (d) of $.20$ to be small, $.50$ to be moderate, and $.80$ to be large. The sign of the effect size (positive or negative) conveys the direction of the relationship, with negative values representing a larger mean for the private dependent sector. The use of effect sizes is more informative than t-tests for comparing groups with this data, as the large sample sizes produce significant p-values for even minute mean differences.

Table 9: School-level descriptive statistics for the international PISA 2009 sample, by school type (weighted)

	School sector					
	Public schools		Publicly-funded private schools		Mean Difference	
	Mean	SD	Mean	SD	Value	Cohen's <i>d</i>
Competition (proportion)						
<i>No schools</i>	.287		.080		.207	
<i>One school</i>	.129	.335	.142	.349	-.013	-.04
<i>Two or more schools</i>	.584	.493	.778	.415	-.194	-.39
Autonomy over resources & hiring	-.171	.936	.595	1.09	-.766	-.82
Autonomy over curriculum & assessment	-.237	.959	.168	.966	-.405	-.42
Accountability (proportion)						
<i>High parental pressure</i>	.182	.386	.207	.405	.025	-.06
<i>Moderate parental pressure</i>	.474	.499	.545	.498	.071	-.14
<i>No parental pressure</i>	.344		.248		.096	
Assessments used to evaluate teachers & principals	.001	1.16	.021	1.13	-.020	-.02
Informed Choice (proportion)						
Admissions consider geographical residence						
<i>Never</i>	.490		.578		-.088	
<i>Sometimes</i>	.181	.385	.204	.403	-.023	-.06
<i>Always</i>	.329	.470	.218	.413	.111	.24
Admissions consider prior student achievement						
<i>Never</i>	.526		.340		.186	
<i>Sometimes</i>	.203	.402	.281	.450	-.078	-.19
<i>Always</i>	.271	.445	.379	.485	-.108	-.24
Information Dissemination	.390	.487	.270	.446	.120	.25
School SES	-1.23	1.02	-1.10	1.13	-.13	-.12

The private dependent sector has more open enrollment policies concerning geographical boundaries, with only 44% of schools considering residence in the admissions process versus 51% of public schools. However, these differences are small to negligible ($d = .24$ for schools that always consider residence; $d = -.06$ for schools that sometimes consider residence).

Private schools are slightly more likely to consider prior student achievement as a determinant of admissions, with 66% of schools using such policies compared to 47% of public schools ($d = -.24$ for schools always considering student performance; $d = -.19$ for schools sometimes considering performance). This could suggest that the private sector is more likely to enroll higher-performing students. The private sector at times has been accused of implementing policies of “cream-skimming,” i.e., limiting admissions in some capacity based on performance, in attempt to maintain a more advantageous composition of student abilities. This has potential significance for matters of social equity, which are further investigated in following analyses. Although PISA does not include any indicators on prior student performance, I use the school SES variable to examine potential school composition effects. Overall, however, the international sample appears to have a negligible difference between sectors in terms of school SES ($d = -.12$).

This initial discussion of school-level descriptives for the international sample is useful in providing a sense of the broad difference between school sectors. Assessing differences at the country level, however, provides a much greater understanding of the differentiated behavior of public-private partnerships globally. As such, these variables are further investigated at the country level in the following chapter.

Missing data. To account for missing data at the school level, I implement methods of *complete-case analysis* (Pigott, 2001), as HLM modeling does not support any missing data at the school level. This approach utilizes only cases that have data for each of the analysis variables. I would have preferred to utilize multiple imputation methods to account for data missingness, creating multiple datasets with estimated missing values to be used in an iterative analysis process. Unfortunately, the technical limitations of the HLM software preclude the simultaneous use of multiply imputed datasets and plausible values estimation. My decision to retain the use of plausible values over multiple imputation was driven by (i) the need to calculate the range of plausible values to maintain more accurate estimates of standard errors and final effects and (ii) the relatively small amount of missing data (Table 10) – only 5.2% of all cases in the 17 selected countries are missing data in any of the school-level predictors. While discarding any number of cases, even very few, has the potential to bias the estimation of effects, I considered this the best option for minimizing bias. Graham, Cumsille, and Elek-Fisk (2003) suggest 5% to be within the acceptable threshold for dealing with missing data in such a manner. At the student level, I account for missing data in the propensity score algorithm using a process of mean substitution and dichotomous indicators representing missing data for each variable.

Table 10: List of school-level PISA variables and percentage of cases with missing data

Data posted publicly	Residence and performance in admissions	School competition	Autonomy in resources and curriculum	Parental pressure	Evaluation of teachers and principals	School SES	Total
0.74%	1.9%	0.64%	0.37%	1.71%	2.17%	0.0%	5.2%

Observational Research and Causal Inference

One of the largest research problems faced in comparing private and public school performance is the inability to correctly determine causal treatment effects. Accurately estimating the causal effect of a particular educational program requires knowledge that observed outcomes are the direct result of the program and not of any other influence. Conceptually, a causal effect is defined as the difference between what would happen to the participant after exposure to the treatment condition (e.g., private schooling) and what would happen if the same participant had instead been exposed to the control condition (e.g., public schooling) (Rubin, 1974; 1977). This is sometimes referred to as the “counterfactual account of causality,” with the term “counterfactual” representing the unobserved outcome (Schneider, Carnoy, Kilpatrick, Schmidt, & Shavelson, 2007). However, in terms of educational research, this explanation of causal comparison is clearly theoretical, as it is impossible to observe the effects of both the treatment and control conditions on the same individual; this is known as the *fundamental problem of causal inference* (Schneider et al., 2007).

Holland’s (1986) proposed solution to this fundamental problem—the statistical solution—utilizes an estimate of the average causal effect for each group rather than for each individual. In order for this approach to be unbiased, however, the individuals in the treatment and control groups should not differ in terms of any characteristics other than treatment group assignment (Schneider et al., 2007). For this reason, the randomized controlled experiment is typically accepted as the most appropriate means for determining causal effects, because random assignment of participants to treatment and control groups essentially eliminates any systematic differences in pretreatment characteristics between groups that may otherwise influence the outcome. As a result of

such a research design, if individuals in the treatment group perform differently than individuals in the control group, this effect is due to differences in the treatment administered. To apply this thinking to the substantive topic of this dissertation, if a randomly assigned treatment group of private school students performs higher on an achievement assessment than a randomly assigned control group of public school students, this difference is defined as the private school treatment effect. The random assignment of participants to control and treatment groups within experimental research equalizes both observable and unobservable characteristics, thus allowing any treatment effects to be causally attributed to the treatment. Some education PPP initiatives are capable of performing randomized trials, when demand is high for participation, through program lotteries. Such information, however, is not available within the PISA context.

Selection Bias in Privatization Research

One of the primary difficulties in assessing the achievement effects of private schools is the problem of separating the school impacts from the individual student and family characteristics that influence student achievement. Research has shown that private school students often bear systematically different characteristics than those in public schools. This results from a number of factors, a primary one being that a choice to send a child to a private school is often accompanied by other family and student characteristics that may positively influence achievement (e.g., socioeconomic status, the relative importance of education in the household, family structure). Commonly referred to as “selection bias,” this imbalance between public and private school students is made up of both observable and unobservable characteristics (Hoxby, 2003).

There is a large body of empirical research that distinguishes certain family, student, and community characteristics as significantly correlated with student attendance in private schools. In many cases, where private education requires more private investment than public education, family income is a significant predictor of private school attendance (Jimenez, Lockheed, & Paqueo, 1988; Long & Toma, 1988; Figlio & Stone, 2001). Other important covariates that are empirically linked to private school attendance include the following: parent education (Jimenez et al., 1988; Figlio & Stone, 2001; Andersen, 2008), parent occupation (Jimenez et al., 1988), parent occupation status (Buddin, Cordes, & Kirby, 1997), family structure (e.g., single-mother versus single father versus two-parent household) (Andersen, 2008; Betts & Fairlie, 2001), school average socioeconomic status (Andersen, 2008), size of city (Andersen, 2008), family socioeconomic status (Escardibul & Villarroya, 2009; Andersen, 2008; Yang & Kayaardi, 2004), sex (Andersen, 2008), homeownership (Long & Toma, 1988), race (Long & Toma, 1988), educational ability (Figlio & Stone, 2001), parent immigration status (Betts & Fairlie, 2001), family size (Buddin et al., 1997; Lankford & Wyckoff, 2001), and parental involvement in child's education (Lankford & Wyckoff, 2001).

As a result of the private education selection bias, observational research of public-private school differences is often limited in its ability to separate the impact of the school from the impact of student and family characteristics. To accurately estimate a private school treatment effect requires this selection bias to be somehow accounted for. This necessitates more advanced statistical techniques than the standard inclusion of covariates as selection bias controls.

In discussing the fundamental problem of causal inference, Holland (1986) recognizes the controlled randomized experiment as the “simplest” rather than the “only” setting for discussing causality. Observational research is typically assumed unable to draw causal inferences because of its usual inadequate control over observable and unobservable treatment group differences. Such research produces biased estimates of treatment effects, as differences in treatment group performance may be attributable to both the treatment condition and preexisting differences in individual characteristics (Hahn-Vaughn & Onwuegbuzie, 2006; Rosenbaum, 1986). However, a substantial amount of high quality research demonstrates that by approximating randomized controlled experiments, statistical methods can adequately control treatment group differences for observational methods to produce “predictive analysis” and “tentative causal inference” (Schneider et al., 2007, p. 38; Rubin, 1974, 2006; Rosenbaum, 1986). One such quasi-experimental approach—propensity score stratification—is the approach used for this dissertation.

Propensity Score Analysis (PSA)

Propensity score analysis is a means of potentially drawing causal inference from observational data (Rosenbaum & Rubin, 1983; Rubin, 1997). Rosenbaum and Rubin (1983), in their foundational paper on propensity score analysis explained that the central purpose of using propensity scores in observational studies is to draw causal inference of treatment effects.

Propensity score analysis utilizes a quasi-experimental research design, creating a control group by statistically matching participants’ observable characteristics. The propensity score is defined as the conditional probability of assignment to a particular treatment as a function of a vector of observed covariates (Rosenbaum and Rubin, 1983).

That is to say that propensity score analysis is an attempt to mimic the research design of randomized controlled experiments, not in assignment of individuals to control and treatment groups, but in an equal balancing of observable characteristics between a treatment group and a statistically matched control group.

In terms of this dissertation, this means that the treatment (students in publicly-funded private schools) and control (students in public schools) groups are balanced in regards to those observable characteristics that typically predict private school attendance. In other words, the students in the treatment and control groups are statistically equivalent in regards to socioeconomic status, parent education, parent employment, language status, and so forth. It is this balance of observed treatment group characteristics that has the potential to eliminate the private school selection bias.

Conceptually, the existence of perfectly matched control and treatment units offers a treatment effect in the observed group mean differences (Rosenbaum and Rubin, 1984). This means that for matched treatment and control cases with the same propensity score value (i.e., for individuals in the treatment and control groups with the same probability of attending a private school), the difference between means is an unbiased estimate of the average treatment effect (D'Agostino & Rubin, 2000). Other benefits of using propensity score analysis include:

- Improved parsimony in statistical modeling. The propensity score statistically constructs control and treatment groups that are balanced on a vector of multiple covariates. This means that statistical models used in subsequent hypothesis testing can omit all of these variables. By thus condensing all confounding variables into a single covariate, the researcher substantially reduces the risk of overfitting the model

(Hahs-Vaughn & Onwuegbuzie, 2006). This is of particular importance for hierarchical linear modeling, as parsimony of student-level (level one) covariates is critical.

- Because the matching process is conducted in the absence of an outcome variable, matching only observed covariates and missing-data indicators, D'Agostino and Rubin (2000) explain that “there is no chance of biasing results in favor of one treatment condition versus the other through the selection of matched controls” (p. 757).

Importantly, the goal of propensity score calculation is not to estimate any parameters, but simply to create the best possible balance between matched cases of treatment and control groups. The success of propensity score analysis is the resultant balance in matches. Once matching has been performed, there are a number of ways that the researcher may proceed with subsequent analysis.

Performing the Propensity Score Analysis

For the purposes of this dissertation, the propensity score analysis follows a process of four steps:

1. Select the covariates to be included in propensity score calculations
2. Select an algorithm and perform the analysis
3. Assess the balance of covariates between treatment and control groups at each strata
4. Adjust calculations as needed for maximization of covariate balance

Selecting the Propensity Score Covariates

One of the most important steps in the design of the propensity score analysis is the selection of variables. The models used to calculate propensity scores must include,

as far as possible, known and theorized determinants of attendance in private schools. Researchers must use existing knowledge and empirical evidence to guide selection of variables, including theoretically significant variables (Bai, 2011; Brookhart et al., 2006). In addition, any additional variables that the researcher believes to be potentially associated with the treatment outcome may be included. The goal of the propensity score estimation is maximal balance of covariates across control and treatment groups. It is important to note that only covariates measuring preexisting characteristics are included within propensity score matching, as these are the factors that potentially influence the type of school attended by a student.

Covariates. The covariates selected for propensity matching within this study were those measures found to significantly predict private school attendance in the current international research literature (see previous section, *Selection Bias in Privatization Research*) as well as three control variables that do not necessarily predict private school attendance but could impact the student achievement relationships (sex, grade, and student attitude towards schools). For the analyses at the international level, a GDP per capita variable was also included. Using the literature as guidance, I selected variables from the PISA dataset to include in the propensity score analysis. In total, the propensity score analysis includes information from over 35 different PISA variables:

Female. I recoded the PISA gender variable (ST04Q01) so that 1 represents females and 0 represents males.

Grade. The PISA variable GRADE indicates the student grade relative to the modal grade for 15-year-olds in each particular country. For example, values of -1 and 2

represent that students are respectively one year below and two years above the modal grade.

School attitudes. This is a composite factor variable derived from multiple indicators of student school attitudes (ST33Q01 – ST33Q04). Students answered four questions on a four-level scale from strongly disagree to strongly agree: (i) school has done little to prepare me for adult life; (ii) school has been a waste of time; (iii) school has helped give me confidence to make decisions; (iv) school has taught me things which could be useful in a job. Negatively phrased items are reverse coded. Higher values on this variable indicate a more positive attitude towards school.

Student immigration status. A PISA variable of immigration status (IMMIG) is used to create dichotomous variables representing each immigration category: (i) native; (ii) second-generation (student born in the country, parents born in another country); and (iii) first-generation (student and parents born outside the country). Immigration status has been shown to significantly predict private school attendance and school cognitive outcomes and is particularly impactful in many European contexts (Dronkers, Van der Velden, and Dunne, 2011).

Student language. A dichotomous variable constructed from the PISA item ST19Q01. A value of 1 means that the language of the test is the primary language spoken at home. A value of 0 indicates that the language of the test is not the primary language spoken at home.

Student socioeconomic status. The PISA composite factor variable ESCS contains information from numerous variables representing a range of family economic,

wealth, and cultural information. Larger values represent higher socioeconomic status.

This variable combines information from three separate indices:

1. Family home possessions (HOMEPOS). This index combines information from four separate PISA measures:
 - a. Family wealth (WEALTH). This measure combines information pertaining to a number of student and family possessions: student has a room of his/her own, internet link, dishwasher, DVD or VCR, 3 country-specific wealth items, cell phones, TVs, computers, cars, rooms with bath or shower.
 - b. Home educational resources (HEDRES). This measure combines information regarding various educational resources at home: student has a desk to study at, a quiet place to study, a computer he/she can use for work, educational software, his/her own calculator, books to help with school work, a dictionary.
 - c. Cultural Possessions (CULTPOSS). This measure combines information pertaining to a number of cultural possessions at home, such as whether the home has classic literature, books of poetry, and works of art.
 - d. Number of books in the home (ST22Q01)
2. Highest occupational status of parents (HISEI). This variable uses Ganzeboom et al.'s (1992) SEI index, which provides an internationally comparable measure of occupational status. If the student has more than one parent, the highest value is used. Higher scores indicate higher occupational status.
3. Highest educational level of parents (PARED). Recorded in number of years of education. If the student has more than one parent, the highest value is used.

Family structure. I use the PISA family structure variable (FAMSTRUC) to create dichotomous indicators for each type of family: (i) single-parent family, (ii) two-parent nuclear family, and (iii) mixed family.

School community. Using the PISA school community variable (SC04Q01), I create dichotomous indicators to signify each community size: (i) village (fewer than 3,000 people), (ii) small town (3,000 to about 15,000 people), (iii) town (15,000 to about 100,000 people), (iv) city (100,000 to about 1,000,000 people), and (v) large city (more than 1,000,000 people).

GDP per capita. This covariate is used as a control for the analyses at the international level. Data were collected from the World Bank (2013) and represent country GDP per capita (current USD) in 2009.

Selecting a Propensity Score Algorithm and Performing the Analysis

The purpose of utilizing propensity score matching in this dissertation is to statistically construct a control group with observed covariates equal to those of the treatment group. Propensity scores are calculated using logistic regression; the dichotomous school sector variable is regressed on the set of covariates. This produces a logit score for each student, which serves as his/her propensity score.

A *nearest-neighbor* matching algorithm without replacement is then used to match (discussed in Dehejia and Wahba, 2002) every student in a private dependent school to the public school student with the nearest propensity score. For each propensity score in the treatment group (private sector), only one match is assigned and no propensity score in the control group (public sector) is used more than once. The process

is performed individually for each private school student until all have been matched to a public counterpart with the closest score available.

The result is a statistically-constructed control group of public school students equal in sample size to the treatment group and much more similar on important background measures than the original data, even without a perfect covariate match (Rutkowski & Rutkowski, 2008). The extent of this balance is assessed after each process of matching. Where balance exists between public and private school groups on the observed covariates, these constructed samples produce estimates of treatment effect with significantly reduced selection bias.

In the case of three countries – Chile, Ireland, and the Netherlands – there were not enough students in the public sector to allow for nearest-neighbor matching. In these instances, a process of *exact matching* using only the most critical covariates (student socioeconomic status, grade, and attitude towards school) was followed. The exact matching algorithm pairs only those cases in the control and treatment groups with identical propensity scores; the remainder of cases are discarded. These results should be treated with caution for a couple reasons. Exact matching obtains a perfect match between treatment and control groups on all included covariates. However, as the covariates in the model had to be decreased for the exact matching, the omitted covariates may not be balanced. The result is a treatment-control match balanced perfectly on student SES, grade, and attitude towards schools, but remaining potentially biased by sex, family makeup, language, or immigration status. Seeing as how SES is the covariate of greatest import, and that it is a composite variable of nearly 20 other student background characteristics, the lost covariates are not of grave concern.

The more pertinent issue is the substantial loss of data through exact matching. The process of pairing only identical propensity scores has the result of discarding the majority of cases. This is known as incomplete matching and has the potential to substantially bias estimates (Rosenbaum and Rubin, 1985; McKinlay, 1975). In Chile, Ireland, and the Netherlands, only 13.7%, 7%, and 19.4% of the cases remain after exact matching. Thus, while the ability to compare these students with identical family backgrounds is beneficial, the results can in no way be considered representative of the private sector effects at the national level for these three countries.

Assessing the Balance of the Match

As discussed previously, the extent to which propensity score analysis methods are able to reduce selection bias requires systematic differences between control and treatment groups to be removed. As such, after matching is completed, covariate balance is assessed to determine whether covariate differences in the two groups have been eliminated or reduced (Lee, 2006).

Although hypothesis tests, such as independent t-tests, are used by researchers in many fields of study to determine covariate differences, experts advise against this approach, for both theoretical and practical reasons (Ho, Imai, King, and Stuart, 2007; Imai, King, and Stuart, 2008). Covariate balance is a characteristic of the sample, having no application for larger populations and thus making hypothesis tests theoretically irrelevant (Ho et al., 2007). More practically, hypothesis tests are flawed in that they are affected by factors other than balance – t-tests are excessively influenced by sample size and have been shown to become biased through random data deletion in simulation studies (Imai et al., 2008).

As an alternative, statisticians suggest using standardized mean differences between treatment and control groups as the best method of assessing covariate balance (Ho et al., 2007). While the ultimate goal is obtaining the best possible balance, I follow a proposed rule of thumb that accepts standardized mean differences less than .2 as an acceptable covariate balance (Cochran, 1968). It is also important to note that obtaining adequate balance across all covariates is important, but that the covariates likeliest to have an impact on the outcome variable (e.g., socioeconomic status) require particular attention.

Where the matching process insufficiently reduces treatment-control group differences, Rubin (1997) suggests altering the propensity score model until adequate balance on the covariates is achieved. Researchers can sometimes account for imbalanced covariates by including squared variables and higher order interactions in the logistic regression equation (Lee, 2006). During the matching process for this dissertation, an SES-squared predictor proved to be effective in providing superior public-private SES balance.

Table 11 and Figure 1 show the pre-post changes in SES standardized mean differences for all countries. These results demonstrate the substantial reduction in bias between public and private sectors after propensity score matching. Across the 14 countries that were matched using nearest-neighbor matching, the average of the pre-match standardized mean differences is .371. This is reduced to an average of .046 after matching.

Table 12 displays the pre-post matching changes in covariate balance for the international sample. The matching process was successful in producing standardized

public-private differences less than the critical value (.2) on all covariates. I call particular attention to the changes in propensity score and GDP per capita, where the standardized differences were significantly reduced (from .753 to .053 on the propensity score and from .459 to .064 on GDP per capita).

