# Looking for Matthew: The Effects of Private Tutoring on the Educational Outcomes of Fourth Grade Public School Students in Cambodia

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# ABSTRACT

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Using the World Bank Public Expenditure Tracking Survey (PETS) 2004 data, propensity score matching is utilized to infer a causal impact of private tutoring on the numeracy, literacy, and total outcomes for fourth grade public school students. This research finds that students who self-report that they participate in private tutoring everyday as compared to their peers who never participate in private tutoring scored higher in literacy, numeracy, and total scores. A small Matthew Effect was found as the statistically significant variables used as predictors aligned with socio-economic status. This alignment depicts that the rich become academically richer while the poor become academically poorer. The hybrid public-private education system in Cambodia may be exacerbating inequity for the most marginalized populations.

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KHMER TERMS AND DEFINITIONS

| Khmer Term | English Translation | Definition |
|---|---|---|
| ***Acharj*** | Monks | Monks |
| ***Rean boban porn*** | Supplemental study | See ***rien kuo*** |
| ***Rean chhnuol*** | Study for hire | See ***rien kuo*** |
| ***Rien kuo*** | Extra study | Teachers provide fee-based private tutoring sessions covering required school curriculum which is not taught during school hours to their own students. |
| ***Rien kuo Anglais/ Barang*** | English/French extra study | Beginning in lower secondary school, the national curriculum requires students to take foreign language, either English (***Anglais***) or French (***Barang***). Some students purchase extra classes outside of government school in private educational centers, schools or homes. |
| ***Rien kuo pel vissmakkal*** | Extra study during holidays/vacation | Private tutoring lessons provided during summer break. Typically conducted by the student's teacher from the previous grade to finish the curriculum from that grade or by the student's teacher for the upcoming grade to start the curriculum before the next school year. |
| ***Rien kuo pises*** | Extra special study | Government school teachers conduct private tutoring lessons one-on-one or for small groups of students, typically from the teachers' government class. These lessons are conducted after school hours either at the teacher's home or a student's home. This type of private tutoring is either used by students for remedial lessons or for replacing government school altogether. |
| ***Sala akchoan*** | Private (tutoring) school | a) Private schools such as private universities to technology training centers.<br>b) Test preparation centers typically located in urban areas that prepare students for the university and/or national examinations taken in grade 12. Students often begin these sessions in grades 10 or 11. |
| ***Sangha*** | Monks | Monks |
| ***Wat*** | Temple | Refers to the Hindu temples built during the Khmer Empire. |

Source: Adapted from Chandler (1988) and Brehm, Silova, & Mono (2012)

ABBREVIATIONS

| Acronym | Term |
|---|---|
| DPC | Direct private costs |
| EFA | Education for All |
| EVEP | Elective Educational Vocational Program |
| GDP | Gross Domestic Product |
| GNI | Gross National Index |
| ISCED | International Standard Classification of Education |
| MoEYS | Ministry of Education, Youth, and Sport |
| NGO | Non-governmental organization |
| OECD | Organization for Economic Co-operation and Development |
| OLS | Ordinary Least Squares |
| PAP | Priority Action Plan |
| PETS | Public Expenditure Tracking Survey |
| PIRLS | Progress in International Reading Literacy Study |
| TIMSS | International Mathematics and Science Survey |
| UNESCO | United Nations Educational, Scientific, and Cultural Organization |
| UNICEF | United Nations International Children's Emergency Fund |
| USD | United States dollars |

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DEDICATION

To my family but especially to Great Grandma Velma Harris,

who believed in me more than I believed in myself.

# Chapter I

# INTRODUCTION

In 2008, I traveled to Siem Reap, Cambodia to study the country's education system and the economy. After touring an elementary school, I noticed a divide among the students. Some students were remaining in the classrooms while others left school for the day. My local guide explained that the students who remained behind were attending private tutoring classes from their teachers. I didn't find this to be unusual, as my own children stayed after school on occasion for extra help from their teachers on homework. However, my guide also added that the students who were leaving likely couldn't afford to pay their teacher for the sessions. These for fee private tutoring classes led by the students' current teacher were taking place in the school's classrooms and even in the open-air playgrounds. This dissertation is about my research on this subject. This first chapter begins with the problem statement and then discusses an overview of my research. Next, the research questions are listed as well as the potential contributions to the field. The chapter concludes with an explanation of the dissertation structure.

## 1.1 Problem Statement

In Cambodia, the Law of Education states that every child shall have nine years of public education at no charge (Kingdom of Cambodia, 2007), and the Code on Teachers' Professional Ethics Teacher Ethics specifically outlines that teachers shall not charge fees, collect monies, or run a business inside the classroom (Kingdom of Cambodia,

2008). However, despite the clear stance taken by the Kingdom of Cambodia, the practice of private tutoring for a fee by the students' classroom teachers in government schools thrives in a non-clandestine manner. One can view private tutoring classes taking place in open-air classrooms and in the government schools -- both before and after school hours.

Unique in its structure, Cambodian private tutoring stretches the predefined parameters of "shadow education" (Stevenson & Baker, 1992) and distorts public education into a hybrid "public-private education system" (Brehm, Silova, & Tout, 2012). In this hybrid system, the purpose of private tutoring is not for remediation, acceleration, or test preparation. Instead, new content is reserved for private tutoring sessions, and as a result, students cannot receive the entire government curriculum without paying for these extra studies. The consequences can be severe, such as affecting the ability to pass end-of-the-grade exams and be promoted to the next grade level. Arguably, these extra study sessions led by the student's current teacher have become more important and, in some cases, have completely replaced the need for students to attend official class time. There are both supply and demand factors that can motivate the perceived need for private tutoring. Supply side factors might include teachers pressuring students to attend their private tutoring session because of low or delayed salaries. These types of motivations require interventions such as an increase in teacher pay, more timely payment of teacher salaries, and increased supervision to ensure that teachers are not withholding curricula for later use in private tutoring session. Demand conditions for tutoring include the motivation of families for their children to excel in school and the ability of families with greater financial means to pay for the services. Interventions to counter these demands might include public information on how families can help their students at home and not require private tutoring sessions. However, in the absence of these supply and demand side interventions, the practice of private tutoring has the potential to exacerbate inequity, especially for already marginalized populations, through the Matthew Effect (Merton, 1968).

The Matthew Effect represents the idea of the rich getting richer and the poor getting poorer in an educational context (Stanovich, 1986, 2000; Walberg, Strykowski, Rovai, & Hung, 1984; Walberg & Tsai, 1983). This is a particularly appropriate metaphor for the impact of private tutoring since typically it is the families with greater financial means who can afford to send their children to these sessions. Therefore, the rich may become academically richer while the poor may become academically poorer. Despite the role private tutoring plays in potentially exacerbating inequity, no research to date has used nationwide data to infer a causal relationship of private tutoring on student outcomes. This research seeks to fill a portion of this gap in educational scholarship by investigating student achievement for fourth graders who received private tutoring everyday as compared to their peers who never participated in private tutoring. The next section describes this research in more detail.

### 1.2 Research Overview

This research evaluates the difference in student academic achievement, as measured by the World Bank Public Expenditure Tracking Survey (henceforth abbreviated as PETS, 2004), in literacy, numeracy, and combined scores for fourth grade Cambodian public school students who self-reported that they participated in private tutoring every day as compared to their peers who self-reported that they never participated in private tutoring. (Chapter III: Private Tutoring discusses the defining characteristics of private tutoring in Cambodia.) Education research to date in Cambodia has defined private tutoring categories and activities and found an association between extra studies and student outcomes in very small samples. However, these studies did not infer a causal relationship between extra study and student outcomes, nor did they include variables that account for family influences. In developed countries, particularly in the United States, research on the impact of family versus school has received notable, if not

controversial, attention (Coleman, 1966; Park, Byun, & Kim, 2011). However, scholarship on the Cambodian education system is lacking research that integrates the impact of these unique private tutoring sessions and family characteristics on student education achievement.

Furthermore, there is an absence of research on Cambodian primary school outcomes. In the international community, fourth grade is of particular interest and tested in both the International Mathematics and Science Survey (TIMSS) and the Progress in International Reading Literacy Study (PIRLS). Fourth grade was selected by TIMSS because it encompasses "the upper of the two adjacent grades with the most 9-year-olds" and thus represents the four years of public schooling inclusive of the first level of the International Standard Classification of Education (ISCED) Level 1 (TIMSS International Study Center, 2003). In most countries, including Cambodia, this is the fourth grade. PIRLS selected fourth grade for similar reasons as well as the fact that fourth grade serves as an important marker in cognitive development. It is "an important transition point in [students'] development as readers" (International Association for the Evaluation of Educational Achievement, 2011) because they are expected to have made the shift from "learning to read" to "reading to learn" (Anderson, 2011). Furthermore, low-income students' test scores in reading often begin to decelerate around fourth grade. Known as the "fourth-grade slump," this negative trend can serve as a precursor for the decline of student achievement in other subjects, including numeracy (Chall, Jacobs, & Baldwin, 1990), and if left unchecked, can result in the Matthew Effect.

Despite the prevalence of private tutoring in Cambodia, there is an absence of causal inference research focusing on outcomes in numeracy, literacy, and combined scores. The objective of this research is to help fill a portion of these research gaps and determine if private tutoring in the Cambodian context exacerbates inequity through a Matthew Effect. The specific research questions posed and answered in this analysis are outlined below.

## 1.3 Research Questions

After several trips to Cambodia, I was clear on my research focus. I was interested in exploring the differences between those students who stayed at the schools every day for private tutoring sessions and those student who never participated in tutoring. Fundamentally, I was interested in exploring if private tutoring impacted academic outcomes and equity at the elementary school level. Based upon these interests, the research questions for this research are as follows:

1. What are the factors that influence the pattern of student tutoring and its outcomes on the PETS (2004) numeracy, literacy, and total test scores?
2. What is the impact of tutoring in Cambodia (both effectiveness and equity)?[1]

The objective of the first research question is to evaluate the determinants of fourth grade success at the student, classroom, and school level. I utilized 29 variables in this analysis (student background characteristics, n=9; teacher characteristics, n=9; and school characteristics, n=11). These include categories such as gender, socio-economic status, motivation, education level, location of birth, educational inputs, and consideration of the impact of schooling versus family.