Table 11: Standardized mean differences in student SES, by country

	School sector			Standardized mean difference		
	Public schools		Publicly-funded private schools	Pre-match	Post-match	Percent balance improvement
	Pre-match mean	Post-match mean	Mean			
Argentina	-.883	-.115	-.140	.743	.030	96.6
Australia	.109	.435	.423	.461	.039	96.5
Austria	.035	.389	.396	.449	.071	98.4
Belgium*	.313*	-.012*	.005*	.349	.026	94.4
Denmark	.067	.423	.419	.391	.047	98.6
Hungary	-.196	.109	.094	.333	.039	94.5
Indonesia	-1.47	-2.06	-2.05	-.650	.058	98.2
Portugal	-.331	-.360	-.432	-.092	.043	28.5
Slovak Republic	-.110	.112	.090	.236	.048	89.1
South Korea	-.119	-.365	-.379	-.318	.052	94.5
Spain	-.480	.054	.056	.539	.012	99.6
Sweden	.283	.689	.670	.476	.050	95.1
Thailand	-1.18	-1.36	-1.30	-.104	.059	52.3
Trinidad and Tobago	-.552	-.548	-.581	-.032	.078	-16.8
Average				.371	.046	80.0

* In Belgium, there are more students in private dependent than public schools. For the purposes of matching, public students were used as the treatment group and private students as the control. The values for public and private schools are thus switched in this figure.

Table 12: International descriptives for student-level pre- and post-matching covariates

	School sector			Standardized mean difference		
	Public schools		Publicly-funded private schools	Pre-match	Post-match	Percent balance improvement
	Pre-match mean	Post-match mean	Mean			
Sample size	269,251 (86.5%)	42,128	42,128 (13.5%)			
Student covariates						
Propensity score	.121	.219	.227	.753	.053	93.2
Female	.507	.510	.510	.006	.013	78.2
Attitude towards school	.093	-.010	-.028	-.129	.067	85.6
Grade	-.170	-.271	-.306	-.189	.146	74.8
Language	.892	.846	.879	-.041	.109	-156.8
Immigration status						
<i>Native</i>	.897	.776	.787	-.267	.115	89.6
<i>Second generation</i>	.044	.132	.127	.252	.107	94.1
<i>First generation</i>	.036	.076	.069	.131	.046	80.7
Family covariates						
Socioeconomic status	-.356	-.116	-.161	.184	.154	77.2
Family structure						
<i>Single parent family</i>	.169	.158	.148	-.059	.029	51.0
<i>Two parent family</i>	.753	.791	.805	.132	.035	72.7
<i>Mixed family</i>	.039	.027	.025	-.087	.024	87.4
School covariates						
School community						
<i>Village</i>	.098	.044	.046	-.245	.027	94.9
<i>Small town</i>	.241	.134	.136	-.307	.042	98.1
<i>Town</i>	.331	.258	.270	-.137	.039	80.9
<i>City</i>	.228	.325	.345	.248	.107	82.3
<i>Large city</i>	.099	.238	.201	.253	.122	64.2
Country GDP per capita	27,577	35,245	34,357	.459	.064	86.9

We also see from the pre-matching figures that nine of the fourteen countries (Argentina, Australia, Austria, Belgium, Denmark, Hungary, Slovak Republic, Spain, and Sweden) have higher average student SES levels in the publicly-financed private sector, while five countries have higher average student SES levels in the public sector (Indonesia, Portugal, South Korea, Thailand, and Trinidad and Tobago). For some of the countries these differences are quite large.

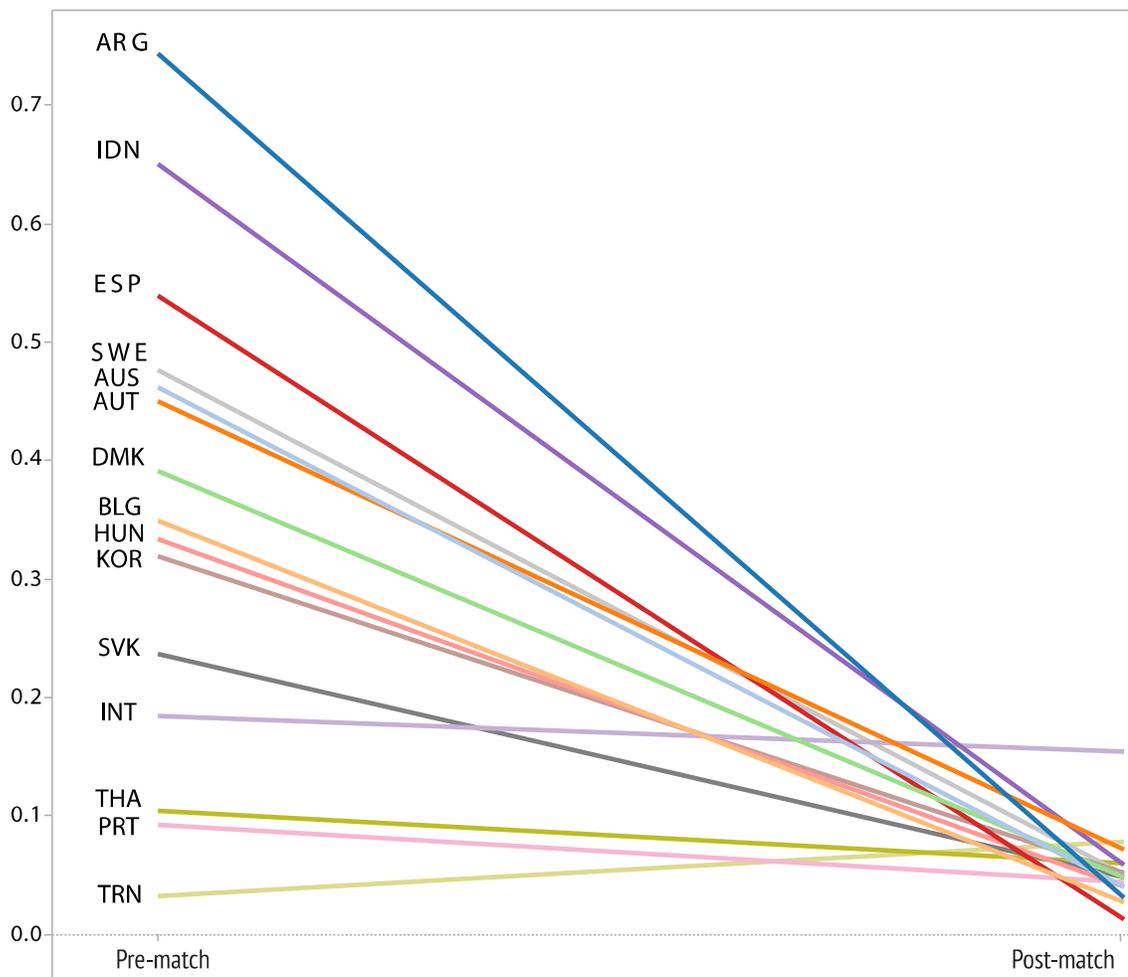


Figure 1: Pre-post changes in student SES standardized mean differences

Analytic Models

After applying the propensity score matching techniques, I use hierarchical linear modeling to address my research questions for the full international sample and the individual 17 selected countries. The first analytical model is a fully unconditional model, a one-way ANOVA with random effects, which separates the variability of student achievement into within- and between-school components (Raudenbush & Bryk, 2002). This model includes the student achievement score as the dependent variable and lacks any other predictors. This unconditional model provides information on how much of the total achievement variation is attributable to schools and how much is attributable to students within schools (Goh, 2006).

Next, I examine the achievement gap between students in public schools and publicly-funded private schools. This step utilizes a *means-as-outcomes* model (Raudenbush and Bryk, 2002), adding the dichotomous school sector variable at the school level. This provides information regarding the relationship between school sector and student achievement. A third model adds the school-level SES predictor to examine potential moderating effects of school socioeconomic composition on the relationship between school sector and student achievement. Finally, I add the school-level variables on competition, informed choice, accountability, and autonomy. Inclusion of these variables in the model helps determine the extent to which these school characteristics are associated with student achievement. Each of these models is run on math, reading, and science scores for pre- and post-matching samples. Models 1, 3, and 4 are additionally run once on the post-matching public students and once on the post-matching private

students, in order to determine how the sectors interact differently with these key predictors.

Limitations

The results obtained in this dissertation need to be interpreted carefully for a few reasons. As a secondary data analysis, this study is limited in terms of operationalizing certain variables. In most instances, PISA datasets include key variables that adequately represent the relationships of interest in the research questions. However, in a few instances, available variables must be used as proxy measures for key associations when exact variables are not present. For example, the predictor that addresses the use of achievement data to evaluate teachers and principals is included as a measure of school accountability. This may be considered a crude proxy for accountability.

Regarding the primary variable of interest in this study – school sector – PISA is also limited. The PISA data do not provide information sufficient to distinguish between different types of PPP models. It is not apparent from the data whether private dependent schools receive funding through vouchers, government subsidy, or fit under charter school or private operation models. As a result, the data only provide the opportunity to assess a generalized view of public-private partnership against the traditional school that is publicly-funded and publicly-managed. Future studies utilizing more detailed data about PPP policies could substantially improve the current knowledge of privatization strategies by distinguishing the most successful types of educational partnerships.

The ability of propensity score matching to produce causal inferences hinges upon its ability to equally balance observed (and unobserved) covariates between treatment and comparison groups (Rubin, 1997; Bai, 2011). While empirical studies often unconditionally claim causal relationships as the result of propensity score analyses,

many of these results are disconcerting for a number of reasons. The primary concern relates to one of the core assumptions of propensity score analysis. The ability for propensity score matching to produce equally balanced control and treatment groups depends upon what Rosenbaum and Rubin (1983) call a “strongly ignorable treatment assignment.” This requires that the matched units be equally balanced in terms of observable covariates and that no unobserved covariates predict treatment assignment. As explained by Luellen and Shadish (2005):

Propensity score analysis assumes that all variables related to both outcomes and treatment assignment are included in the vector of observed covariates—that is, that the researcher knows and measures the selection model perfectly...If the propensity score model is incorrect or the covariates are measured imperfectly, then hidden bias may exist that affects estimates of treatment effects. (p. 546)

The clear conclusion is that only those propensity score models which include all potential predictors of treatment assignment can be fully said to explain causal treatment effects. This is difficult to obtain in educational research, where a nearly infinite number of predictors have the potential to impact treatment assignment. Even if propensity score models include correct measurement of every influential observable covariate, “hidden bias” can still result from unobserved characteristics (Rubin, 1997).

It cannot be assumed that balance between observable covariates can be equated with balance between unobservable covariates that may impact assignment to the treatment group. This assumption is often ignored within propensity score analyses and findings erroneously declared to be causal treatment effects. In the event that this

assumption is not met, Rosenbaum and Rubin (1983) explain that investigators cannot claim causal treatment effects.

Additionally, propensity score models are only able to reduce bias in estimating treatment effects insofar as covariates that accurately predict the outcome are balanced across treatment and control groups. Scholars suggest that, in some instances, covariate balance in matched treatment groups is unable to be obtained, at which point, researchers must conclude propensity score techniques to be an inadequate method of determining treatment effects (Lee, 2006).

For some of these reasons, scholars such as Guo et al. (2006) refute the potential for PSA to explain causal relationships and accurate treatment effect estimates. However, it has been empirically shown that closely matched groups can significantly reduce the selection bias and thus produce more accurate estimates of treatment effects than other techniques of controlling for bias (Rosenbaum and Rubin, 1983; Cochran, 1968). Many researchers support the notion that if groups are carefully and closely matched, researchers can use propensity score analysis to estimate treatment effects (Bai, 2011, Caliendo & Kopeinig, 2008). Gu and Rosenbaum (1993) suggest propensity score analysis to be the matching technique most able to achieve the randomization-like outcome of balanced covariates. In particular, if propensity score models are constructed with careful consideration of existing empirical and theoretical knowledge, PSA can be an effective technique for estimating the impact of private education strategies.

In response to arguments against PISA data as bias-free scientific evidence, I acknowledge that PISA represents only one method of scientific inquiry, which should be regarded with a certain level of skepticism. Findings cannot be assumed to be certain,

factual, or unbiased, but should be used with caution and care to advance educational knowledge. It is suggested that researchers and policymakers “have less naïve trust in the ability of science to produce accurate, neutral, and detached ‘evidence,’” which necessarily represents a “pre-existing reality” (Gorur, 2011, p. 91). I recognize the limitations inherent to such approaches of measuring and assessing student cognitive abilities, and thus use the results of this study not as “matters of fact,” but as “matters of concern” to be discussed, placed in contexts of current educational research, and further investigated (Latour, 2004).

Summary of Chapter Three

This chapter has addressed the international PISA assessment, discussing the pros and cons of using PISA for secondary data analysis. I have discussed the samples in this study and outlined the methods used to answer the research questions. Methods of propensity score matching and hierarchical linear modeling allow me to estimate the treatment effect of private dependent schools in 17 countries while significantly reducing selection bias. The analytic models used for this study have also been outlined. The following chapter presents the findings from empirical analyses in discussion with each of the research questions on public-private partnerships.

CHAPTER FOUR: RESULTS

Having addressed the current state of public-private partnerships within the international education landscape and outlined the research methods used in this study, I now turn to a presentation of the analysis results. This chapter addresses the study's five research questions and discusses the findings related to each. The final chapter will discuss the implications of these findings in relation to current public-private partnership research.

Research question 1: to what extent do students in publicly-funded private schools perform differently than students in public schools on the 2009 cross national PISA exam?

This is the primary research question of this study. Having statistically constructed treatment and control groups that are balanced across the range of student-level covariates, I utilize a "means-as-outcomes" model (model 2), including the dichotomous school sector variable at the school level. I also assess the private sector effect using the pre-match data to determine the extent to which propensity score matching impacted the relationship between school sector and student achievement.

Achievement Differences Before Propensity Score Matching

Figure 2 shows the pre-match 95% confidence intervals for the private dependent coefficients. These provide the range of private sector effects in each country. For example, in Argentina, students in publicly-funded private schools perform between 52 and 109 points higher in science than students in public schools, before matching. This represents a difference of .5 to 1 standard deviations, quite a substantial difference. In 9 of 17 countries, students in private dependent schools score higher than public school students in all three subjects: Argentina, Australia, Austria, Belgium, Chile, Hungary,

Ireland, Spain, and Sweden. The size of these effects range from 22.4 in Spain (science) to 80.3 in Argentina (science) (Table 13). In the international sample, students in private dependent schools score 10.9 points higher than public school students in reading, with no difference in math or science. The 95% confidence interval [4.9, 6.0] for this international sample shows that the reading difference is extremely small but statistically significant ($p < .001$).

Table 13: Private dependent school effect coefficients (before propensity score matching)

Country	Math		Reading		Science		Mean
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient
Argentina	69.2 ^{***}	13.0	43.6 ^{**}	14.0	80.3 ^{***}	14.5	64.4
Australia	25.0 ^{***}	5.7	37.3 ^{***}	5.6	32.0 ^{***}	6.0	31.4
Austria	41.5 ^{**}	13.9	56.0 ^{***}	14.6	56.0 ^{***}	14.6	51.2
Belgium	24.9 [*]	11.1	30.5 ^{**}	10.9	25.7 [*]	11.7	27.0
Chile	40.5 ^{***}	9.9	52.0 ^{***}	10.2	41.4 ^{***}	8.3	44.6
Denmark	3.5	6.4	9.2	6.1	7.7	6.7	6.8
Hungary	40.6 [*]	17.4	56.2 ^{***}	17.3	48.8 ^{**}	16.5	48.5
Indonesia	-31.1 ^{***}	7.9	-33.7 ^{***}	7.9	-27.2 ^{***}	7.9	-30.7
Ireland	34.9 ^{***}	8.7	45.2 ^{***}	9.7	39.6 ^{***}	10.1	39.9
Korea	0.1	16.6	-0.5	13.3	-3.1	13.8	-1.2
Netherlands	5.3	12.0	-0.9	11.6	14.6	14.1	6.3
Portugal	16.2	10.6	18.7	10.5	14.6	9.7	16.5
Slovak Republic	7.1	14.5	12.4	13.1	11.4	15.3	10.3
Spain	22.7 ^{***}	3.1	30.0 ^{***}	3.0	22.4 ^{***}	3.1	25.0
Sweden	36.0 ^{***}	9.5	45.7 ^{***}	9.2	43.8 ^{***}	9.8	41.8
Thailand	-14.1	10.8	3.8	8.5	-9.7	8.3	-6.7
Trinidad & Tobago	-48.4 [*]	22.5	-75.1 ^{**}	25.2	-48.4 [*]	24.1	-57.3
International	-2.2	2.4	10.9 ^{***}	2.5	2.3	2.5	3.7
Mean	16.1		19.4		20.6		18.7

*** $p < .001$; ** $p < .01$; * $p < .05$

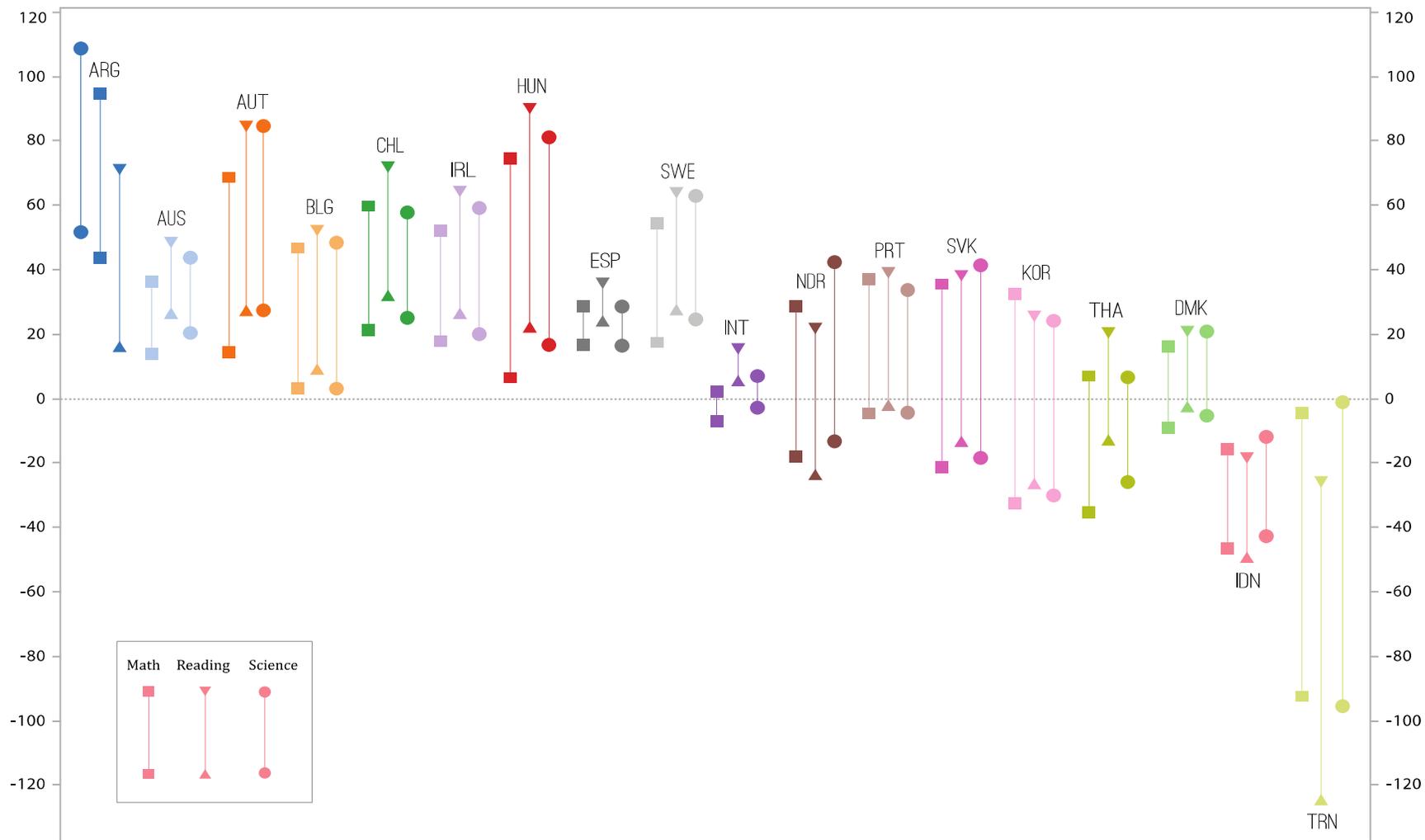


Figure 2: Pre-match sector effect 95% confidence intervals (in PISA points)

The private dependent effect is negatively significant in two countries, Indonesia and Trinidad & Tobago (Table 13). In these two countries, public school students score between 1 and 124 points higher than their private dependent counterparts in all subjects. The large variation in this confidence interval is the result of a large standard error and a p -value that is just under the .05 alpha level ($p = .04$) (Table 13).

Overall, across countries and subjects, there are 28 positive effects, 20 insignificant effects, and 6 negative effects. After averaging the private sector coefficients across countries and subjects, we find that the private dependent sector scores 18.7 points (.20 standard deviations) higher than the public sector. These results provide evidence that before matching, i.e., without controlling for any student background characteristics, there is a small private dependent advantage in student performance. When achievement differences exist between school sectors in a country they are likely to favor the private sector. This private dependent achievement advantage is present in just over half of all country-subject cases¹⁷ (28 of 54) before matching.

In a majority of the selected countries, students in publicly-funded private schools outperform students in public schools. However, in most instances, the size of these achievement differences is not considerable, the largest being about one standard deviation. The means of all positive significant effects, across country and subject, are 37.4 (math), 44.1 (reading), and 43.4 (science) PISA points. These represent differences of .41 (math), .48 (reading), and .46 (science) standard deviations. In nearly every country the sector effect has the largest impact on reading scores. As seen in Table 14,

¹⁷ Use of the word *case* in this context refers to public-private sector effect in a single country on a single PISA subject. Thus, across the 17 countries of interest and the international sample, there are 54 sector effect cases.

school sector accounts for more school-level variation in reading scores than in math or science.

Achievement Differences After Propensity Score Matching

Across countries, school sector accounts for as much as 20.9 percent of variation in achievement scores before matching (Chile, reading) (Table 14). This effect is considerably reduced after propensity score matching. The average percentage of variation accounted for by school sector across countries is reduced approximately 50% after propensity score matching. In Spain, school sector accounts for only one-tenth the amount of variation in reading scores after matching (from 14.2% to 1.3%). Similar trends are seen in many of the countries of interest (Table 14).

The number and magnitude of significant school sector effects is also decreased after propensity score matching. The number of positive effects decreases from 28 (9 countries) to 15 (7 countries) when comparing students with similar background characteristics. The mean of these positive significant coefficients decreased from 37.4 to 30.3 PISA points in math, from 44.1 to 29.8 PISA points in reading, and from 43.4 to 35.4 PISA points in science. These mean private sector achievement advantages represent differences of .33 (math and reading) and .38 (science) standard deviations.

Table 14: Percentage of school-level variation accounted for by school sector, pre- and post-match

Country	Math		Reading		Science		Mean	
	Pre-match	Post-match	Pre-match	Post-match	Pre-match	Post-match	Pre-match	Post-match
Argentina	15.9	5.5	20.6	8.3	17.1	5.6	17.9	6.5
Australia	7.5	1.6	14.7	4.4	10.5	3.2	10.9	3.1
Austria	3.5	0.2	5.8	0.1	5.8	0.1	5.0	0.1
Belgium	2.2	1.0	3.4	1.7	2.2	1.1	2.6	1.3
Chile	18.1	9.6	20.9	11.0	19.2	13.0	19.4	11.2
Denmark	0.5	2.4	2.4	0.6	1.5	1.0	1.5	1.3
Hungary	3.4	0.2	5.8	0.4	5.1	0.1	4.8	0.2
Indonesia	12.9	5.8	15.4	6.2	11.1	2.9	13.1	5.0
Ireland	15.4	13.0	19.4	16.2	15.0	15.1	16.6	14.8
Netherlands	0.1	0.2	0.1	0.8	0.7	0.2	0.3	0.4
Portugal	1.3	1.1	1.7	3.3	1.3	2.2	1.4	2.2
Slovak Republic	0.2	0.9	0.7	1.9	0.4	1.2	0.4	1.3
South Korea	0.1	0.2	0.1	0.2	0.01	0.7	0.1	0.4
Spain	8.2	0.2	14.2	1.3	8.4	0.3	10.3	0.6
Sweden	9.1	1.7	14.6	3.9	11.5	2.0	11.7	2.5
Thailand	0.9	5.2	0.2	1.1	0.8	5.6	0.6	4.0
Trinidad & Tobago	3.7	2.4	6.9	3.9	3.3	1.8	4.6	2.7
International	0.01	1.3	0.1	0.5	0.01	1.2	0.0	1.0
Mean	6.1	3.0	8.6	3.8	6.7	3.3	7.1	3.4

The most substantial private sector advantages are found in Argentina and Ireland. The 95% confidence intervals show students in publicly-funded private schools performing between 11 and 81 points higher than public students in Argentina, and between 11 and 91 points higher than public students in Ireland (Figure 3). After averaging each of the country coefficients, we see that the private dependent sector scores 1.1, 4.2, and 3.9 PISA points higher in math, reading, and science than their public sector counterparts (Table 15). The overall mean across countries and subjects is 3.1 PISA points in favor of public schools. As can be seen, the sector differences are very small. A difference of 3 points on the PISA exam is an inconsequential difference.

Table 15: Private dependent school effect coefficients (after propensity score matching)

Country	Math		Reading		Science		Mean
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient
Argentina	37.7**	13.1	52.4***	14.9	40.4**	14.5	43.5
Australia	13.3*	6.1	20.8***	5.9	18.3**	6.3	17.5
Austria	7.9	13.4	5.9	14.4	1.9	14.5	5.2
Belgium	16.4	10.9	21.4**	10.8	18.3	11.5	18.7
Chile	26.7**	9.3	27.5**	9.3	26.8**	8.7	27.0
Denmark	-11.3	6.8	-6.6	7.5	-9.4	8.2	-9.1
Hungary	-7.9	16.0	11.8	15.1	4.6	13.1	2.8
Indonesia	-18.2*	8.7	-19.9*	8.7	-12.4	8.5	-16.8
Ireland	43.6**	16.3	54.8**	17.7	56.1**	17.9	51.5
Korea	-4.5	15.2	-3.9	12.8	-10.1	13.8	-6.2
Netherlands	-4.9	11.6	-12.6	11.7	-3.6	13.1	-7.0
Portugal	7.0	9.6	16.3	10.4	10.1	9.7	11.1
Slovak Republic	-13.4	16.6	-17.4	14.8	-12.0	14.6	-14.3
Spain	2.6	3.2	8.7**	3.2	3.6	3.3	5.0
Sweden	13.5	10.6	22.9*	10.6	20.9	11.9	19.1
Thailand	-15.3	10.2	-4.5	7.8	-14.6	8.3	-11.5
Trinidad & Tobago	-37.0	24.2	-58.1*	29.0	-35.4	27.0	-43.5
International	-20.4***	2.4	-10.6***	2.4	-18.4***	2.4	-16.5
Mean	1.1		4.2		3.9		3.1

*** $p < .001$; ** $p < .01$; * $p < .05$

After propensity score matching, public school achievement advantages are found in Indonesia (math and reading), Trinidad & Tobago (reading), and the international sample (all subjects). The average of these negative effects are -19.3 (math), -29.5 (reading), and -18.4 (science) PISA points, representing differences of .21 (math), .33 (reading), and .20 (science) standard deviations. A 95% confidence interval shows public students outperforming private dependent students by 1 to 114 points in Trinidad and Tobago.

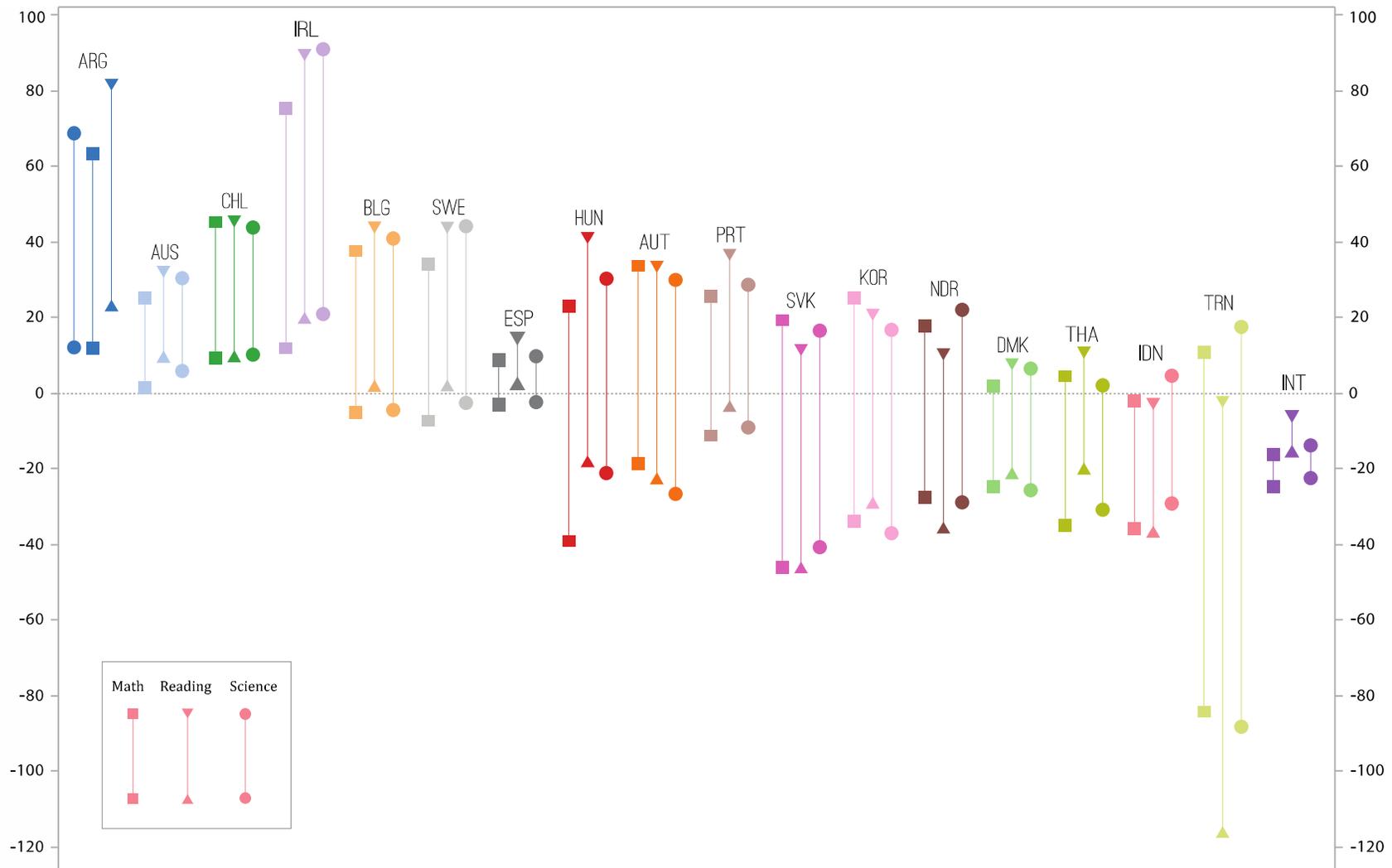


Figure 3: Post-match sector effect 95% confidence intervals (in PISA points)

Summing results across countries and subjects, there are 15 positive, 33 insignificant, and 6 negative private sector effects. These results suggest that after matching students on important background characteristics, in the majority of cases there are no differences between school sectors. When differences do exist, they are more likely to favor private school achievement. These differences, however, are not large in magnitude.

Achievement Differences after Matching and Controlling for School SES

The final step in examining student achievement differences between school sectors involves accounting for differences in school composition. The process of propensity score matching ensures that we are comparing students with similar characteristics. Controlling for school SES ensures that we are comparing similar students in schools with similar socioeconomic compositions.

As has been shown, the general trend across selected countries before controlling for any student-level covariates is an achievement advantage for the private dependent sector. When comparing only students across sectors with similar characteristics, i.e., after propensity score matching, the private sector effect is reduced. The majority of these post-match cases show no achievement differences between sectors (Table 16).

After controlling for school socioeconomic levels, the small private sector effect from the previous model is reversed: public sector students outperform private dependent students in 31% of cases (from 7 of 17 countries) and perform lower than private dependent students in 9% of cases (from 2 of 17 countries). In the majority of cases, however (59% from 8 of 17 countries), there is no difference in performance between

either set of students (Argentina, Belgium, Chile, Indonesia, Netherlands, South Korea, Slovak Republic, and Sweden).

Table 16: List of countries by school sector achievement differences

Categories	Pre-match	Post-match	Post-match (controlling for school SES)
Private dependent students outperform public students in all three subjects	Argentina Australia Austria Belgium Chile Ireland Hungary Spain Sweden	Argentina Australia Chile Ireland	Portugal
Private dependent students outperform public students in one or two subjects	International	Belgium Sweden Spain	Ireland
No difference between public and private dependent students in any subject	Denmark Netherlands Portugal Slovak Republic South Korea Thailand	Hungary Austria Portugal Slovak Republic South Korea Netherlands Denmark Thailand	Argentina Belgium Chile Indonesia Netherlands South Korea Slovak Republic Sweden
Public students outperform private dependent students in one or two subjects		Indonesia Trinidad & Tobago	Australia Hungary International Thailand Trinidad & Tobago
Public students outperform private dependent students in all three subjects	Indonesia Trinidad & Tobago	International	Austria Denmark Spain

The percentage of statistically significant positive private sector effects decreases from 51.8% to 27.8% to 9.3% from pre-match to post-match to post-match while controlling for school SES (Table 17). The percentage of negative private sector effects is

11.1% in both pre-matching and post-matching models. When controlling for school mean SES, 31.5% of all effects are negatively significant (Table 17).

Table 17: Summary of school sector achievement effects

Categories	Pre-match	Post-match	Post-match (controlling for school SES)
Private students outperform public students	28 effects (51.8%) 9 countries	15 effects (27.8%) 7 countries	5 effects (9.3%) 2 countries
No difference between public and private students	20 effects (37%)	33 effects (61.1%)	32 effects (59.2%)
Public students outperform private students	6 effects (11.1%) 2 countries	6 effects (11.1%) 2 countries	17 effects (31.5%) 7 countries

In a majority of countries, students with similar qualities experience no achievement advantage in any particular school sector. Where achievement differences do exist, there is a private sector advantage after propensity score matching. When only comparing similar students in schools with equal student socioeconomic compositions, public schools perform better than private dependent schools (Figure 4).

In 3 of 17 countries – Austria, Denmark, and Spain – public school students outperform their private dependent counterparts in all three subjects. In 2 of 17 countries – Australia and Thailand – public student outperform private dependent students in both reading and science. In 2 of 17 countries – Hungary and Trinidad and Tobago – public students perform better on one subject (math and reading, respectively). Where differences do exist between sectors, they are small in magnitude, ranging from -6.0 (.07 standard deviations) in Spain (reading) to -25.4 (.27 standard deviations) in Hungary (math) (Table 18).

Private dependent sector advantages are found in Ireland (reading and science) and Portugal (math, reading, and science). The size of these effects range from 40.9 (.41 standard deviations) in Ireland (science) to 28.9 (.34 standard deviations) in Portugal (reading).

Table 18: Private dependent school effect coefficients (after propensity score matching and controlling for school SES)

Country	Math		Reading		Science		Mean
	Coefficient	SE	Coefficient	SE	Coefficient	SE	Coefficient
Argentina	-5.1	11.4	5.4	13.7	-4.5	12.9	-1.4
Australia	-16.6**	5.4	-9.2	5.2	-14.6**	5.4	-13.5
Austria	-24.2**	9.0	-28.0**	9.6	-29.3**	9.5	-27.2
Belgium	-8.3	6.3	-3.2	6.3	-7.4	6.9	-6.3
Chile	6.2	8.8	9.3	8.7	13.5	8.7	9.7
Denmark	-25.0***	6.3	-21.2**	6.8	-23.9**	7.8	-23.4
Hungary	-25.4**	8.9	-10.8	7.6	-12.8	7.9	-16.3
Indonesia	-10.9	8.1	-14.6	8.6	-6.8	8.4	-10.8
Ireland	28.2	16.3	40.5*	17.7	40.9*	18.4	36.5
Korea	18.4	11.7	14.1	10.0	8.5	11.1	13.7
Netherlands	1.1	8.3	-5.6	8.8	2.3	9.0	-0.7
Portugal	19.2*	7.6	28.9***	8.6	20.7**	7.7	22.9
Slovak Republic	-10.4	11.1	-14.6	9.0	-9.5	9.0	-11.5
Spain	-11.7***	3.0	-6.0*	2.9	-11.3***	3.0	-9.7
Sweden	-7.9	8.8	-0.5	8.8	-3.6	9.7	-4.0
Thailand	-28.3**	10.4	-15.0	8.0	-25.1**	9.1	-22.8
Trinidad & Tobago	-22.0	14.8	-41.5*	20.0	-19.1	17.8	-27.5
International	-7.5***	1.6	1.0	1.9	-5.8***	1.6	-4.1
Mean	-7.4		-4.8		-4.9		-5.4

*** $p < .001$; ** $p < .01$; * $p < .05$

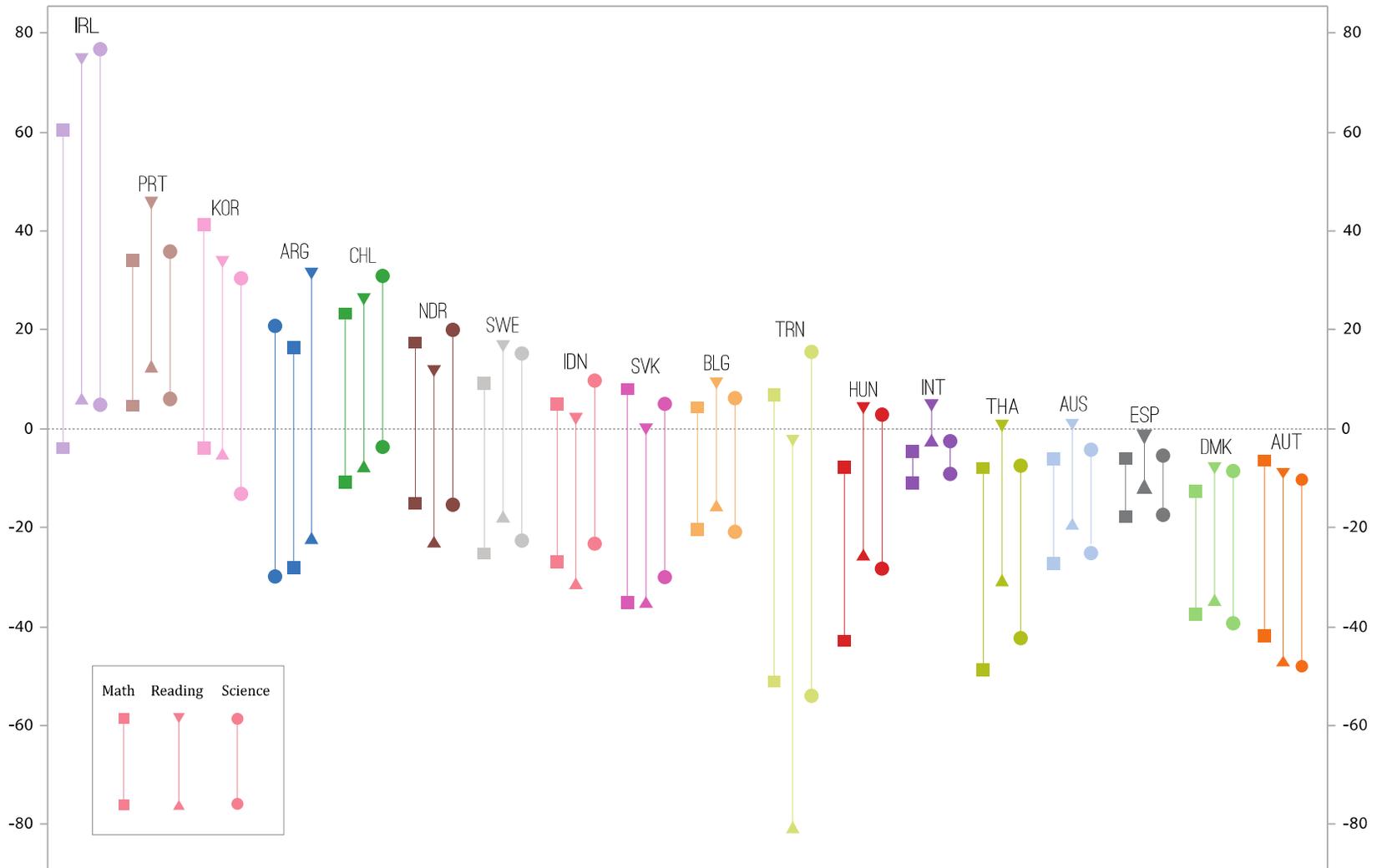


Figure 4: Post-match sector effect 95% confidence intervals (in PISA points), controlling for school mean SES

The mean sector coefficient is -5.4, suggesting that the average cross-country public sector advantage is 5.4 PISA points (.06 standard deviations). These findings have important implications for the international education landscape. It suggests that, student and school socioeconomic characteristics being equal, public schools slightly outperform publicly-financed private schools in a number of countries.

Research question 2: to what extent do publicly-funded private schools and public schools differ in terms of student socioeconomic makeup?

The first research question of this dissertation addresses the impact of public-private partnerships on student achievement. Questions 2 and 3 tackle the issue presented by progressives that education PPPs perpetuate social inequalities. For some of these scholars, the issue of non-state involvement in education is not a matter of school efficiency or performance at all but rather an issue of social justice. These questions evaluate some of the social impacts of PPPs.

Figure 5 shows that, in 12 of 17 countries, the private dependent sector has higher average levels of school mean SES. In the Netherlands, South Korea, Trinidad and Tobago, Portugal, and Indonesia, the public sector has higher school SES. In all but one of these countries (Indonesia) the sector SES differences are quite small. Seeing that the private dependent sector has higher average school SES levels provides some insight into the changes in school sector effects after controlling for student- and school-level wealth indicators. The private dependent achievement advantage found in Figure 2 and Figure 3 is largely attributed to differences in student and school wealth.