The second research question investigates the impact of private tutoring on the aforementioned student outcomes. Students are divided into two categories -- those who self-reported that they participated in private tutoring every day and those who self-reported that they never participated in private tutoring. I first investigate if there is a causal influence of private tutoring on student outcomes and then move to examine if private tutoring negatively impacts equity. For each research question, literacy,

[1]There is a distinct difference between equity and equality. According to *Webster's Dictionary*, equality is, as the name implies, "the condition or quality of being equal." For example, every student receives the same textbook or curriculum. Equity, on the other hand, is defined as "impartiality." In this research, equity is particularly important, as students who do not participate in private tutoring may not have the same likelihood of progressing to the next grade. The distinction between these two terms will be discussed in greater depth in the literature review portion of this research.

numeracy, and combined scores for the PETS (2004) exam for fourth grade Cambodian public school students are evaluated.

### 1.4 Contribution to the Field

This research contributes to the current body of research in five areas. First, it seeks to explore the impact of private tutoring on student achievement and the role it plays in exacerbating inequity. The research conducted to date on private tutoring in Cambodia has focused on older grades. This study is the first to investigate the impact of private tutoring at the elementary school level.

Second, as previously discussed, few quantitative studies have been conducted that utilize large datasets to draw a causal inference between private tutoring and student achievement. Because I use propensity score matching as my method of analysis, this research seeks to move the field closer to using empirical findings to draw a causal relationship between private tutoring and student achievement through the use of a nationwide dataset.

Third, this research integrates private tutoring into student background, classroom, and school level variables. Therefore, the impact of private tutoring can be evaluated alongside school and family influences. Identifying other variables that contribute to student participation in private tutoring can potentially help structure policy and, in the end, balance the playing field for all students.

Fourth, this research explores the impact of private tutoring in exacerbating the Matthew Effect in the numeracy, literacy, and total scores of fourth grade students. The concept of Matthew Effects has been applied to the development of English as a second language (Lamb, 2011), mortality rates (Aguirre & Vela-Peón, 2013), literacy and technology (UNESCO, 2014), and economics (Chen, Zhang, Liu, & Zhang, 2014) in

developing countries but has not been applied to the critical role of private tutoring instruction of government curricula.

Fifth, and finally, this research is the first to connect the government's discursive stance on the subject of private tutoring to the exacerbation of inequity among the already marginalized populations in Cambodia. This is especially poignant because the private tutoring services offered by Cambodian public school teachers introduce required curriculum content of basic primary education for a fee to the students. To contribute to the field in these five areas, this research is parceled into nine separate chapters, which are described in more detail below.

## 1.5 Dissertation Structure

As mentioned, this dissertation is structured into nine chapters. This chapter (**Chapter I: Introduction**) is followed by a synopsis of Cambodia history. **Chapter II: Cambodian Education: A Historical Context** parcels Cambodian history into five distinct time periods: 1. Khmer Empire through the French Occupation; 2. Prince Sihanouk and Lon Nol Regimes; 3. Khmer Rouge; 4. Socialist Occupation; and 5. Cambodia as a Post-Conflict/Post-Socialist State. Each time period highlights the development of the education systems and, if available, provides quantitative data to support the main points.

**Chapter III: Private Tutoring** is divided into nine sections. The first section evaluates private tutoring as a global phenomenon despite location and economics, and the second section details the barriers to researching private tutoring. The next section analyzes the modes of private tutoring inclusive of content, cost, instructional location, motivation of the recipient, quality, and class size. This is followed by a discussion of the systemic motivation for the prevalence of private tutoring, including supplementary education, culture, and corruption. The fifth section illustrates the threshold of tolerance

for the practice by society and governments, while the sixth section provides a view of private tutoring as a cost sharing and government mechanism for augmenting educational funding. The next section, section seven, articulates the Matthew Effect in the context of private tutoring, section eight provides the specifics of private tutoring in Cambodia, and section nine is the chapter summary.

**Chapter IV: Cambodia Educational Statistics** highlights qualitative data, including financing, structure, curricula, repetition and dropout rates, and inputs.

**Chapter V: Theoretical and Conceptual Frameworks** illustrates the frameworks utilized in this research as well as alternative hypotheses.

**Chapter VI: Research Design and Methods** includes a description of the dataset, criteria for reducing the dataset, description of the outcome variables, utilizing the treatment variable, private tutoring, as a binary variable, strategies for missing data, protocol for recoding the variables used as predictors, building the basic ordinary least squares model and collinearity of independent variables. The chapter concludes with a description of propensity score matching, and the threats to validity and the limitations of this research.

**Chapter VII: Descriptive Statistics** addresses the descriptive statistics for the outcome variables, treatment variable, and covariates used as predictors.