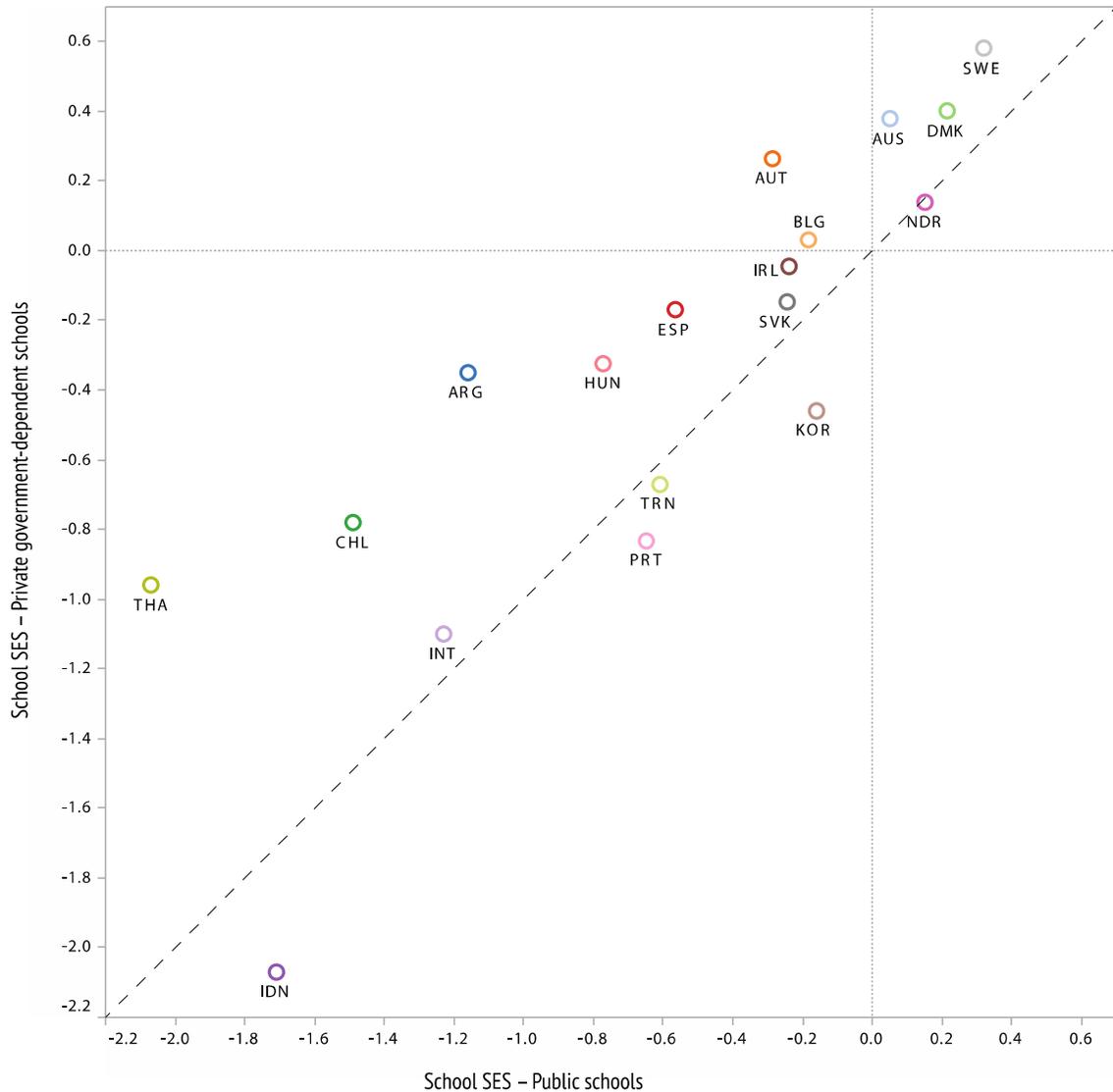


Figure 5: School mean SES, by sector

Research question 3: to what extent is socioeconomic status associated with academic achievement differences?

Intraclass Correlation Coefficients

As shown in Table 19 there is considerable variation in the size of intraclass correlation coefficients across countries, ranging from .186 in Spain (math) to .715 in the Netherlands (science) with a mean in each subject roughly .40. In addition to being the primary indicator for determining the necessity of multilevel modeling, the intraclass correlation coefficient also serves as a good indicator of the equity in a school system.

Being a measure of between-school variation, the intraclass correlation coefficient provides information on the variability of student achievement across a school system.

School systems with large achievement gaps will have large ICCs, as students in the highest performing schools will perform considerably better than those in the lowest performing schools. Systems with smaller ICCs have less variation in school performance and, thus, the achievement is more equalized between schools. The intraclass correlation coefficient therefore can be a valuable means of comparing the equity of the public and private dependent schools sectors.

OECD (2009) uses the intraclass correlation coefficient as a measure of academic segregation, which has substantial consequences for the equity of an education system. Higher ICCs represent academic grouping by academic performance or social background and a higher correlation between socioeconomic background and performance. I examine intraclass correlation coefficients in both sectors and discuss the potential equity implications of these findings.

Based on much of the current literature on education privatization, one might expect public school sectors to more equitably serve their student populations than private sectors. Along with such an assumption, public schools would be expected to have lower achievement gaps between the low and high performing students.

Table 19 and Figure 6 show that there is no apparent equity advantage for either school sector across countries. Figure 6 shows an even split in regards to intraclass correlation coefficients. In 9 of the 17 countries, intraclass correlation coefficients are larger in the private dependent sector (Argentina, Belgium, Chile, Denmark, Slovak Republic, South Korea, Spain, Sweden, and Trinidad and Tobago). In 8 of the 17

countries, intraclass correlation coefficients are larger in the public sector (Australia, Austria, Hungary, Indonesia, Ireland, Netherlands, Portugal, Thailand).

Table 19: Intraclass correlation coefficients, by sector

Country	Math		Reading		Science		Public Mean	Public-Private Mean
	Public	Public-Private	Public	Public-Private	Public	Public-Private		
Argentina	0.494	0.554	0.481	0.551	0.505	0.544	0.493	0.550
Australia	0.248	0.117	0.220	0.121	0.246	0.079	0.238	0.106
Austria	0.532	0.500	0.564	0.554	0.569	0.507	0.555	0.520
Belgium	0.405	0.658	0.454	0.636	0.462	0.663	0.440	0.652
Chile	0.287	0.427	0.326	0.455	0.271	0.349	0.295	0.410
Denmark	0.166	0.173	0.149	0.192	0.147	0.222	0.154	0.196
Hungary	0.634	0.535	0.679	0.453	0.641	0.407	0.651	0.465
Indonesia	0.456	0.289	0.449	0.323	0.439	0.250	0.448	0.287
Ireland	0.246	0.169	0.277	0.156	0.283	0.152	0.269	0.159
Netherlands	0.722	0.629	0.669	0.640	0.778	0.651	0.723	0.640
Portugal	0.278	0.164	0.298	0.180	0.252	0.139	0.276	0.161
Slovak Republic	0.408	0.484	0.390	0.516	0.453	0.396	0.417	0.465
South Korea	0.361	0.396	0.284	0.384	0.274	0.328	0.306	0.369
Spain	0.162	0.196	0.164	0.200	0.175	0.184	0.167	0.193
Sweden	0.206	0.176	0.162	0.167	0.168	0.277	0.179	0.207
Thailand	0.405	0.256	0.280	0.205	0.225	0.232	0.303	0.231
Trinidad & Tobago	0.644	0.742	0.576	0.792	0.597	0.745	0.606	0.760
International	0.615	0.683	0.577	0.626	0.588	0.647	0.593	0.652
Mean	0.391	0.380	0.378	0.384	0.382	0.360	0.384	0.375

Mean intraclass correlation coefficients range from .154 (Denmark) to .723 (Netherlands) in the public sector and from .106 (Australia) to .760 (Trinidad and Tobago) in the private dependent sector. These results demonstrate that the real ICC differences exist not between sectors but between countries.

In Belgium, 44% of the achievement variation in the public sector is between schools. In the private dependent sector, 65% of achievement variation is between schools. In Hungary's public sector, 65% of achievement variation is between schools,

while between-school differences account for 46% of achievement variation in the private dependent sector. In Australia, there is more than twice the amount of between-school variation in the public sector (23.8%) than in the private dependent sector (10.6%).

Table 19 shows that the country intraclass correlation coefficient means are nearly identical between public and private dependent sectors for all subjects. This even distribution of intraclass correlation coefficients across sectors provides evidence against claims of private sector inequity.

School mean SES

The other measure used to assess equity in this study is the school mean SES variable. Table 20 and Figure 7 show that the impact of school SES on student achievement is spread quite equally across school sectors. School mean SES accounts for a very similar percentage of school-level achievement variation in public as in private schools.

In Denmark, school SES accounts for twice as much school-level math variation in private dependent schools (52.5%) as in public schools (26.2%). In the Netherlands, school SES accounts for more than three times the percentage of school-level science variation in public schools (84.3%) than in private schools (28.2%). It is not safe to assume that public schools provide more equalizing educational opportunities across the globe. Across countries, the average percentage of variation accounted for by school SES is nearly identical between sectors (Table 20). These results hold across all subjects.

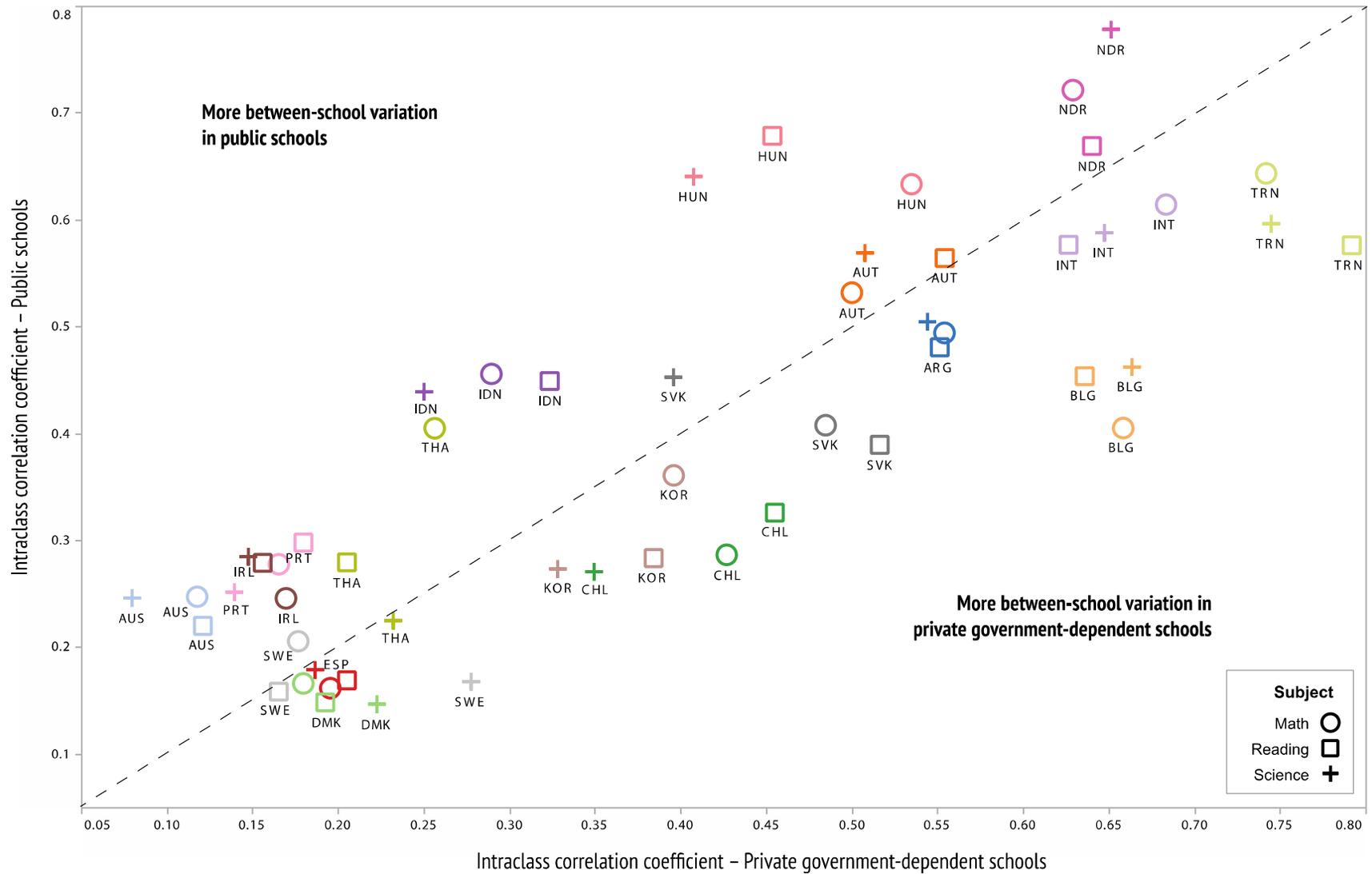


Figure 6: Intraclass correlation coefficients by sector

Table 20: Percentage of school-level variation accounted for by school mean SES

Country	Math		Reading		Science		Public Mean	Public-Private Mean
	Public	Public-Private	Public	Public-Private	Public	Public-Private		
Argentina	32.6	52.1	30.6	46.7	31.3	50.0	31.5	49.6
Australia	44.8	40.9	45.1	42.6	51.3	47.8	47.1	43.8
Austria	82.4	60.4	80.3	47.2	81.9	61.0	81.5	56.2
Belgium	66.9	72.7	73.1	75.0	62.9	73.4	67.6	73.7
Chile	39.2	49.3	30.1	42.8	12.0	34.2	27.1	42.1
Denmark	26.2	52.5	33.7	56.1	18.1	47.1	26.0	51.9
Hungary	78.8	84.9	82.2	78.1	82.1	68.5	81.0	77.2
Indonesia	18.4	16.8	16.6	3.2	16.2	8.9	17.1	9.6
Ireland	15.5	18.2	18.7	5.1	14.1	11.5	16.1	11.6
Netherlands	77.9	33.8	75.7	27.4	84.3	28.2	79.3	29.8
Portugal	64.2	59.2	55.1	44.1	55.1	69.1	58.1	57.5
Slovak Republic	43.9	80.6	57.5	80.6	61.2	79.7	54.2	80.3
South Korea	45.2	69.3	44.2	65.3	36.1	74.2	41.8	69.6
Spain	30.3	30.2	33.4	32.8	31.4	36.1	31.7	33.0
Sweden	61.9	55.9	65.6	54.1	74.1	27.6	67.2	45.9
Thailand	4.1	26.6	39.6	1.8	21.9	4.9	21.9	11.1
Trinidad & Tobago	70.2	54.7	59.8	51.9	67.0	47.4	65.7	51.3
International	58.0	68.3	53.0	60.5	57.3	65.9	56.1	64.9
Mean	47.2	50.5	49.4	44.4	47.1	45.3	47.9	46.7

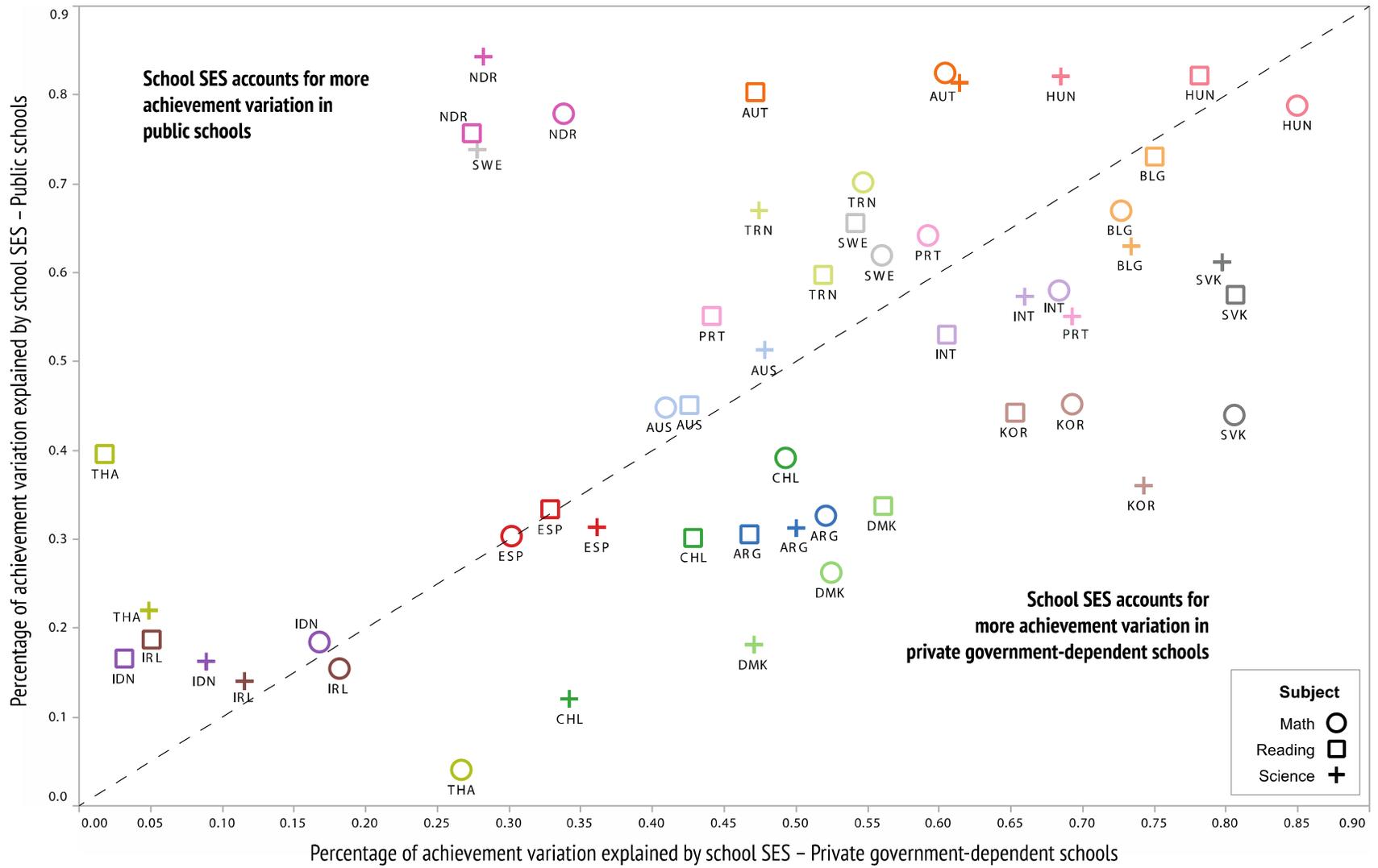


Figure 7: Percentage of school-level variation explained by school mean SES, by sector

Table 21: School mean SES coefficients (after propensity score matching)

Country	Math		Reading		Science		Mean	
	Public	Private Dependent	Public	Private Dependent	Public	Private Dependent	Public	Private Dependent
Argentina	70.6 ^{***}	81.3 ^{***}	82.5 ^{***}	82.0 ^{***}	77.8 ^{***}	82.2 ^{***}	77.0	81.8
Australia	111.1 ^{***}	83.7 ^{***}	110.5 ^{***}	90.9 ^{***}	129.0 ^{***}	80.3 ^{***}	116.9	85.0
Austria	136.8 ^{***}	128.8 ^{***}	144.5 ^{***}	130.1 ^{***}	137.7 ^{***}	138.8 ^{***}	139.7	132.6
Belgium	122.7 ^{***}	126.5 ^{***}	133.8 ^{***}	121.1 ^{***}	135.0 ^{***}	128.8 ^{***}	130.5	125.5
Chile	35.1 ^{***}	46.8 ^{***}	38.9 ^{**}	37.4 ^{***}	19.8	32.1 ^{***}	31.3	38.8
Denmark	45.3 ^{***}	72.3 ^{***}	49.3 ^{***}	78.2 ^{***}	43.4 ^{***}	87.0 ^{***}	46.0	79.2
Hungary	117.7 ^{***}	96.7 ^{***}	120.1 ^{***}	74.7 ^{***}	100.9 ^{***}	65.6 ^{***}	112.9	79.0
Indonesia	39.0 ^{**}	24.7 [*]	35.0 ^{**}	11.7	34.5 ^{**}	16.2	36.2	17.5
Ireland	86.5 [*]	66.3	104.2 [*]	35.2	97.5 [*]	51.8	96.1	51.1
Korea	77.5 ^{***}	121.7 ^{***}	60.7 ^{***}	104.6 ^{***}	59.5 ^{***}	106.6 ^{***}	65.9	111.0
Portugal	53.6 ^{***}	54.1 ^{**}	63.6 ^{***}	44.5 [*]	51.3 ^{***}	49.4 ^{**}	56.2	49.3
Slovak Republic	107.0 ^{***}	131.7 ^{***}	111.2 ^{***}	124.6 ^{***}	111.2 ^{***}	111.5 ^{***}	109.8	122.6
Spain	44.2 ^{***}	38.3 ^{***}	46.0 ^{***}	37.9 ^{**}	47.5 ^{***}	38.5 ^{**}	45.9	38.2
Sweden	98.0 ^{***}	48.0 ^{**}	104.9 ^{***}	45.4 ^{**}	110.3 ^{***}	31.2	104.4	41.5
Thailand	11.2	17.6	27.0 ^{***}	2.2	21.4 [*]	6.2	19.9	8.7
Trinidad & Tobago	151.3 ^{***}	182.0 ^{**}	159.9 ^{***}	246.6 ^{**}	162.2 ^{***}	192.3 ^{**}	157.8	207.0
International	67.3 ^{***}	65.7 ^{***}	60.7 ^{***}	54.2 ^{***}	65.9 ^{***}	61.4 ^{***}	64.6	60.4
Mean	81.7	82.5	87.0	79.2	83.7	76.2	84.1	79.3

*** $p < .001$; ** $p < .01$; * $p < .05$

Assessing the size of the coefficients for school mean SES across countries and subjects, we find that the private dependent sector depends slightly less on mean school SES for achievement than public schools (79.3 versus 84.1 PISA points) (Table 21). Private dependent schools have a larger average school SES effect than public schools in math and smaller school SES effects in reading and science. Private dependent schools have 9 non-significant school SES effects (in four countries: Indonesia, Ireland, Sweden, and Thailand). Public schools have only 2 non-significant SES effects (in two countries: Thailand and Chile) (Table 21).

Achievement of the poorest quintile

The third method for assessing the equity implications of public-private partnerships is to evaluate the private sector impact on underprivileged student populations. For these purposes, propensity score matches were divided into quintiles based on the propensity score. The lowest quintile group includes the students with the smallest propensity logit scores, i.e., the one-fifth of public and private students least likely to attend private dependent schools, based on the logistic regression results equation. This group likewise captures the lowest SES students for each country.¹⁸ I run the analytical models on this quintile of students to investigate any potentially differentiated public-private effects on the lowest-income students.

The results for the low-income students are very similar to those of the larger samples of students. In the large majority of cases, this group of socioeconomically underprivileged students performs equally well in public and private dependent schools.

¹⁸ The propensity score quintiles are only created for those countries that utilize the nearest-neighbor matching algorithm. Thus, the three countries that required exact matching approaches (Chile, Ireland, and the Netherlands) are not included in the quintile analyses.

Before controlling for school mean SES, there are 7 positive private sector effects, 1 negative private sector effect, and 34 insignificant effects (Table 22). In Argentina, the lowest-quintile students perform better in private dependent than in public schools in all three subjects with an average coefficient of 41.4 PISA points (the confidence intervals range from 3.0 to 83.9 points) (Figure 8). Students in the lowest quintile in Australia perform better in private dependent schools in reading and science with an average coefficient of 21.1 (the confidence intervals range from 4.4 to 41.8). Portugal’s private dependent students outperform its public students in math by 31.1 points (confidence interval of [1.4, 60.8]) and in reading by 36.4 points (confidence interval of [2.7, 70.1]). In Sweden, students in public schools score higher in science than students in private dependent schools by 60.3 points with a confidence interval of [-104.0, -16.7].

Table 22: Summary of school sector achievement effects, lowest propensity score quintile

Categories	Before controlling for school SES	After controlling for school SES
Private students outperform public students	7 effects (16.7%) 3 countries	1 effect (2.4%) 1 country
No difference between public and private students	34 effects (80.9%)	35 effects (83.3%)
Public students outperform private students	1 effects (2.4%) 1 country	6 effects (14.3%) 4 countries

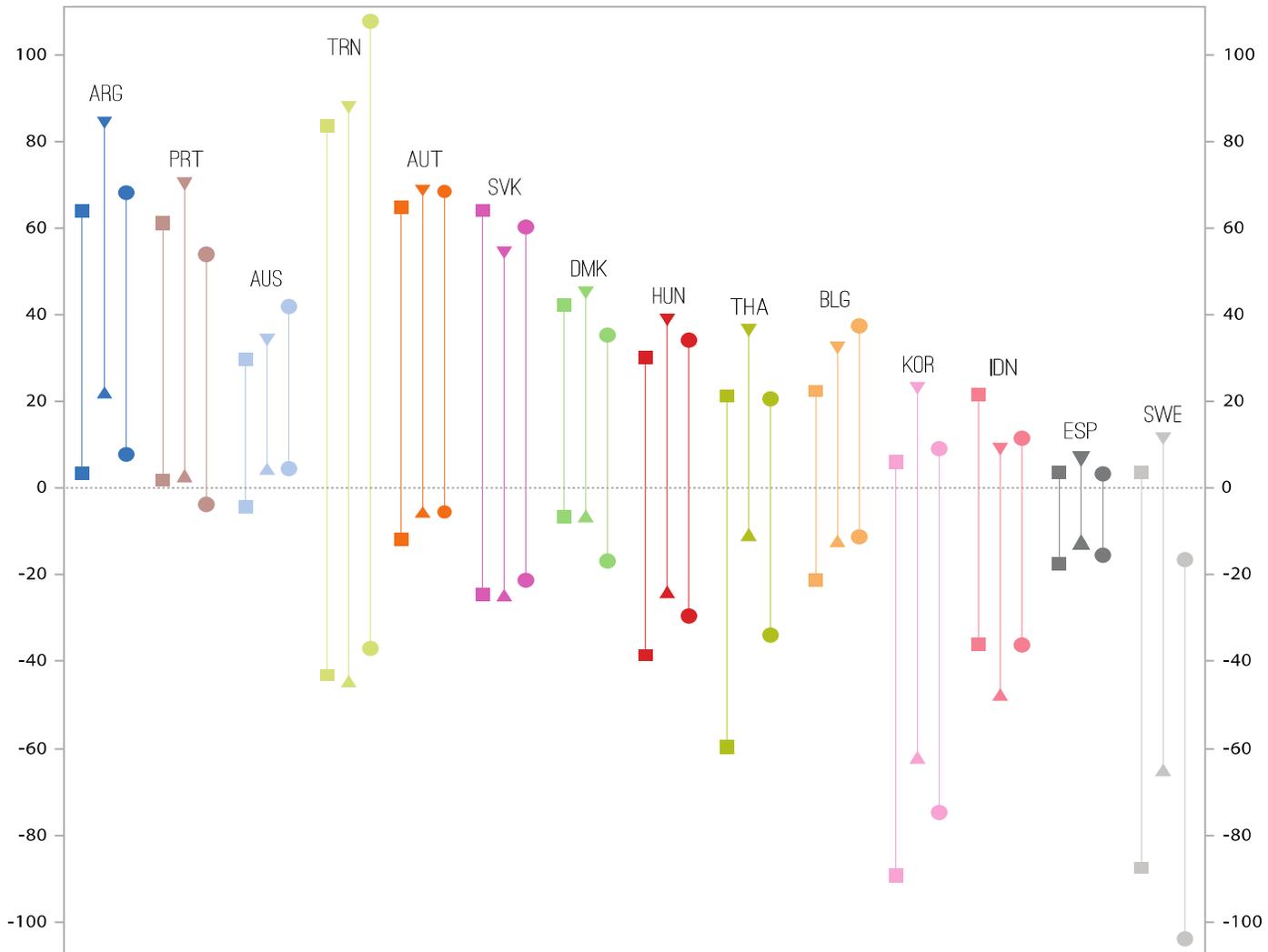


Figure 8: Post-match sector effect 95% confidence intervals, low student SES quintile (in PISA points)

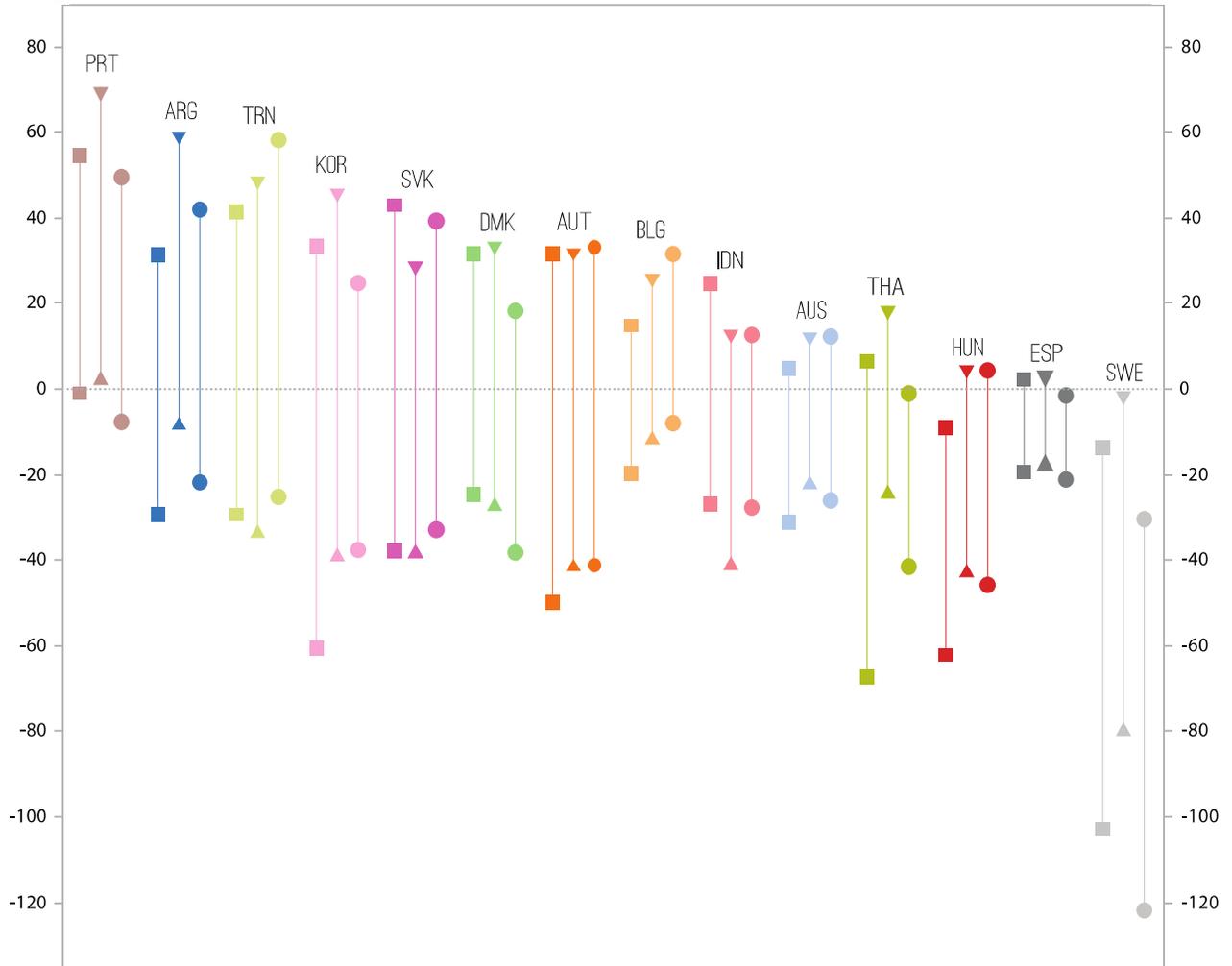


Figure 9: Post-match sector effect 95% confidence intervals, low student SES quintile, controlling for school SES (in PISA points)

After controlling for school mean SES, a substantial majority of cases (36 effects, 85.7%) still show no difference in public and private dependent achievement for the lowest-income students (Figure 9). There is one (2.4%) positive private sector effect and five (11.9%) negative private sector effects (Table 22). In Sweden, the lowest income students in public schools perform better than private dependent students in all subjects by an average of 59.3 PISA points (the confidence intervals range from -3.6 to 122.3 points). Low-income public school students in Hungary (math), Thailand (science), and Spain (reading) outperform their private dependent counterparts by 35.5, 22.1, and 11.4

points, respectively. In Portugal, low-income students in the private dependent sector score higher than the public sector in reading by 32.7 points (the confidence interval ranges from 1.1 to 64.3). In nine of fourteen countries there are no achievement differences between low-income students in public and private dependent schools in any subject.

Overall, the public and private dependent sectors in the countries of interest are closely split by various measures of equality. Measures of systemic equity – ICC and school SES – show an even distribution across public and private sectors. In a handful of cases the lowest-income students perform better in public schools (after controlling for student background characteristics and school SES). But, by and large, this lowest quintile group performs equally well across sectors.

Equitable Access to Private Education

Although the previous three measures of equity, measuring the impact of PPP approaches on equitable student performance, found no systemic advantage in either sector, there is still source for concern regarding the stratification effects of public-private partnerships. From the PISA data, I find evidence of a significant gap in international access to private school services. Table 23 shows the relationships between student SES and enrollment in a private dependent school as well as school fees and private enrollment. Point biserial correlations show that enrollment in a private dependent school is associated with higher student socioeconomic status in 13 of the 17 countries (Argentina, Australia, Austria, Belgium, Chile, Denmark, Hungary, Ireland, Slovak Republic, Spain, Sweden, Thailand, and Trinidad and Tobago). The magnitudes of these correlations range from .025 in Thailand to .311 in Argentina, with a cross-country mean

correlation of .088. In Indonesia, the Netherlands, South Korea, and Portugal, the correlation between school sector and student SES favors the public sector, ranging from -.088 in Hungary to -.283 in South Korea, with a cross country mean correlation of .181. All 17 of these relationships are significant at an alpha level of $p < .001$.

Table 23: Correlation between student SES and school sector; correlation between school fees and school sector; public and private school fee means and differences

	Correlation between student SES and school sector	Percentage of school budget coming from student fees				Cohen's <i>d</i>
		Correlation between school fees and school sector	Public mean	Private dependent mean	Mean difference	
Argentina	.311***	.147***	.187	.267	-.080	-0.38
Australia	.167***	.403***	.132	.253	-.121	-1.06
Austria†	.130***					
Belgium	.159***	.168***	.069	.120	-.051	-0.38
Chile	.228***	-.249***	.300	.191	.109	0.48
Denmark	.123***	.835***	.006	.248	-.242	-2.90
Hungary	.109***	-.088***	.001	.000	.001	0.39
Indonesia	-.200***	-.128***	.163	.085	.077	0.37
Ireland	.124***	.293***	.011	.049	-.038	-0.67
Korea	-.109***	-.283***	.484	.314	.170	0.83
Netherlands	-.053***	.028***	.023	.025	-.002	-0.06
Portugal	-.018***	.296***	.050	.191	-.141	-0.84
Slovak Republic	.063***	.549***	.000	.070	-.070	-0.98
Spain	.234***	.391***	.043	.165	-.122	-0.92
Sweden	.159***	.132***	.000	.003	-.003	-0.20
Thailand	.025***	.283***	.073	.187	-.114	-0.81
Trinidad & Tobago	.041***	.116***	.026	.065	-.039	-0.44
International	.031***	.060***	.101	.150	-.048	-0.26
Mean	.088	.181	.092	.131	-.039	

Cohen's *d*: .20 = small, .50 = moderate, .80+ = large;

Correlation (*r*): .10 = small, .30 = moderate, .50+ = large;

*** $p < .001$; †No data on school fees was available for Austria

Likewise, I find that in 12 of 16 countries (Argentina, Australia, Belgium, Denmark, Ireland, Netherlands, Portugal, Slovak Republic, Spain, Sweden, Thailand, and Trinidad and Tobago; Austria does not have any data on school fees), school fee levels¹⁹ are positively associated with private dependent schools. These correlations range from .028 in the Netherlands to .835 in Denmark, with a cross-country mean correlation of .181. In Chile, Hungary, Indonesia, and South Korea, higher school fees are positively associated with public schools. Most of the between-sector differences regarding school fees range in size from moderate to large, as measured by Cohen's *d* (Table 23).

Research question 4: to what extent do publicly-funded private schools and public schools differ in their levels of school competition, informed choice, autonomy, and accountability?

School competition

Across the 17 countries of this study, levels of school competition are higher in the private dependent sector. A relatively equal percentage of public and public-private schools compete for students with one other school (Table 24), but private dependent schools compete with two or more schools at a higher rate than public schools (62.3% versus 73.7%). These differences are even larger across the 43 countries of the international sample (58.4% versus 77.8%). The distribution of countries is shown in Figure 10.²⁰ Four countries (Indonesia, Hungary, Austria, and South Korea) have larger proportions of two-or-more-school competition in the public sector. Ten countries (Argentina, Australia, Chile, Denmark, Ireland, Netherlands, Slovak Republic, Spain,

¹⁹ The school fee variable represents the level of school fees as a proportion of the total school budget. Thus, in Argentina, an average of 18.7% (26.7%) of school funding comes from students in public (private dependent) schools.

²⁰ The descriptives for individual countries, including t-tests of mean differences, on the school-level variables can be found in Appendix.

Sweden, and Thailand) have larger proportions of two-or-more-school competition in the private dependent sector.

School autonomy

Private dependent schools experience higher levels of autonomy over resources, hiring, assessment, and curriculum across the 17 selected countries and the international sample (Table 25). These represent the largest public-private differences on any of the school-level predictors in this study. The distributions of the autonomy variables (by sector) are shown in Figure 11. In 16 of the 17 countries, schools in the private dependent sector have greater autonomy over resources and hiring practices than schools in the public sector (the Netherlands has equal school resource autonomy in the two sectors).

Table 24: Proportion of schools competing for students with one and two or more schools, by school type (weighted)

	Competes with one school			Competes with two or more schools		
	Public schools	Private dependent schools	Mean difference	Public schools	Private dependent schools	Mean difference
Argentina	0.064	0.133	-0.069 ^{***}	0.606	0.867	-0.261 ^{***}
Australia	0.103	0.002	0.101 ^{***}	0.804	0.980	-0.176 ^{***}
Austria	0.159	0.278	-0.119 ^{***}	0.483	0.421	0.062 [*]
Belgium	0.127	0.129	-0.002	0.803	0.788	0.015
Chile	0.232	0.108	0.124 ^{***}	0.466	0.734	-0.268 ^{***}
Denmark	0.116	0.000	0.116 ^{***}	0.588	0.879	-0.291 ^{***}
Hungary	0.182	0.295	-0.113 ^{***}	0.563	0.492	0.071 ^{**}
Indonesia	0.093	0.154	-0.061 ^{***}	0.848	0.783	0.065 ^{***}
Ireland	0.074	0.135	-0.061 [*]	0.642	0.764	-0.122 ^{**}
Korea	0.050	0.282	-0.232 ^{***}	0.647	0.413	0.234 ^{***}
Netherlands	0.308	0.187	0.121 ^{***}	0.619	0.796	-0.177 ^{***}
Portugal	0.196	0.260	-0.064	0.513	0.569	-0.056
Slovak Republic	0.158	0.112	0.046 [*]	0.682	0.888	-0.206 ^{***}
Spain	0.189	0.126	0.063 ^{***}	0.537	0.855	-0.318 ^{***}
Sweden	0.177	0.090	0.087 ^{***}	0.521	0.859	-0.338 ^{***}
Thailand	0.209	0.106	0.103 ^{***}	0.552	0.894	-0.342 ^{***}
Trinidad & Tobago	0.156	0.108	0.048	0.719	0.551	0.168
International sample	0.129	0.142	-0.013 ^{***}	0.584	0.778	-0.194 ^{***}
Mean	0.153	0.147	0.005	0.623	0.737	-0.114

*** $p < .001$; ** $p < .01$; * $p < .05$; **Bold** = not statistically significant

In 12 countries (Argentina, Australia, Belgium, Chile, Denmark, Hungary, Ireland, Korea, Portugal, Spain, Sweden, Trinidad & Tobago), schools in the private dependent sector have greater autonomy over curriculum and assessment, while the public sector demonstrates greater curriculum and assessment autonomy in Austria, Indonesia, Slovak Republic, and Thailand. The autonomy advantage for the private dependent sector across all 43 countries is quite substantial (.41 and .77 standard

deviation differences for autonomy over curriculum/assessment and resources/hiring, respectively).

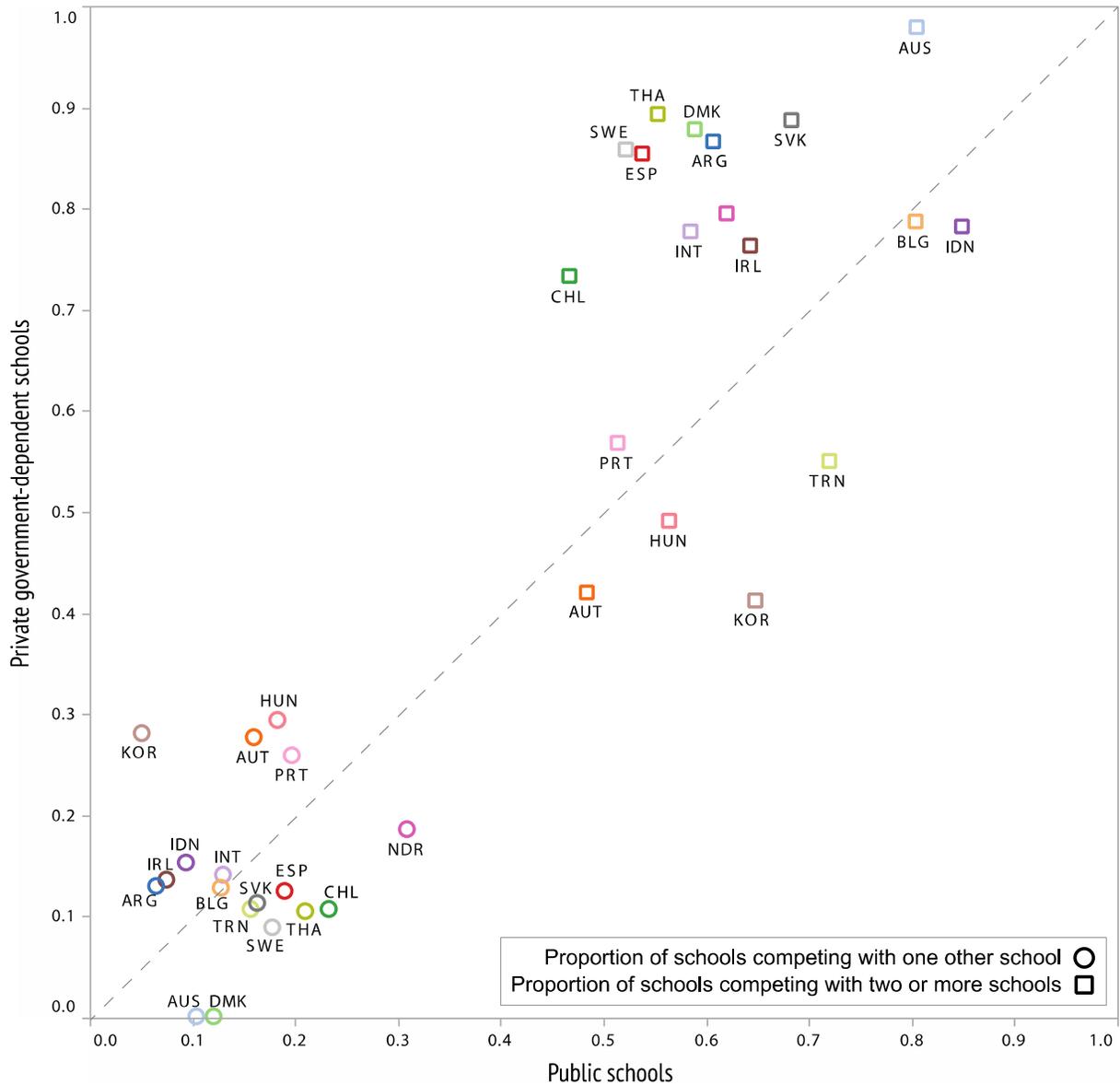


Figure 10: Levels of school competition by sector (proportions, weighted)

Accountability: parental pressure

Publicly-funded private schools experience higher levels of parental pressure for high academic standards across both the international 43 and selected 17 country samples, although in most instances these differences are small (Table 26, Figure 12).

Four countries (Belgium, Netherlands, Portugal, and Slovak Republic) have larger proportions of high parental pressure in public schools. Seven countries (Austria, Denmark, Hungary, Ireland, South Korea, Spain, Sweden, and Thailand) have larger proportions of high parental pressure in private dependent schools. The proportion of schools receiving moderate pressure from parents is split quite evenly between public and private dependent sectors (Figure 12).