**Chapter VIII: Empirical Results** highlights the findings for this analysis. It is organized by the above mentioned research questions.

Finally, **Chapter IX: Conclusions and Agenda for Future Research** provides concluding thoughts and ideas for extending research in this area. Each chapter, with the exception of this chapter (**Chapter I: Introduction**) and the final conclusions and agenda for future research chapter (**Chapter IX: Conclusions and Agenda for Future Research**), closes with a chapter summary.

# Chapter II

# CAMBODIA EDUCATION: A HISTORICAL CONTEXT

This chapter provides an overview of Cambodia's history through an educational lens. The purpose of this chapter is to provide a historical foundation for those elements that apply to this research. To do so, the chapter begins by discussing the earliest evidence of education that took place during the Khmer Empire and then details how this traditional mode of education was used as a strategy to control the Cambodian citizens during the French occupation. Next, the impact of the Khmer Rouge is detailed, followed by the influence of Russia and Viet Nam during Cambodia's most immediate post-conflict state years. The chapter concludes with a summary of the state of Cambodia's education system at present.

## 2.1 Khmer Empire to French Occupation (13th century-1953)

Cambodia is home to some of the most astonishing temples on Earth. Temples, or *wats*, such as Angkor Wat, Ta Prom, and Bayon, were constructed between the 9th and 15th centuries. From as early as the seventh century, elite members of society were educated in these temples by volunteer Buddhist monks, or *sangha* or *acharj* (Chandler, 1988). By the 12th century, this traditional system had expanded to educate non-elite boys (Bilodeau, Pathammavong, & Lê, 1955; Clayton, 1995; Dy, 2004) in topics such as reading and writing Khmer, principles of Buddhism, basic elements of mathematics, rules of propriety, and some manual arts (Gyallay-Pap, 1989, p. 258). In addition, the monks

instructed the students in construction (i.e., roads, bridges, and temples) and carpentry (i.e., furniture) (Torhorst, 1966, p. 154). It is because the students were required to reside and work at the temples during the period of their instruction that the education was restricted to males (Dy, 2004). The monks relied on the rote memorization of sacred Buddhist texts, and as a result, most students left the temple public schools unable to read or write the very words and phrases they were devotedly reciting (Bilodeau et al., 1955, p. 21). However, the temple education also served a wider purpose of instilling in the young men fundamental elements of life and society, such as social conduct and ethics, which could be carried back with them to their villages. As such, temple education provided a cultural foundation for the broader Khmer society (Dy, 2004).

It wasn't until the invasion by France in 1853 that this traditional education system changed. The French colonialist agenda, with regard to education, was to develop an elite subset of the population who could speak both Khmer and French and act as intermediaries between the conquered and the conquerors. A population divided by language served as a fundamental strategy of the French to rule and suppress the masses not just in Cambodia but throughout all of the French colonies (White, 1996). More interested in the neighboring colony of Viet Nam, the French exerted little effort in Cambodia during the first part of their occupation (Clayton, 1995). Some argue that this lack of attention was due to the larger economic gains the French predicted to yield from Viet Nam (Osborne, 1969, in Clayton, 1995). Others believe that the French occupiers found the Cambodian people to be stubbornly resistant to change and, therefore, directed their efforts toward Viet Nam, whose citizens were perceived as being more dynamic, better workers (Chanda, 1986), and more cooperative than Cambodians (Clayton, 1995; Haas, 1991). Once attention was redirected toward Cambodia, the French opened enrollment into newly established Franco-Cambodian schools and issued a decree in 1916 requiring all boys to attend a French school if one existed within two kilometers of their home. A handful of these schools included sections for girls. However, Cambodian

parents were unwilling to succumb to this change and still preferred the traditional *wat* education system (Clayton, 1995). In fact, there is some evidence that the monks themselves motivated parental pushback to French education. Realizing that the temple schools had long served as a foundation not just for education but also for social cohesion (Clayton, 1995), the French adjusted their strategy to work through the temple schools in an attempt to "modernize" traditional education and educate a small percentage of the population. Slowly, the monks were persuaded to first consider and then participate in educational training. The curriculum in the temple schools was largely the same as that in the French school except that the monks conducted the instruction in Khmer (Clayton, 1995). Ultimately, the strategy to work through the temple schools was more successful than the original plan of expanding the Franco-Cambodian schools. For example, in 1931, there were only seven students who received a high school diploma, or a *baccalaureate*, and in 1936, there were fewer than 60,000 students enrolled in primary school. By the end of the French occupation in 1945, there were over 270,000 enrolled in primary school, over 3,000 enrolled in secondary school, and 144 had received a baccalaureate (Vickery, 1984, p. 9). These small enrollment figures illustrate that the French strategy of creating an elite group of educated Cambodians through restricting access to the masses was successful. By 1945, only 15% to 20% of the population had some type of French education (Ne pote, 1979, p. 776, translated in Clayton, 1995, p. 10).