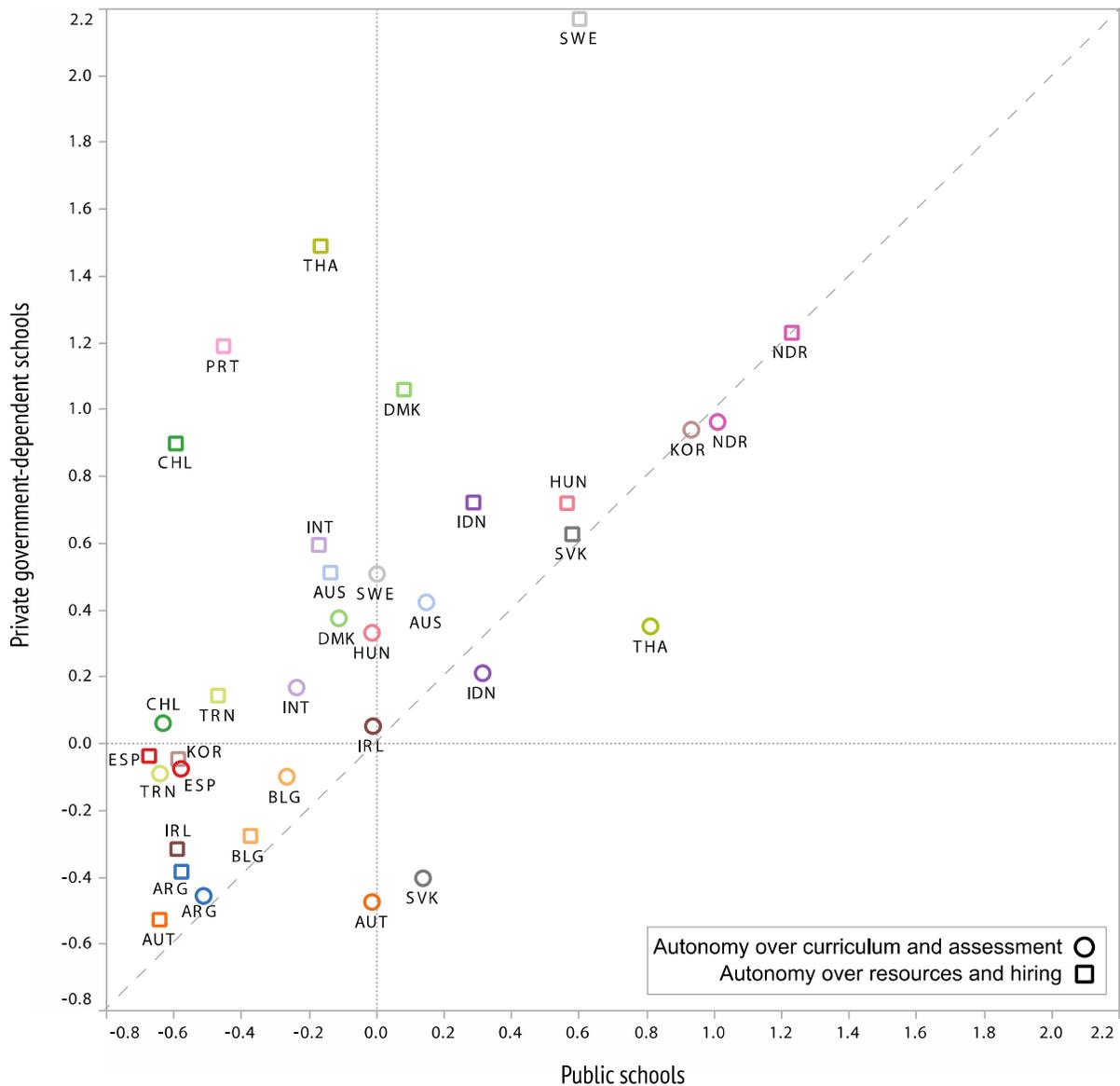


Figure 11: School autonomy over resources, hiring, curriculum, and assessment, by sector

Table 25: Autonomy over school resources, hiring, assessment, and curriculum (weighted)

	Autonomy over curriculum and assessment			Autonomy over resources and hiring		
	Public schools	Private dependent schools	Mean difference	Public schools	Private dependent schools	Mean difference
Argentina	-0.513	-0.456	-0.057**	-0.578	-0.384	-0.194***
Australia	0.147	0.423	-0.276***	-0.137	0.512	-0.649***
Austria	-0.014	-0.474	0.46***	-0.643	-0.527	-0.116***
Belgium	-0.266	-0.099	-0.167***	-0.374	-0.276	-0.098***
Chile	-0.633	0.061	-0.694***	-0.595	0.899	-1.494***
Denmark	-0.112	0.375	-0.487***	0.081	1.06	-0.979***
Hungary	-0.014	0.332	-0.346***	0.564	0.72	-0.156**
Indonesia	0.314	0.211	0.103***	0.287	0.722	-0.435***
Ireland	-0.011	0.052	-0.063	-0.591	-0.316	-0.275***
Korea	0.932	0.94	-0.008	-0.588	-0.046	-0.542***
Netherlands	1.01	0.963	0.047	1.23	1.23	0.00
Portugal	-0.939	-0.427	-0.512***	-0.454	1.19	-1.644***
Slovak Republic	0.137	-0.403	0.54***	0.579	0.627	-0.048
Spain	-0.58	-0.069	-0.511***	-0.674	-0.037	-0.637***
Sweden	0.001	0.508	-0.507***	0.601	2.17	-1.569***
Thailand	0.811	0.351	0.46***	-0.166	1.49	-1.656***
Trinidad & Tobago	-0.642	-0.09	-0.552*	-0.47	0.144	-0.614*
International	-0.237	0.168	-0.405***	-0.171	0.595	-0.766***
Mean	-0.022	0.129	-0.151	-0.113	0.540	-0.653

*** $p < .001$; ** $p < .01$; * $p < .05$; **Bold = not statistically significant**

Informed choice: admissions determinants

Some of the most significant between-sector differences in the school-level variables are found in the varied admissions policies of public and private dependent schools. Similar to the international results discussed in the previous chapter, the individual country analyses demonstrate that private dependent schools are far more likely to use previous student performance as a determinant of school admissions. The private dependent sector is more likely to always consider student performance for admissions in nine countries (Argentina, Australia, Austria, Chile, Hungary, Korea,

Slovak Republic, Sweden, and Thailand). Only in four countries was performance always used as an admissions determinant at a higher rate in public schools (Denmark, Indonesia, Ireland, Netherlands) (Table 27). Likewise, the proportion of schools that sometimes consider student achievement for admissions is greater in the private dependent sector in ten countries (Argentina, Australia, Austria, Chile, Denmark, Hungary, Indonesia, Netherlands, Portugal, and Slovak Republic). Only in two countries was the public sector more likely to sometimes consider student achievement for admissions (Spain and Thailand).

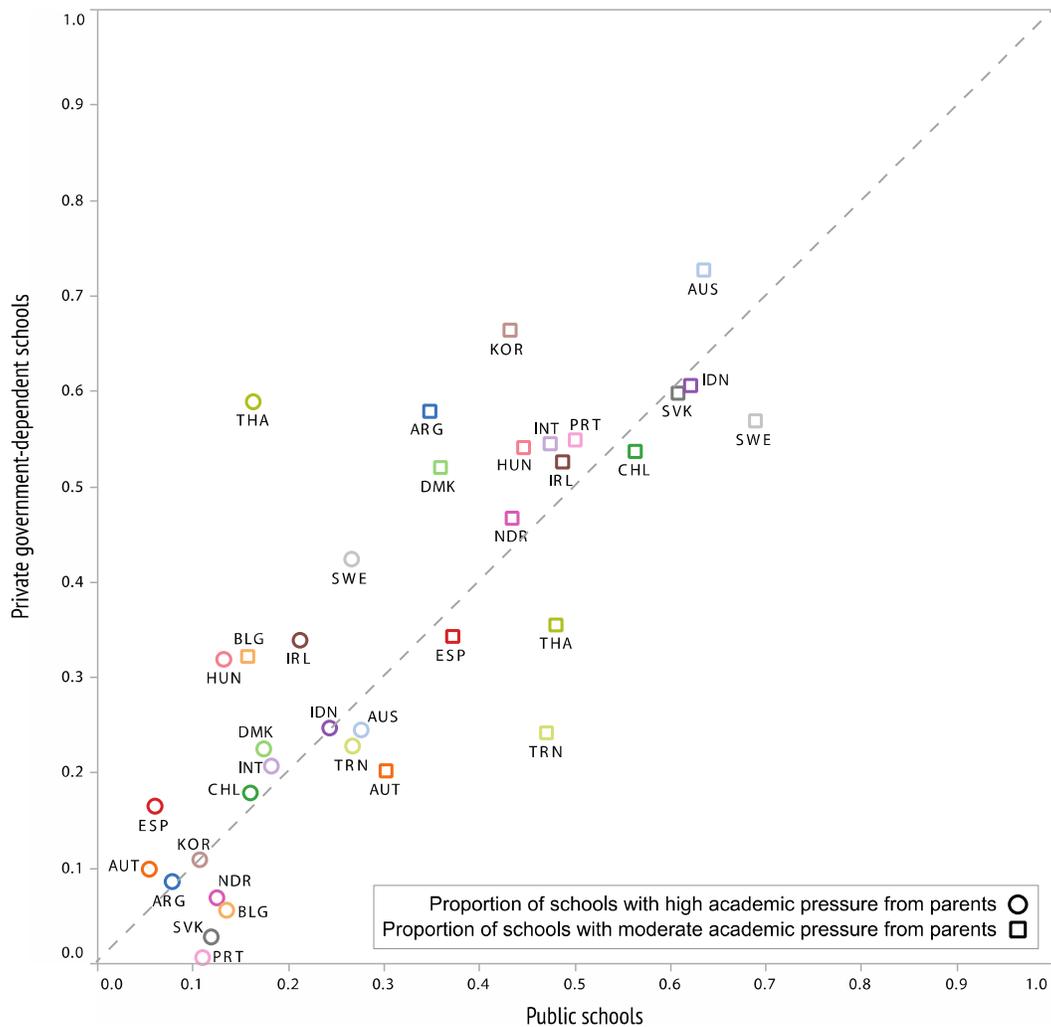


Figure 12: Distribution of parental pressure on schools, by sector (proportion)

Table 26: Proportion of schools with high and moderate parental pressure for maintaining academic standards (weighted)

	High parental pressure			Moderate parental pressure		
	Public schools	Private dependent schools	Mean difference	Public schools	Private dependent schools	Mean difference
Argentina	0.078	0.086	-0.008	0.348	0.579	-0.231 ^{***}
Australia	0.276	0.245	0.031	0.635	0.727	-0.092 ^{***}
Austria	0.054	0.099	-0.045 ^{**}	0.302	0.202	0.100 ^{***}
Belgium	0.135	0.056	0.079 ^{***}	0.157	0.322	-0.165 ^{***}
Chile	0.160	0.179	-0.019	0.563	0.537	0.026
Denmark	0.174	0.225	-0.051 [*]	0.359	0.520	-0.161 ^{***}
Hungary	0.132	0.319	-0.187 ^{***}	0.446	0.541	-0.095 ^{***}
Indonesia	0.243	0.247	-0.004	0.621	0.606	0.015 ^{**}
Ireland	0.212	0.339	-0.127 ^{**}	0.487	0.526	-0.039
Korea	0.107	0.109	-0.002	0.432	0.664	-0.232 ^{***}
Netherlands	0.125	0.069	0.056 ^{***}	0.434	0.467	-0.033
Portugal	0.110	0.000	0.110 ^{***}	0.500	0.549	-0.049
Slovak Republic	0.119	0.028	0.091 ^{***}	0.608	0.598	0.010
Spain	0.060	0.165	-0.105 ^{***}	0.372	0.343	0.029 [*]
Sweden	0.266	0.424	-0.158 ^{***}	0.689	0.569	0.120 ^{***}
Thailand	0.163	0.589	-0.426 ^{***}	0.480	0.355	0.125 ^{***}
Trinidad & Tobago	0.267	0.228	0.039	0.470	0.242	0.228
International	0.182	0.207	-0.025 ^{***}	0.474	0.545	-0.071 ^{***}
Mean	0.158	0.200	-0.043	0.465	0.491	-0.026

*** $p < .001$; ** $p < .01$; * $p < .05$; **Bold = not statistically significant**

As would be expected, the public sector is shown to more often consider student residence as a determinant of admission (Table 28). Residence is always used for admissions at a higher rate in the public sector in eight countries (Argentina, Australia, Austria, Chile, Denmark, Hungary, Slovak Republic, and Sweden). The rate is higher in the private dependent sector in five countries (Belgium, Netherlands, South Korea, Spain, and Thailand). The results are similar for schools that sometimes consider student residence for admissions: eight countries in the public sector (Chile, Indonesia, Korea, Netherlands, Portugal, Slovak Republic, Spain, and Sweden), and five in the private

sector (Argentina, Austria, Denmark, Hungary, and Thailand). The country distributions are shown in Figure 14.

Table 27: Proportion of schools considering student performance for admissions (weighted)

	Performance always considered			Performance sometimes considered		
	Public schools	Private dependent schools	Mean difference	Public schools	Private dependent schools	Mean difference
Argentina	0.145	0.269	-0.124 ^{***}	0.122	0.441	-0.319 ^{***}
Australia	0.239	0.287	-0.048 [*]	0.328	0.407	-0.079 ^{***}
Austria	0.399	0.624	-0.225 ^{***}	0.179	0.226	-0.047 ^{***}
Belgium	0.147	0.177	-0.030	0.395	0.382	0.013
Chile	0.128	0.194	-0.066 ^{***}	0.191	0.450	-0.259 ^{***}
Denmark	0.064	0.032	0.032 ^{**}	0.162	0.465	-0.303 ^{***}
Hungary	0.403	0.724	-0.321 ^{***}	0.129	0.276	-0.147 ^{***}
Indonesia	0.547	0.399	0.148 ^{**}	0.260	0.282	-0.022 ^{***}
Ireland	0.179	0.089	0.090 ^{**}	0.149	0.163	-0.014
Korea	0.285	0.642	-0.357 ^{***}	0.131	0.128	0.003
Netherlands	0.896	0.671	0.225 ^{***}	0.097	0.298	-0.201 ^{***}
Portugal	0.027	0.050	-0.023	0.133	0.491	-0.358 ^{***}
Slovak Republic	0.294	0.574	-0.280 ^{***}	0.170	0.222	-0.052 [*]
Spain	0.009	0.005	0.004	0.133	0.112	0.021 ^{***}
Sweden	0.134	0.203	-0.069 ^{**}	0.029	0.049	-0.020
Thailand	0.414	0.830	-0.416 ^{***}	0.175	0.129	0.046 ^{***}
Trinidad & Tobago	0.589	0.553	0.036	0.348	0.393	-0.045
International	0.271	0.379	-0.108 ^{***}	0.203	0.281	-0.078 ^{***}
Mean	0.288	0.372	-0.084	0.184	0.289	-0.105

*** $p < .001$; ** $p < .01$; * $p < .05$; **Bold** = not statistically significant

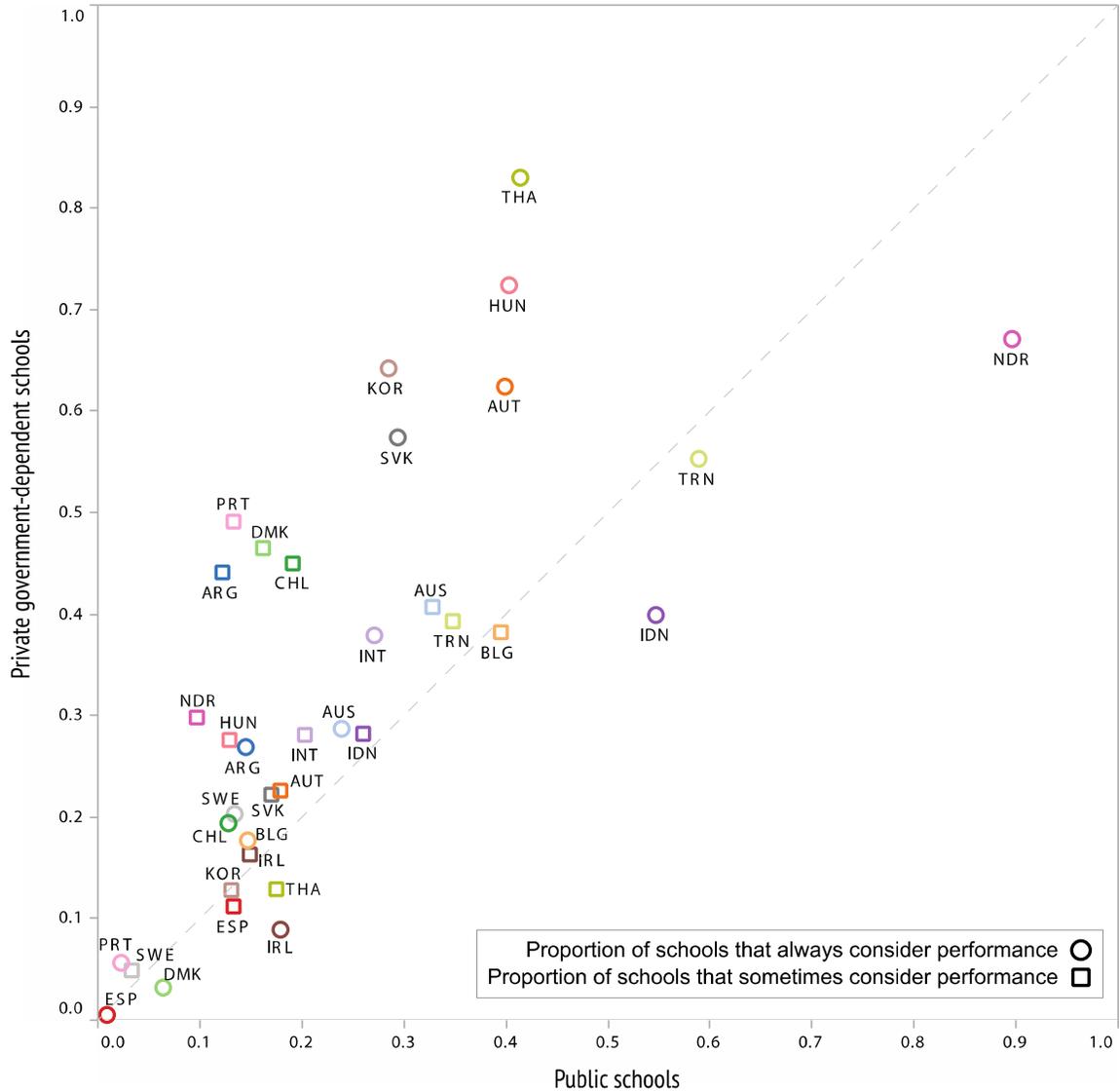


Figure 13: Distribution of schools considering performance for admissions, by sector (proportion)

Informed choice: information dissemination

The public sector exemplifies higher levels of information dissemination of achievement results. In nine countries (Austria, Belgium, Korea, Netherlands, Portugal, Slovak Republic, Spain, Sweden, and Trinidad and Tobago), the public sector publicly posts achievement data at a higher rate than the private dependent sector (Table 29). The

rate is higher for the private dependent sector in four countries (Argentina, Australia, Denmark, and Indonesia).

The international sample also demonstrates higher proportions of publicly-posted data in the public (.39) than the private dependent (.27) sector. This represents a mean difference of .25 standard deviations. The country distributions of information dissemination proportions are shown in Figure 15.

Table 28: Proportion of schools considering residence as a determinant of admissions (weighted)

	Residence always considered			Residence sometimes considered		
	Public schools	Private dependent schools	Mean difference	Public schools	Private dependent schools	Mean difference
Argentina	0.097	0.000	0.097 ^{***}	0.174	0.259	-0.085 ^{***}
Australia	0.457	0.214	0.243 ^{***}	0.227	0.219	0.008
Austria	0.518	0.009	0.509 ^{***}	0.131	0.260	-0.129 ^{***}
Belgium	0.017	0.089	-0.072 ^{***}	0.126	0.119	0.007
Chile	0.070	0.016	0.054 ^{***}	0.261	0.149	0.112 ^{***}
Denmark	0.579	0.019	0.560 ^{***}	0.179	0.406	-0.227 ^{***}
Hungary	0.364	0.116	0.248 ^{***}	0.117	0.306	-0.189 ^{***}
Indonesia	0.239	0.245	-0.006	0.313	0.214	0.099 ^{***}
Ireland	0.272	0.257	0.015	0.246	0.193	0.053
Korea	0.137	0.239	-0.102 ^{***}	0.228	0.043	0.185 ^{***}
Netherlands	0.141	0.202	-0.061 ^{**}	0.202	0.143	0.059 ^{**}
Portugal	0.593	0.560	0.033	0.184	0.054	0.130 ^{***}
Slovak Republic	0.336	0.000	0.336 ^{***}	0.140	0.000	0.140 ^{***}
Spain	0.609	0.668	-0.059 ^{***}	0.133	0.112	0.021 [*]
Sweden	0.418	0.053	0.365 ^{***}	0.056	0.000	0.056 ^{***}
Thailand	0.337	0.421	-0.084 ^{***}	0.211	0.421	-0.210 ^{***}
Trinidad & Tobago	0.197	0.111	0.086	0.587	0.499	0.088
International	0.329	0.218	0.111 ^{***}	0.181	0.204	-0.023 ^{***}
Mean	0.317	0.189	0.127	0.207	0.200	0.007

*** $p < .001$; ** $p < .01$; * $p < .05$; **Bold** = not statistically significant

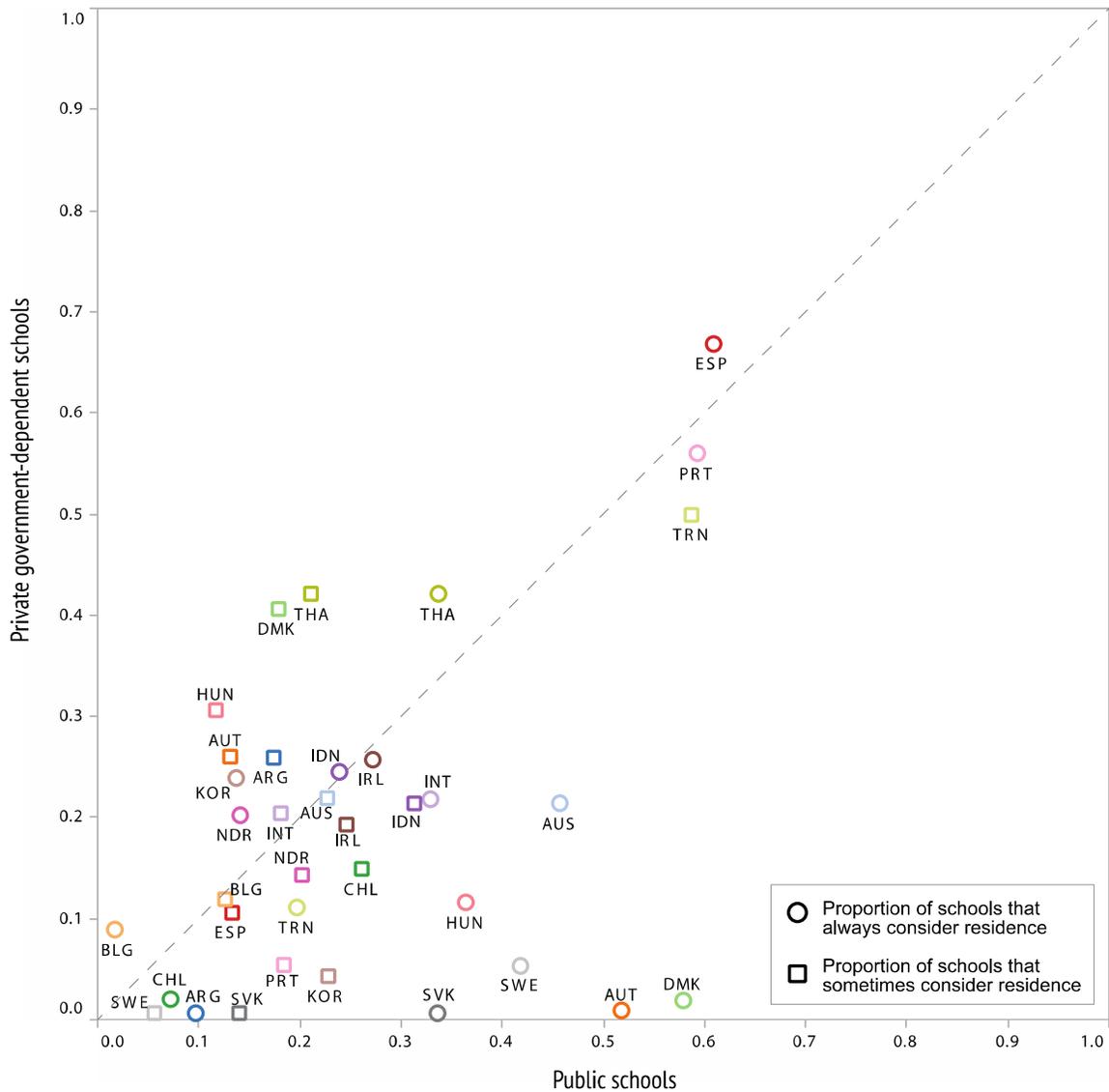


Figure 14: Distribution of schools considering residence for admissions, by sector (proportion)

Accountability: teacher and principal evaluation

Public and private dependent sectors are very similar in regards to the use of achievement data to evaluate teacher and principal performance. In the international sample, publicly-funded private schools use achievement data slightly more to evaluate teachers and principals. This difference is statistically significant at a .01 alpha level, but the size of the difference is small (.2 standard deviations). The distribution of this

variable is split evenly among the 17 selected countries: five in the public sector (Argentina, Austria, Portugal, Spain, and Thailand) and five in the private dependent sector (Australia, Indonesia, Ireland, Korea, and Sweden) show higher levels of teacher and principal accountability through achievement assessments (Table 29 and Figure 16).

Table 29: Country sector differences: achievement data used to evaluate teachers and principals; achievement data posted publicly

	Achievement data used to evaluate teachers and principals			Achievement data posted publicly (proportion of schools)		
	Public schools	Private dependent schools	Mean difference	Public schools	Private dependent schools	Mean difference
Argentina	-0.768	-0.604	-0.164 ^{***}	0.08	0.10	-0.02 [*]
Australia	-0.345	-0.800	0.455 ^{***}	0.42	0.47	-0.05 ^{***}
Austria	-1.125	-0.862	-0.263 ^{***}	0.05	0.00	0.05 ^{***}
Belgium	-1.135	-1.219	0.084	0.02	0.00	0.02 ^{**}
Chile	-0.491	-0.426	-0.065	0.27	0.26	0.01
Denmark	-0.731	-0.645	-0.086	0.40	0.46	-0.06 [*]
Hungary	0.069	0.006	0.063	0.35	0.31	0.04
Indonesia	0.873	0.708	0.165 ^{***}	0.22	0.29	-0.07 ^{***}
Ireland	-1.210	-1.340	0.130 [*]	0.22	0.18	0.04
Korea	-0.868	-1.058	0.190 ^{***}	0.25	0.13	0.12 ^{***}
Netherlands	-0.304	-0.295	-0.009	0.81	0.63	0.18 ^{***}
Portugal	-1.230	-0.589	-0.641 ^{***}	0.31	0.25	0.06 [*]
Slovak Republic	0.145	0.249	-0.104	0.57	0.49	0.08 [*]
Spain	-0.993	-0.732	-0.261 ^{***}	0.08	0.05	0.03 ^{***}
Sweden	-0.511	-0.796	0.285 ^{***}	0.62	0.45	0.17 ^{***}
Thailand	0.351	0.469	-0.118 ^{***}	0.55	0.55	0.00
Trinidad & Tobago	-0.566	-0.353	-0.213	0.12	0.00	0.12 ^{***}
International	0.001	0.021	-0.021 ^{**}	0.39	0.27	0.12 ^{***}
Mean	-0.520	-0.487	-0.032	0.314	0.272	0.042

^{***} $p < .001$; ^{**} $p < .01$; ^{*} $p < .05$; **Bold** = not statistically significant

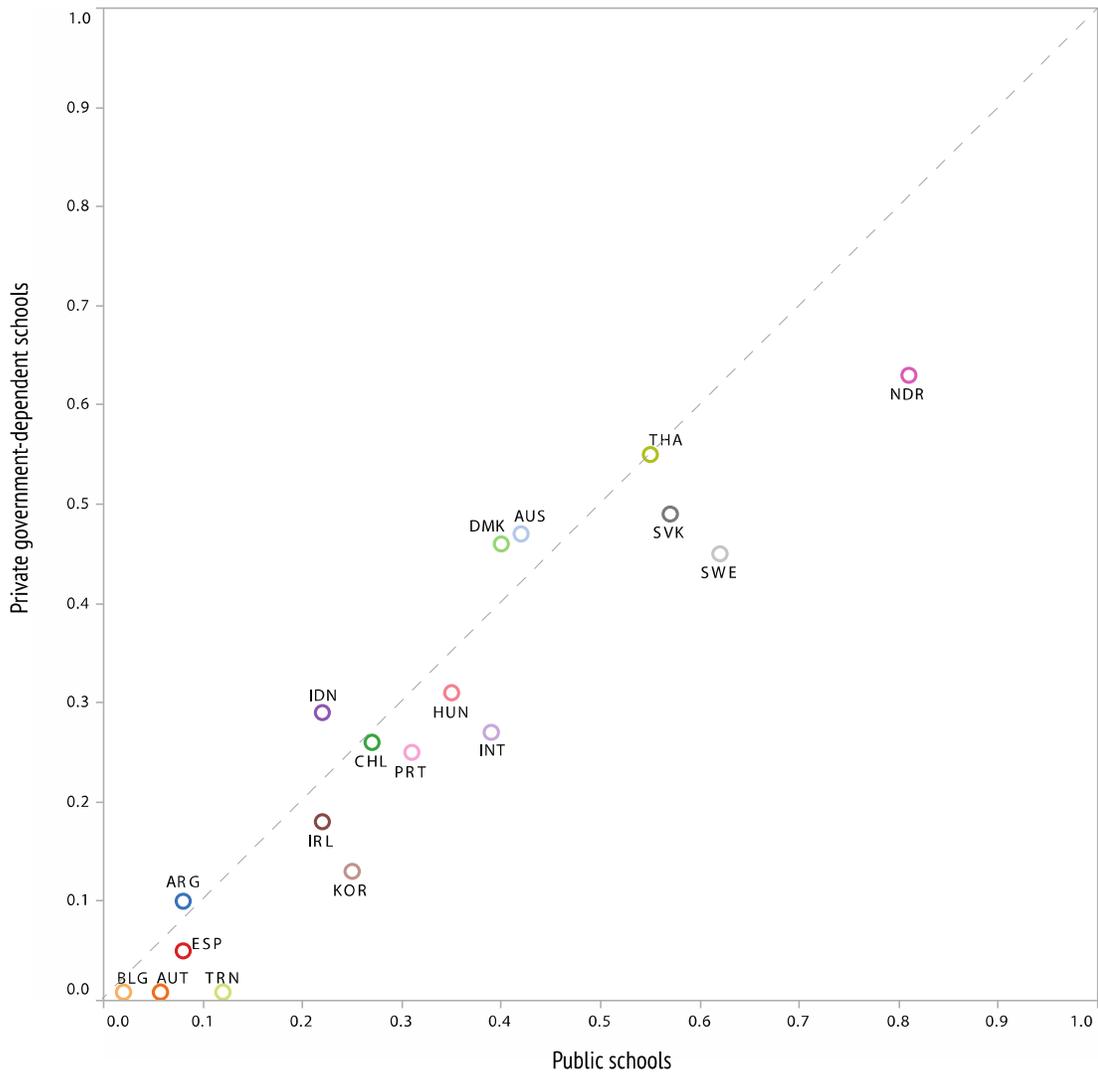


Figure 15: Distribution of proportion of schools posting achievement data publicly

Summary

Figure 17 shows the general trend of significant sector differences across the set of this study's school-level variables, combined for all countries. The largest sector differences are found on the autonomy variables. The private dependent sector has significantly higher levels of autonomy over, most notably, resources and hiring, but also curriculum and assessment than the public sector. The private sector demonstrates greater incidence of competition with two or more schools than the public sector. Student

academic performance is used much more often in the private dependent sector as a criterion for admissions. Finally, the private sector shows slightly higher levels of pressure from parents for academic standards. Schools in the public sector more commonly post achievement data publicly and are much more likely to use geographic residence as a criterion for admissions.

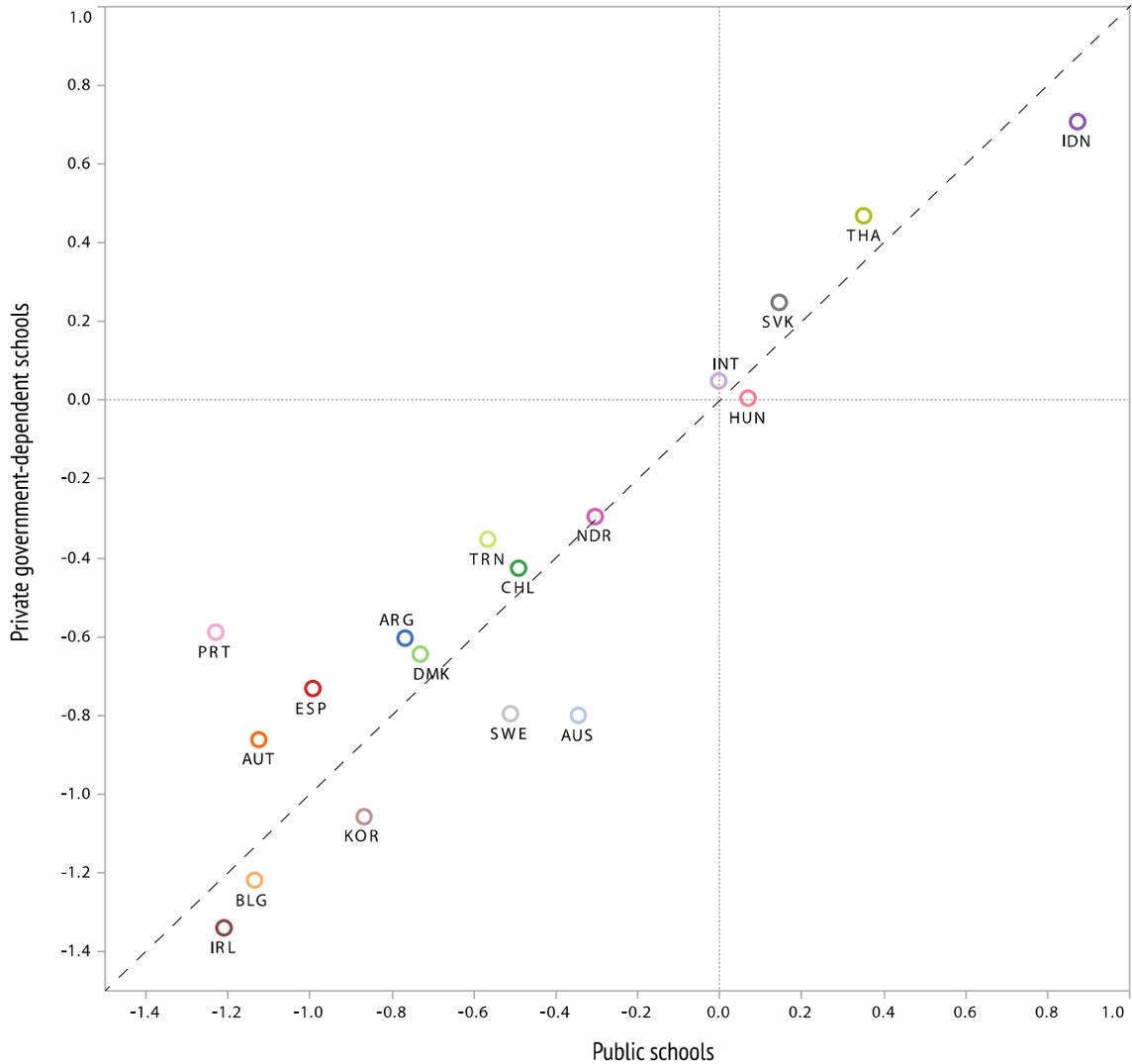


Figure 16: Achievement data used to evaluate teachers and principals, by school sector (proportion)



Figure 17: Significant sector differences in school-level variables, combined for all countries

Research question 5: to what extent are school competition, admissions and information dissemination policies, autonomy, and accountability associated with student achievement differences?

Empirical model 4 in this study considers the effect of 12 school-level variables regarding competition, informed choice, accountability, and autonomy on student achievement, after matching students by background characteristics and controlling for school mean SES. Table 30 shows the percentage of school-level variation accounted for by the set of these 12 variables. This table also demonstrates that there is a fair amount of variability in the effect of these predictors across countries ranging from a low of 3.4% of explained between-school variability in Spain to a high of 28.5% in Chile. The mean percentage of explained variability across countries is 13.4%. For the international sample of 43 countries these variables explain only 1.8% of between-school variation.

Table 31 and Figure 18 demonstrate that some of these school-level predictors matter more than others for student achievement outcomes. Table 31 provides the means of all statistically significant school-level coefficients for each academic subject. Aside from school mean SES, which has, by a considerable amount, the largest student achievement impact (mean of significant coefficients is 76.4 PISA points), the school-level variables with the greatest effects are (a) high levels of parental pressure for academic standards (mean of significant coefficients is 33.8 PISA points), (b) performance is always considered for admissions (33.5 PISA points), (c) performance is sometimes considered for admissions (21.2 PISA points), and (d) school autonomy over resources and hiring (21.1 PISA points). Always (-17.6 PISA points) and sometimes (-17.0 PISA points) considering geographic residence for admissions has negative impacts on achievement.

Table 30: Percentage of school-level variation accounted for by school competition, admissions and information dissemination policies, accountability, and autonomy

	Math	Reading	Science	Mean
Argentina	3.3%	5.8%	5.8%	5.0%
Australia	9.1%	6.1%	5.7%	7.0%
Austria	8.1%	14.2%	10.8%	11.0%
Belgium	8.8%	5.9%	8.7%	7.8%
Chile	27.3%	31.5%	26.7%	28.5%
Denmark	17.7%	24.0%	24.5%	22.1%
Hungary	7.6%	11.0%	12.1%	10.2%
Indonesia	16.7%	19.2%	26.4%	20.8%
Ireland	26.9%	26.9%	28.5%	27.5%
Korea	20.9%	14.4%	21.3%	18.9%
Netherlands	6.9%	8.9%	7.1%	7.6%
Portugal	16.9%	14.5%	7.9%	13.1%
Slovak Republic	4.9%	11.2%	5.8%	7.3%
Spain	4.3%	1.9%	4.1%	3.4%
Sweden	9.8%	9.2%	9.2%	9.4%
Thailand	16.4%	22.3%	15.5%	18.1%
Trinidad & Tobago	8.3%	11.8%	8.5%	9.5%
International	1.8%	1.8%	1.9%	1.8%
Mean	12.6%	14.1%	13.4%	13.4%

Table 31: Mean of all significant school-level coefficients, by variable (descending order)

	Math	Reading	Science	Mean
School mean SES	77.2	75.3	76.6	76.4
High parental pressure	39.3	30.7	31.3	33.8
Performance always considered for admissions	27.1	42.2	31.2	33.5
Performance sometimes considered for admissions	18.9	24.5	20.2	21.2
Autonomy over resources & hiring	20.6	13.7	29.1	21.1
Moderate parental pressure	11.1	15.7	17.3	14.7
Autonomy over curriculum & assessment	6.2	6.3	8.6	7.0
Achievement posted publicly	-7.4	15.8	11.4	6.6
Teacher and principal evaluation	2.4	10.7	2.3	5.1
Competition with two or more schools	-11.6	-2.6	-12.4	-8.9
Residence always considered for admissions	-23.9	-11.8	-15.4	-17.0
Residence sometimes considered for admissions	-8.3	-21.9	-22.6	-17.6

Contrary to what might be expected based on previous school competition research, these findings suggest that schools competing for students with two or more other schools perform worse than those with lower levels of competition (mean of significant coefficients is -8.9 PISA points).

Figure 18 displays the number of positive and negative significant effects across the 12 school-level variables for all subjects. The number of significant effects is closely related to the size of the effect coefficients, already discussed. Those with the most common significant relationships with student achievement are: high and moderate pressure for academic standards, school autonomy over resources and hiring, use of student performance as a determinant of school admissions, and use of student geographic residence as a determinant of school admissions (negative effect).

Conclusion

This chapter has presented the findings from this study's quasi-experimental analytical methods in relation to each of the five research questions. The empirical evidence produced will be discussed in the following chapter with reference to the current international public-private partnership landscape.



Figure 18: School-level effects. Combined math, reading, science (after student matching and controlling for school SES)

CHAPTER FIVE: DISCUSSION

The intent of this dissertation is to offer a robust examination of the international landscape surrounding education public-private partnerships. I use this chapter to discuss the empirical findings of this study in relation to the current knowledge and scientific evidence surrounding PPPs. I organize the chapter by outlining the key findings of this work and discussing the literature and empirical results supporting each.

The review of the research literature provides evidence of an emerging narrative within the international landscape, one in which private education providers are assumed to be superior to their public counterparts (Rutkowski and Rutkowski, 2009). There is some evidential support to this assertion, as the private sector has been found in many studies to outperform the public sector in terms of student achievement. In most instances, however, the between-sector performance differences are small. The results are similar when disaggregating private government-supported schools and private independent schools.

From the ideological anti-neoliberalism arguments as well as from the privatization literature, the primary concern surrounding education PPPs is not a matter of efficiency, performance, or quality, but rather the impact of such policies on social stratification. Opponents of privatization suggest that, at best, only means-tested PPPs are capable of improving the circumstances of students, and, at worst, that public-private partnerships necessarily perpetuate and reinforce social inequities.

Absence of a Significant International PPP School Performance Effect

This dissertation lends a new voice to the discussion, using scientifically robust methodological approaches to examine the cross-country effects of public-private

partnerships. Based on the findings of the literature review and the theoretical justifications of the conceptual framework, before performing this research, I hypothesized that the empirical methods would find students in publicly-funded private schools performing slightly better on the PISA 2009 exam than their public school counterparts, before and after balancing student observable characteristics through propensity score matching. I also expected to find substantial evidence of inequality in the private dependent sector. Such findings would have been consistent with the much of the empirical research literature.

The results of this study are mixed. There is no omnibus trend in regards to international PPP sector performance. That is to say, after averaging all of the cross-country PPP effects, there is virtually no difference in student performance between the public and private-dependent sub-sectors (5.4 PISA points or .06 standard deviations in favor of public schools). In a majority of cases, students perform as well in public schools as in private dependent schools.

PPPs are Not Monolithic

These results do not imply that school sector doesn't impact student performance, but rather shows that the effects of public-private partnerships on student performance vary widely by country. When the examination is undertaken on a country-by-country basis, a slight public sector advantage emerges. After matching students by background characteristics and controlling for school socioeconomic status, public schools in 3 of 17 countries – Austria, Belgium, and Spain – outperform their private dependent counterparts in all three subjects, with differences ranging from 6 reading points in Spain (.07 standard deviations) to 29 science points in Austria (.29 standard deviations).

The public sectors in 2 of 17 countries – Australia and Thailand – outperform the private dependent sectors in both math and science, with no difference between sectors in reading for either country. The sizes of these differences range from 14.6 science points in Australia (.14 standard deviations) to 28.3 math points in Thailand (.36 standard deviations). The public sectors in 2 of 17 countries – Trinidad & Tobago and Hungary – outperform corresponding private sectors in one subject each. Public students in Trinidad & Tobago outperform private dependent students by 41.5 reading points (.37 standard deviations). Public students in Hungary outperform private dependent students by 25.4 math points (.28 standard deviations).