### 2.2 Norodom Sihanouk and Lon Nol Regimes (1953-1975)

The fall of France in 1940 during World War II marked the beginning of a slow decline of power in its colonies, including Cambodia. By 1953, France relinquished its claim on Cambodia, and Prince Sihanouk embarked on a strong departure from the French educational strategy. Instead of focusing on educating just the elite, he strove to grant access to all Cambodian citizens. By pushing educational spending up to 20% of all

government expenditures, additional schools and tertiary institutions, inclusive of teacher training institutes, were built, and enrollment climbed. By 1970, enrollment in primary school reached one million students, secondary school enrollment exceeded 100,000, and tertiary school enrollment expanded to over 10,000 (Vickery, 1984, p. 9). However, Prince Sihanouk's education expansion strategy failed on at least two fronts. First, he neglected to address the quality of education being delivered (Ayers, 2000), emphasizing quantity over quality. Taking their cue from the French and ignoring their traditional past, Cambodian citizens, as a whole, believed that being educated was a means of achieving status and wealth and, therefore, demanded that what had been restricted from them by the French be provided. This demand pushed Prince Sihanouk to rapidly expand access to education. However, this strategy flew in the face of recommendations put forth in a UNESCO report (Bilodeau et al., 1955), which stated that it was the "moral duty of the state, before making education compulsory, to offer the pupils proper schools with hygienic conditions, qualified teachers and a suitable curriculum" (p. 31). The quality of the education became secondary to the diploma documenting an individual's educational attainment (Vickery, 1984). Second, Prince Sihanouk overlooked the importance of fostering private sector growth, and industry and commerce could not absorb all of the new graduates produced (Dy, 2004; Vickery, 1984). For those who could not find jobs in the private sector, they turned to the government for employment. Teaching jobs were particularly desirable because the first post-independence salaries were aligned with the same position in France, as opposed to setting salaries in accordance with the local cost of living. Therefore, teachers lived lavishly compared to peasants or the average laborer. By the late 1960s, all of the 20,000 primary and secondary teaching positions had been filled, and the government announced that it could not absorb any additional graduates in teaching positions or otherwise. For a tertiary or even upper secondary graduate, returning to the peasant life was unconscionable, and, therefore, public outcry ensued (Vickery, 1984). Between the absence of focus on educational quality and the lack of

available employment, “the education system was thus producing an increasingly numerous class of useless [and frustrated] people” (p. 10). Harking back to Cambodia's traditional past, Prince Sihanouk readjusted his educational strategy to focus on universal primary education with an emphasis on Khmer language and culture. Unfortunately, his reforms were never implemented as the political turmoil in the 1970s gave way to the bloodiest period in Cambodian history (Dy, 2004). In 1970, Prince Sihanouk was overthrown and Lon Nol seized power. However, Lon Nol’s tenure was short-lived, as the Khmer Rouge took control of the country.

### 2.3 Khmer Rouge (1975-1979)

The nearly century-long French occupation was arguably less traumatic than the four years of Pol Pot’s reign. The Khmer Rouge has been likened to China’s Great Leap Forward in the 1950s and the warfare of communism in the Soviet Union in the 1920s. Similar to the Chinese and Soviet objectives, the goal of the Khmer Rouge regime was to "destroy the old society and its social, political, economic, and cultural infrastructure" (Quinn, 1989, p. 180). During these four years, nearly two million Cambodians perished. Of this, it is estimated that 75% of teachers, professors, and educational administrators (Clayton, 1998; Hirschhorn, Haviland, & Salvo, 1991; Ministry of Education, 1990), 96% of university students, and 67% of all primary and secondary students were killed (Chandler, 1992; Clayton, 1998). Educated citizens, who were typically those who protested, were categorized as enemies of the state and systematically selected for execution. For those who survived, formal education was deemed unnecessary, as citizens were required to work on collectivist farms or in factories (Chandler, 1992; Clayton, 1998). Infrastructure was destroyed, 90% of the schools were abandoned or demolished, and books were burned (Clayton, 1998; Ministry of Education, 1990). In the shadows of the temples, the entire education system was eradicated.

### 2.4 Socialist Occupation (1979-1991)

In 1979, the Vietnamese invaded Cambodia, forcing the Khmer Rouge leadership to flee to neighboring Thailand. The Cambodian people viewed the Vietnamese as "saviors" without whom a great many more people would have died. As one Ministry of Education official said in 1994:

> [During the Khmer Rouge regime] we prayed every day for someone to come and rescue us, [but] only Viet Nam came to help us. I tell you honestly, in three months more of Khmer Rouge rule, we would have all been killed. [I] will never forget, and please, don't you forget. (Clayton, 1999, p. 70)

The new People's Republic of Kampuchea was established, and under the Vietnamese occupancy, slowly schools were revived as the government sent out a national plea for anyone who could read to teach. In 1979, the first curricula were issued. Only four to five pages in length, these were distributed to those who were teaching (Yi et al., 2003), and the entire public education system from kindergarten to higher education was officially reopened in the 1980s with an enrollment of approximately one million students (Dy, 2004). Of these students, 30% of the students had no father, 10% had no mother, and 5% to 10% were orphaned (Postlethwaite, 1988). Cambodian education, throughout the 1980s, was marked by missing or poor infrastructure, unqualified teachers, the absence of a national curriculum framework, an inadequate supply of resources, and high dropout rates in primary school (Asian Development Bank, 1996). Still, the government schools were open, and enrollment soared (Clayton, 1999; Dy, 2004). In the early 1980s, the four- to five-page curriculum briefs were developed into a full national curriculum with a strong focus on nation building (Yi et al., 2003). The content served to bury the horrors of the Khmer Rouge past and uplift the citizens by reminding them of the strength of their ancestors who had built the temples that still surrounded them (Villiams, 2014, p. 158).

In the early 1980s, in non-pedagogical tertiary education, the language of instruction for classes led by Vietnamese and Russian professors was French. Over time,

more students who were not fluent in French were granted admission into higher education, and by the mid-1980s, tertiary education had adopted a "flexible" language policy. Students would study Vietnamese in anticipation of taking a class by a Vietnamese professor and conversely switch to study Russian if a desired class was led by a Russian professor. Similarly to their own country, the Vietnamese systematically removed French from the Cambodian society and prohibited English and Western ideology (Ayres, 2000; Clayton, 1995).

Vietnamese development workers, assisted by the Soviet Union and other Eastern-bloc countries and generous donations from international donors, worked to reopen the country's 18 primary and 6 lower secondary teacher training institutes (Dy, 2004). However, the control of language was stricter in the pedagogical universities than in the non-pedagogical institutions. Teacher training institutes were staffed with Vietnamese professors, and French was replaced with Vietnamese, with lectures translated into Khmer. By 1988, tens of thousands of new Cambodia teachers had graduated from one- and three-year pedagogical institutes (Clayton, 2006), and the teaching cadre grew.

Russia and Viet Nam worked to instill a socialist ideology and, as a means of monitoring the results, developed technical, political, common staff, and "gray-area" groups. The *technical group* designed the teacher training and monitored teacher ideas that challenged the current socialist ruling party. The *political group*, staffed with senior teachers, instructed less experienced teachers on the "right ideology," and the *common staff group* worked to suppress ideas that did not support the ruling party. The *gray-area group* consisted of a list of teachers whose "conscience and beliefs were doubted" and who were considered "outsiders" (Yi et al., 2003, p. 3). Those teachers whose names appeared on the gray-area group's list were excluded from accessing some of the teaching benefits for which they were entitled (Yi et al., 2003). Prior to the Khmer Rouge, teachers, inclusive of the Buddhist monks, were held in high regard in Cambodian society. However, these pro-Socialist ideological strategies divided the teaching cadre.

The work of the political group was particularly malicious, as they enjoyed direct access to the ruling party, which could discipline teachers who were marked as straying from the appropriate political ideology. As a result of perceived infractions by the political party, teachers could have their official classes reassigned to another teacher (and thus lose access to the more lucrative private tutoring sessions) or find themselves restricted from promotions, and the political party could negatively influence officials when teacher salary increases and payments were due (Yi et al., 2003). Viet Nam and Russia vowed to withdraw once Cambodia was strong enough to stand on its own (Haas, 1991). Due to the imminent collapse of the Soviet Union and the impact on funding, an exodus of Russian and Vietnamese teachers, professors, and advisors occurred in 1989. The remaining development staff and educators left when the Soviet Union completely crumbled in 1991 (Clayton, 1999).

### 2.5 Cambodia as a Post-Conflict/Post-Socialist State (1991-Present)

In 1991, the first period of autonomous peaceful rule since 1975, the Cambodian government was faced with the task of reconceptualizing the education system and creating a national curriculum. One of the first decisive moves made by the Ministry of Education, Youth, and Sport (MoEYS) was to remove political coursework and socialist dogma from all levels of education. After the withdrawal of the socialist occupants, Cambodia disavowed communist practices. In fact, the impressive Political Training College that was built by the Vietnamese in 1989 as a space dedicated to the promotion of socialist ideology remained unused by 1995 (Clayton, 1999).

With political aspects removed from education, the government turned to consider education for the masses. Originally, in the traditional temple schools, basic education was designed to provide a "minimally adequate level of education to live in society" (Dy, 2004, p. 4). Young men attended the temple to be educated by Buddhist monks, girls

were instructed by their parents at home, and senior members of society provided guidance in village governance. But this structure did not fit in post-conflict/post-socialist Cambodia in 1991. By 1996, MoEYS had employed a rapid succession of reforms that adjusted the education structure three times (from 4-3-3 to 5-3-3 to 6-3-3), and, as under the French and Prince Sihanouk, girls were included in public education (Dy, 2004; Geeves & Bredenberg, 2004). The 6-3-3 structure remains in effect today.