Private dependent students in 1 of 17 countries – Portugal – outperform public student in all subjects, ranging from 19.2 math points (.21 standard deviations) to 28.9 reading points (.34 standard deviations). In 1 of 17 countries – Ireland – private dependent students outperform public students in two subjects: in reading by 40.5 (.46 standard deviations) and in science by 40.9 points (.41 standard deviations).

After matching students by background characteristics and controlling for school socioeconomic status, there is no between-sector performance difference in any subject in 8 of 17 countries (Argentina, Belgium, Chile, Indonesia, the Netherlands, South Korea, Slovak Republic, and Sweden).

In a number of ways, my findings contradict much of what is currently understood about public-private partnerships in education. The implications are important for the international PPP literature. Much of the existing PPP research shows that public-private partnerships have small performance advantages over traditional public schools. The results of this quasi-experimental empirical assessment provide evidence that, after

matching students by background characteristics and controlling for school SES, public schools are more likely to outperform private dependent schools than the reverse occurrence.

Equitable Performance is Spread Evenly across Public and Private Sectors

High education performance for any school system is made up of high quality, high efficiency, high equity, and high participation (OECD, 2009b). This study uses three separate approaches to investigate academic and social equality of student performance across school sectors: (i) comparing the performance of the poorest quintile of students across sectors, (ii) comparing the interclass correlation coefficients across sectors, and (iii) comparing the dependence of achievement on school SES across sectors. Given the criticisms against education privatization as a perpetuator of social disparities, these are critical considerations for any private education evaluation.

The first approach to evaluating sector equity is to assess the differential performance of the lowest income quintile by school sector. In an equitable education landscape, low-income students would perform equally well in public and private dependent schools. Analyses using the lowest socioeconomic quintile show that a very small percentage of low-income students perform better in public than in private dependent schools dependent in 14% of cases (in 4 countries: Hungary, Thailand, Sweden, Spain). Private dependent students perform better in only one case (2%; Portugal, reading). I don't consider this a substantial difference, and, in fact, the achievement advantage for the public sector is actually smaller for this low-income quintile than it is for the entire sample of students. Roughly stated, with the exception of Sweden, where comparable students in comparable schools perform substantially better

in the public sector for all subjects, low-income students appear to perform at equal levels in public and private dependent schools.

The second method of evaluating equitable sector performance is by means of the intraclass correlation coefficient. OECD (2009) uses the intraclass correlation coefficient as a measure of academic segregation, which has substantial consequences for the equity of an education system. Higher ICCs represent academic grouping by academic performance or social background and a higher correlation between socioeconomic background and performance. Stated differently, large values on the ICC represent potentially large achievement gaps between schools in a country. Such differentiation within an education has substantial impact on the equity of that system.

The third approach to evaluating equitable sector student achievement is by examining the dependence each sector has on school SES as a predictor of student achievement. More equitable education systems provide equal opportunity for student regardless of any family wealth characteristics. Higher dependence on SES for academic achievement is a strong indicator of social segregation within an education system.

Monseur and Crahay (2008), through secondary analyses of PISA 2000, 2003, and 2006, demonstrate that higher levels of academic and social segregation within a school system perpetuate a number of social problems such as:

- Increasing differences between low and high performers increase;
- Increasing differences between the socioeconomically privileged and underprivileged students;
- Strengthening the link between student social background and achievement.

For reasons such as these, there is great concern over the impact of PPP policies on equitable student performance. Failure to spread the benefits of education provision across the multiple segments of a national population has long-term implications for both social and economic outcomes. For example, McKinsey and Company (2009) estimate that closing the achievement gap between the United States' high and low income students would raise national GDP by 3 to 5 percent per year (\$400 billion to \$670 billion). Social and academic segregation within a country's education system has the effect of a "permanent national recession" (McKinsey and Company, 2009, p. 6).

I find no evidence of any systemic equity advantages in either school sector. In the large majority of cases (83%), the most socioeconomically disadvantaged students perform equally well in either school sector. In 9 of 14 countries (Argentina, Australia, Austria, Belgium, Denmark, Indonesia, South Korea, Slovak Republic, and Trinidad and Tobago), there are no differences between public and private sector student achievement on any subject.

The second and third measurements of systemic equity – the intraclass correlation coefficient, and the percentage of school-level variation accounted for by school mean SES – are evenly distributed across school sectors. This suggests that, measuring sector-wide, public schools are as likely to reproduce segregation in academic performance as publicly-funded private schools (Figure 6 and Figure 7). These assertions are of course based on a cross-country analysis of these indicators. When looking at the country level, there are many instances where one sector is more equitable than the other. As such, this matter needs to be assessed on a country-by-country basis.

Internationally speaking though, there is no sector equity advantage relative to student performance. In terms of equal academic performance, there is no substantial cross-country difference between school sectors. The two sectors depend equally on school mean SES for performance and show roughly equal levels of between-school variation, meaning that neither sector has larger achievement gaps between schools.

I consider this to be a consequential finding resulting from this work. It is quite widely assumed that public schools are more equitable than private schools. The results of this study provide counter evidence, suggesting that in terms of academic and social segregation of school performance, there is no wide-scale international difference between sectors. Obtaining access to these services, however, is another matter entirely and, for some segments of the population, can be problematic. This issue is discussed in the next section.

Evidence of an International Private Sector Access Gap

Although this study finds public and private sectors to score equally well across the three measures of performance equity, this does not mean that they are free from segregation. Parts of the empirical privatization research assess social equity by examining differential achievement of social groups in public and private schools, i.e., whether disadvantaged students perform differently in either sector. An equally significant aspect of this discussion, however, is concerned with segregation in the form of educational opportunity. From this perspective, the focus turns away from those students already in private schools and towards those that are not able to access private education services in the first place.

Myriad empirical studies and essays substantiate the argument that private education services are often plagued by inequitable access. John Ambler (1994) cites

evidence on school choice and vouchers in Britain, France, and the Netherlands to demonstrate that lower-income students are often less-likely to access private school opportunities. Harma (2009) finds an overwhelming demand for low-fee private schooling in India, but with limited access for many students. There is evidence of “serious equity issues” surrounding participation in these low-fee private schools (Bangay and Latham, 2013). A well-documented impediment to accessing private schools is poverty (Harma, 2009; Bangay and Latham, 2013). Carnoy (1998) posits that if the opportunity to attend private schools is not distributed, expansion of these services will prove to widen gaps between advantaged and disadvantaged social groups.

While this study finds no substantial difference of equitable academic performance between sectors, there is broad international evidence of social discrimination in private sector school access. Point biserial correlations show that enrollment in a private dependent school is associated with higher student socioeconomic status in 13 of the 17 countries (Argentina, Australia, Austria, Belgium, Chile, Denmark, Hungary, Ireland, Slovak Republic, Spain, Sweden, Thailand, and Trinidad and Tobago). Likewise, as was shown in the previous chapter, private dependent schools are more likely to discriminate in admissions by student socioeconomic background and previous academic performance.

These findings suggest that there is much greater cause for concern surrounding inequitable sector access than inequitable sector performance. In this study, private school enrollment is tied to powerful socioeconomic indicators such as student wealth and academic ability. From this evidence, I find myself in a certain level of agreement with Klees (1999), who suggests that the public-private school debate should be less

about efficiency, quality, and performance, and more about social welfare, especially in light of the findings that performance differences between the two sectors are slight.

While, at the surface, this may sound like a call for continued government dominance of service provision, it could also provide support in favor of government supervision within PPP strategies. These findings suggest that education policies aimed towards increasing access of the poor to private dependent schools can positively equalize opportunity. The greater concern centers around getting the disadvantaged into schools, be it public or private, and less about equitable performance once those students are in school. From a policy perspective, this is a positive finding for the PPP community, as, I would argue, it is much easier for the state to control the distribution of access to private education services across a population than it is to control educational outcomes. As is seen in a variety of educational initiatives, the state's potentially greatest sphere of influence in private education policymaking surrounds who is offered access through school choice and competition strategies. This idea is supported by the experience of multiple PPP initiatives that have reduced educational disparities through policies of equal access such as means-tested vouchers and demand-side financing. This also brings attention to the criterion within the framework for engaging the private sector, which calls for school admissions to be open to all regardless of social class or student ability.

Multiple international PPP programs have effectively increased the opportunities for traditionally disadvantaged students to access private education resources. Experience from Pakistan shows that demand-side PPPs can be pro-poor, expanding education services to traditionally marginalized students at lower costs than the public system (Malik, 2010). The Punjab Education Foundation's PPP project – Foundation Assisted

Schools – targets vouchers and private school subsidies to female students and students in urban slums and districts with the lowest literacy and enrollment rates (Malik, 2010). An external evaluation of this program found that it has “made significant progress in making quality education accessible to the poor, particularly from the slums across Punjab” (Malik, 2010, p. 10). Specifically, Malik (2010), found that government subsidization of private schools decreased dropouts and reduced student absenteeism in participating schools, while a targeted voucher program in the urban slums of Sukhnehar, Lahore provided free private school access to 31,053 students.

In the Philippines, the *Educational Service Contracting* program has significantly expanded the opportunities for students to access secondary education services (Baum, 2012). In the Ugandan case, recent experience with the Universal Post Primary Education and Training (UPPET) program has led to local stakeholder consensus that PPPs can substantially improve school access opportunities by providing school fees for low-income students (Brans, 2013). UPPET was instituted in Uganda in effort to turnaround the country’s low levels of secondary school enrollment – only 25.2 percent in 2007 (World Bank, 2010a). Access to secondary education in Uganda has historically depended heavily upon student wealth and urban residence. This relationship between school access and student background is weakening as an increase in PPP opportunities for students is opening educational opportunities up to segments in the population that, in the past, have had little hope of receiving a secondary-level education. The PPP project has been successful in reaching many students, increasing secondary school enrollment from 160,000 in 2007 to 452,000 in 2009 (World Bank, 2010b). The number of PPP secondary schools in Uganda increased by 34% (550 to 739) between 2009 and 2012

while the number of public schools increased by only 12% (803 to 902) (Brans, 2013). Additional examples of increased pro-poor access to educational services through PPPs are discussed in the literature review.

Based on my findings, in addition to the substantial body of experience demonstrating increased access through a multitude of PPP programs, I argue that PPP initiatives can be used as viable approaches to social equalization. In these arrangements, the state maintains significant control over school enrollment policies and has the potential to overturn social stratification through increased access to both public and private educational resources. Successful targeted PPP strategies provide evidence of this (Patrinos, 2009).

Quasi-Experimental Methods Can Significantly Reduce Selection Bias

The empirical findings from this study offer prime support in favor of using quasi-experimental techniques for proper investigation of education sector differences. Such methods as propensity score matching have the potential to significantly reduce the private sector selection bias and produce much more reliable estimates of sector differences. Before controlling for treatment and control group covariate differences through propensity score matching there was a sizable achievement advantage in favor of the private dependent school sector. The results after matching, however, provided evidence that these differences were the result of group imbalance rather than private sector efficacy. After matching, the cross-country average private dependent coefficient decreased from 18 points (.2 standard deviations) to 3 points (.03 standard deviations). Without propensity score matching, the analytical models found private dependent schools to perform significantly better than public schools. The quasi-experimental design showed that much of the original difference in student performance was associated

with differences in student background characteristics, surely a result of the fact that the private dependent sector has higher proportions of socially advantaged students. There were substantial changes to the results of the study after propensity score matching and controlling for school-level characteristics.

Such approaches are especially critical, as the data shows us that private schools are, by and large, better-funded than public schools and have on average higher student social compositions. Comparing heterogeneous student groups and assuming homogeneity will necessarily lead to biased results, most often in favor of the public sector as it is, generally speaking, the more socioeconomically privileged. I would further suggest that the large body of empirical research that shows significantly higher private sector performance is likely skewed due to improper accounting for selection bias.

The Private Sector Engagement Framework Provides Mixed Results

Overall, regarding the school-level factors promoted by the private sector engagement framework to matter for school performance, there are a few trends that are important to consider. Similar to the findings surrounding the school sector effect, I find evidence that the behavior of students based on school levels of competition, accountability, autonomy, and informed choice is not monolithic. There is a considerable amount of variation across countries with respect to how each of these factors effects school and student performance. Across countries, the 12 variables across the competition, accountability, autonomy, and informed choice spheres explain an average of 13.4% of between-school variation. The percentage of explained variation from these indicators ranges from 3.4% in Spain to 28.5% in Chile.

Accountability

Accountability of schools to parents for maintaining high academic standards has a greater effect on student achievement outcomes than any other of the private sector engagement variables. Students perform better in schools where there is high parental pressure for academic standards. This effect was statistically significant in 24% of all models and was positive in every instance, with a mean coefficient 13.6 PISA points across countries (.15 standard deviations). This suggests that students in schools that experience high levels of parental pressure for maintaining academic standards score 13.6 points higher, on average, than those not experiencing high pressure. In Trinidad and Tobago, the high parental pressure effect is roughly 53 PISA points or .5 standard deviations. In Hungary, the effect is roughly 35 PISA points or .39 standard deviations.

Moderate levels of parental pressure also benefit schools in terms of student achievement. On average, schools with moderate levels of parental pressure for academic standards perform 6.3 PISA points (.07 standard deviations) better than schools without moderate pressure. There are 13 positive effects and 4 negative effects from moderate parental pressure across countries.

These findings have important implications for PPP policy decision-making. At present, these parental accountability advantages are equally spread across school sectors, as neither sector shows significantly higher levels of parental accountability. The findings suggest, however, that policy changes in the public or private sector that can effectively increase the level of accountability of schools to parents can have positive influence on student outcomes.

Autonomy

The private dependent sector exemplifies considerably higher levels of autonomy than the public sector over school resource, hiring practices, curriculum, and assessment. In every single country case, there is a greater level of school autonomy over resources and hiring/firing practices in the private dependent sector (with the exception of the Netherlands, where the distribution is equal).

In Belgium, with every standard deviation increase in school autonomy over resources and hiring, there is an average increase of 60 points on the PISA exam. And seeing as how the private dependent sector's score on this variable is about .75 standard deviations above the public sector's resource autonomy score, this represents a private sector advantage of 45 points or .44 standard deviations. Across countries, school autonomy over resources, hiring, curriculum, and assessment has a slightly positive effect on student cognitive outcomes.

Competition

The results relating to school-level competition run contrary to the framework for private sector engagement. Only in South Korea was competition with two or more schools significantly associated with positive achievement outcomes. In South Korea, schools competing with two or more other schools for students score on average 31 points higher (.36 standard deviations) across three subjects than schools competing with fewer than two other schools.

Negative relationships were found between competition with two or more schools and student performance in Spain, Thailand, and Australia. Across these three countries

there were 5 negative effects found, ranging in magnitude from 10 to 49 points in favor of public schools.

Informed Choice

Some of the most predictable independent variable behavior within this study surrounds the activity of the informed choice variables. These are also some of the variables that account for the most discrimination across school types. Private schools are much more likely than public schools to consider previous student achievement for school admissions. Public schools are much more likely to consider student residence as a determinant of school access. The former has positive effects on student outcomes; the latter has negative effects. Considering performance as a determinant of admissions is positively and strongly tied to student performance. This provides evidence of potential cream skimming within the private sector, in line with what is found in a number of other empirical studies. However, the private sector engagement model attempts to actively break down these private sector access barriers through state oversight of admissions practices, allowing students instead free access to the school of their choice without regard to cost.

Addressing Equity in Private Sector Engagement

The framework for engaging the private sector in education is currently used by the World Bank as a model for establishing new educational projects between governments and private sector actors across the globe. The World Bank is heavily assailed by the progressive community for its support of private sector education involvement. Critics are quick to accuse the Bank of perpetuating its legacy as neoliberal policy apologist. Such accusations surround the discourse of education public-private

partnerships. However, its adopted framework for private education involvement in the international development education agenda favors privatization based more on effective school performance and management theories than on free market idealism. Recent research provides evidence of this assertion.

Karen Mundy (2012), in a thorough review of World Bank private education exploits finds that, despite the Bank's overt policy support of education PPPs, its practical decisions are not aimed towards private education as the panacea in the Education for All agenda. Its financial support to countries does not depend upon opening educational markets and privatizing state education programs, as was common with former Bank agendas such as structural adjustment. Instead, Mundy finds that private education exploits are financially supported by the Bank only in cases where they are "unfortunately necessary" (p. 33). When private education intervention is deemed unfortunately necessary, the private sector engagement model serves as a tool for guiding the development of public-private partnerships as well as measuring results (I refer the reader to the World Bank's SABER project for engaging the private sector in education: web.worldbank.org). The principals of competition, accountability, autonomy, and informed choice addressed in this dissertation guide these activities.

However, a critical element is found absent from this private education model; there is no consideration or assurance of equitable opportunity for students. Such an oversight confirms the criticism of many progressives who see private education as a perpetuator of social stratification. And provided that the Bank's PPP exploits are explained as an attempt to embolden EFA efforts, failing to adequately ensure state protection of the most vulnerable is a considerable weakness of the model. If advocates

of public-private partnerships desire for these strategies to have a meaningful impact on the world's poorest students, there must be provisions included within frameworks for protecting equal opportunity to private school access.

As a suggestion, I call attention to a similar private education evaluation model, Henry Levin's (2002) comprehensive framework for evaluating educational vouchers. Within this framework, Levin rightly moves private sector success beyond the spheres of student test scores, school efficiency, and quality. His model includes provisions for assessing levels of school (a) choice, (b) efficiency, (c) equity, and (d) social cohesion. In contrast, the private sector engagement framework has the potential to influence and improve school governance, autonomy, and performance, but overlooks any social impacts. Without specific assurances, private school access will continue to depend largely upon student social and wealth characteristics and will fail to reach the disadvantaged students who need education reform most. Private education frameworks must go beyond goals of student achievement and begin to equally work towards decreasing the current barriers to private education opportunities for all students.

Moving Beyond the *State vs. Market Debate*

This situation therefore serves to re-emphasize the need to view state and non-state schools as sub components within a wider system. *Neither one nor the other offers all the answers.* (Bangay and Latham, 2013, italics added)

This study has found, through an extensive review of the literature and an original empirical investigation, that comparisons of PPP strategies to neoliberalism are unwarranted, that the role of the state within such policies differentiates PPPs substantially from traditional privatization initiatives which primarily seek to remove state control, that public-private partnerships can increase efficiency in education, and

that, if used correctly, these approaches to educational provision and finance can account for social inequities just as well as the traditionally state-controlled public education sector.

The ultimate assertion presented in this dissertation is that (a) achievement differences between traditional public and PPP-type schools slightly favor the public sector, although the results vary by country, that (b) concerns over equity within education should be targeted to matters of access rather than performance, and that (c) government policy can be used to mitigate such inequalities of opportunity by means of public or private education provision. This notion moves towards a more complementary relationship between states and markets, and entails a more modern view of the state, in which the government shifts away from sole education provider towards a larger supervisory capacity focused on regulating learning and guaranteeing equitable educational opportunity.

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APPENDIX

School-level predictor	Higher level in private dependent sector	No significant difference between sectors	Higher level in public sector
Competition with one school	Argentina Austria Hungary Indonesia Ireland Korea International	Belgium Portugal Trinidad & Tobago	Australia Chile Denmark Netherlands Slovak Republic Spain Sweden Thailand
Competition with two schools	Argentina Australia Chile Denmark Ireland Netherlands Slovak Republic Spain Sweden Thailand International	Belgium Trinidad & Tobago Portugal	Austria Hungary Indonesia Korea
Autonomy over curriculum and assessment	Argentina Australia Belgium Chile Denmark Hungary Ireland Korea Portugal Spain Sweden Trinidad & Tobago International	Netherlands	Austria Indonesia Slovak Republic Thailand
Autonomy over resources and hiring	Argentina Australia Austria Belgium Chile Denmark Hungary Indonesia Ireland Korea Portugal Spain Sweden Thailand Trinidad & Tobago International	Netherlands Slovak Republic	

School-level predictor	Higher level in private dependent sector	No significant difference between sectors	Higher level in public sector
High parental pressure from parents	Austria Denmark Hungary Ireland Spain Sweden Thailand International	Argentina Australia Chile Indonesia Korea Trinidad & Tobago	Belgium Netherlands Portugal Slovak Republic
Moderate parental pressure from parents	Argentina Australia Belgium Denmark Hungary Korea International	Chile Ireland Netherlands Portugal Slovak Republic Trinidad & Tobago	Austria Indonesia Spain Sweden Thailand
Residence always considered	Belgium Korea Netherlands Spain Thailand	Indonesia Ireland Portugal Trinidad & Tobago	Argentina Australia Austria Chile Denmark Hungary Slovak Republic Sweden International
Residence sometimes considered	Argentina Austria Denmark Hungary Thailand International	Australia Belgium Ireland Trinidad & Tobago	Chile Indonesia Korea Netherlands Portugal Slovak Republic Spain Sweden

School-level predictor	Higher level in private dependent sector	No significant difference between sectors	Higher level in public sector
Performance always considered	Argentina Australia Austria Chile Hungary Korea Slovak Republic Sweden Thailand International	Belgium Portugal Spain Trinidad & Tobago	Denmark Indonesia Ireland Netherlands
Performance sometimes considered	Argentina Australia Austria Chile Denmark Hungary Indonesia Netherlands Portugal Slovak Republic International	Belgium Ireland Korea Sweden Trinidad & Tobago	Spain Thailand
Achievement data used to evaluate teachers and principals	Argentina Austria Portugal Spain Thailand International	Belgium Chile Denmark Hungary Netherlands Slovak Republic Trinidad & Tobago	Australia Indonesia Ireland Korea Sweden
Achievement data posted publicly	Argentina Australia Denmark Indonesia	Chile Hungary Ireland Thailand	Austria Belgium Korea Netherlands Portugal Slovak Republic Spain Sweden Trinidad & Tobago International