Similarly to Prince Sihanouk's reign, the post-conflict/post-socialist Cambodian administration focused on access to education instead of quality. The push for higher enrollment numbers strained the educational system in terms of financing, the teacher workforce, and the curriculum. In order to accommodate all of the new primary and secondary students enrolled and to provide a solution to the teacher shortage, the government increased the capacity of the new classrooms being constructed to hold 40 students and introduced double shifts. Double shifts allow one group of students to receive classroom instruction for four hours in the morning and then a second group of students to receive instruction for the same amount of instructional time in the afternoon (Geeves & Brendenberg, 2004). By 2005, over 80% of primary and 40% of lower secondary schools were running double shifts (Benveniste, Marshall, & Araujo, 2008, p. 43). In the short term, this strategy served the fundamental purpose of allowing all students to receive an education. However, in the long run, it may negatively impact the quality of the education provided and serve as a catalyst to increase the demand for private tutoring due to decreased classroom instruction time (Bray, 2008; Brehm & Silova, 2014). Private tutoring is explored more in the following chapter, and current educational statistics for Cambodia are detailed in **Chapter IV: Cambodia Education Statistics**.

## 2.6 Chapter Summary

This chapter provided a historical context for Cambodia's education system and the primary forces and events that have shaped it. Included in this discussion was the earliest evidence of education which took place during the Khmer Empire in the temples, followed by the French occupation, the Sihanouk regime, the Khmer Rouge, the Socialist occupation, and ultimately, Cambodia as a post-social/post-conflict state. There are several themes that emerge from this investigation. The first is access. During the Khmer Empire, access to education was permitted only to boys, and during French colonialism, access was granted to those select few who were chosen by the French to be the new Cambodian elite. In Prince Sihanouk's reign, education was declared to be accessible to any citizen, only to have access denied to all citizens by Pol Pot. The second theme is quality. Quality appears to be a missing component throughout the history of Cambodian education. In the Khmer Empire, education was arguably more focused on pragmatic aspects of learning, such as vocational skills and oral history. The French neglected schooling for the better part of the occupation, and when attention was redirected to the education system, quality was not the objective. Prince Sihanouk's educational agenda was squarely on access despite outside counsel advising him to turn his attention toward a quality curriculum and teacher training. Restrictions on access and to a quality education are themes that remain as relevant today as they did in Cambodia's past. These topics, and the implications for equity carry through this report and are explored in the chapters that follow.

# Chapter III

# PRIVATE TUTORING

This chapter explores the policies and practices associated with private tutoring as a global phenomenon. Before turning to a discussion of private tutoring, a word is appropriate on the methodological procedures utilized in the development of this chapter. For the purpose of this research, a systematic evaluation of rigorous qualitative and quantitative methods was conducted**.** By inputting key words such as *private tutoring, shadow education, supplemental education, teacher compensation (formal and informal), teacher performance pay, teacher quality, performance pay and compensating differentials,* and *non-pecuniary benefits* into research databases, comprehensive lists of literature were gathered and selected for inclusion. The databases used include EBSCO's Academic Search Premier, Professional Development Collection, Education Research Complete, Education Full Text, ERIC, JStor, ProQuest, Social Sciences Citation Index, and Google Scholar. Additionally, donor and government websites were investigated for current reports and research. The literature included in this report was selected based upon appropriateness of topic fit, methodological rigor, and publication date. Research conducted in the past 15 years was given priority over older publications. This review is not designed to be an exhaustive list of all of the literature addressing private tutoring. Instead, it provides a snapshot of the some of the most relevant publications on the topic of private tutoring. In this dissertation, I cite Brehm and Silova (2014) extensively. Brehm and Silova did an excellent study on the effects of private tutoring, but it differs

from my research in several important ways. First, Brehm and Silova focused on six schools in one district and a total of 36 6th grade and 9th grade students. This study focuses 2,984 on fourth grade students drawn from across the country. Second, Brehm and Silova gathered original data, while this research uses the World Bank PETS data. Third, this research infers a causal relationship between private tutoring and student achievement in Khmer and mathematics using propensity score matching, while the purpose of Brehm and Silova "was not to draw a correlation between private tutoring and student achievmeent, but rather to highlight a disparity between student who go and do not go to private tutoring" (p. 105). To this end, Brehm and Silova provide descriptive statistics. This section begins with a discussion of private tutoring as a global phenomenon.

### 3.1 Private Tutoring as a Global Phenomenon

Private tutoring is not restricted to rich countries or to those that participate in international standardized tests. Dang (2007) documented the existence of private tutoring in countries with vastly different educational statistics, economic levels, and geographic settings, such as Singapore, South Korea, Egypt, Greece, Kenya, Japan, Romania, Kenya, the United States, and the United Kingdom. In the mid-1990s, Japan reported private tutoring revenues at $14 billion (Russell, 1997); Singaporean families, with fewer citizens than Japan by an order of magnitude, spent approximately $2 billion USD in private tutoring revenues (George, 1992, in Bray, 1999);[2] in Egypt, private tutoring consumed 20% of household expenditures per child in urban primary schools and 15% per child in rural primary schools (Fergany, 1994). As a percentage of GDP, in Turkey, parents invested approximately 1.44% in private tutoring as compared to public

[2]Bray (1999) estimated this figure based upon research conducted by George (1992) discussed in the *Straits Times* article. George does not state these financial conclusions explicitly.

education expenditures, which absorbed about 2% (Tansel & Bircan, 2006). However, in Korea, the percentage of GDP spent on private tutoring is staggering. Recent studies have found that approximately 3% of GDP was invested in private tutoring (Lee, 2013).

The existence of private tutoring is indisputable; the reasons for its ubiquitous rise are circumstantial. Private tutoring is a global phenomenon individually molded by a country's context. Its scope and purpose highlight tension points in education systems and serve as collective markers denoting which levels and what types of education a society perceives as having the greatest value or importance to a student's future. Generally speaking, the frequency of private tutoring appears to trend upward as grade levels and the stakes increase. Graduation from high school can be at risk, and enrollment into higher education looms as a desired next step. For example, in Viet Nam, approximately 31% of primary school students enroll in private tutoring. In lower secondary school, this number increases to 56%, and in upper secondary school over 77% of students pay for some form of private tutoring (Dang, 2007). In Zimbabwe, the regional variation of sixth grade students who received private tutoring was between 36% to 74% (Machingaidze, Pfukani, & Shumba, 1998). Interestingly, a 1996 study in Hong Kong yielded less clear results. In this research, private tutoring was received by 45% of primary students, 26% of lower secondary students, and 41% of upper secondary students (Lee, 1996). This uncommon example of primary students receiving greater levels of private tutoring than upper secondary students may be a result of middle school admission policies. In Hong Kong, primary school performance was used to determine which of the five college-going bands a student would be placed in at middle school and high school. Therefore, the highest quality middle schools only select students from the highest scoring primary schools, and the premier high schools only admit students from the highest scoring middle schools. The pressure for primary school students to perform is intense, and the test scores have long-term repercussions on a student's K-12 experience (Levin, 2013).

However, in some contexts, private tutoring has played a much larger role in politics. For example, in the 1990s, as post-Socialist states transitioned to market economies, fiscally strapped governments allowed private tutoring as a means of augmenting the federal education budget and justifying the reallocation of government funds into more immediate strategies for promoting the new country's economic growth (Bray, 1999; UNICEF, 1998). Silova and Bray (2006) found that private tutoring occurred even at the height of the Soviet Union, but the government's admittance would have shaken the very foundation of the socialist concept of fair and consistent education for all citizens. As communism foundered, the political and economic infrastructures collapsed, and the educational system's foundation crumbled, some citizens viewed private tutoring as a more effective and immediate response to children's individual needs and welcomed the chance to have a voice in their children's education. Others, however, saw private tutoring as a threat to the equitable socialist education system and put their support behind strengthening what remained of the former soviet system. Teachers, with declining salaries, viewed their emerging roles as private tutors as a method of acquiring greater financial security, increased social status, and even political influence. As the system continued to fall, private tutoring rose at unprecedented rates in the former Soviet bloc (Silova & Bray, 2006) and remains in existence today supported by the continued use of the antiquated former soviet pay structure (Steiner-Khamsi, 2007).

### 3.2 Barriers to Researching Private Tutoring

Despite the sums of money invested into private tutoring, Dang (2007) notes that until recently private tutoring fell below the radar of scholars and still remains a subject lacking significant quantitative analysis for several specific reasons. The first reason is not an absence of academic interest as much as the obstacles to gathering data

representative of a country. Large databases typically do not contain detailed information on private tutoring receipts. Additionally, micro-data can be difficult to obtain. In some countries, even where private tutoring is allowed, public school teachers may not be enthusiastic about sharing the amount of financial gain they received from their students, and parents may not be willing to share the amount they pay in out-of-pocket expenses. Additionally Dang (2007) cites that Gordon and Gordon (1990) found that limited research on private tutoring might also be due to teachers' unwillingness to harm the reputation of the school, exposure to income tax consequences, and risking promotions. Notwithstanding these research obstacles, the following sections explore some of the seminal research to date on private tutoring in terms of the modes, systemic motivations, thresholds of tolerance, and cost-sharing strategies.

### 3.3. Modes of Private Tutoring

Private tutoring has evolved to include a menu of choices. Content, cost, instruction, location, motivation, quality, and size all vary by context, and the challenges with researching private tutoring (as noted by Dang, 2007) are dependent upon the variables included in the analysis. Table 1 below details these categories. The content of private tutoring can include academic or extracurricular activities, such as music or art. There may or may not be a fee, and instruction can be traded for a good or service (e.g., food). Instruction can be provided by a host of individuals ranging from administrators to teachers, and the content can be delivered in almost any location. The motivation of the recipient or the recipient's parents may address the need for more challenging content for the purposes of advancement, maintenance to ensure that the student understands the current content, remediation for those who are behind, or test preparation. In the case of South Korea, high-performing students participate in private tutoring as a means of covering content before it is presented in the teacher's regular class (Kim, 2011).

Table 1. Modes of Private Tutoring

| Content | Cost | Instruction | Location | Motivation | Quality | Size |
|---|---|---|---|---|---|---|
| Academic subjects | Fee | Administrators | Center | Advancement | [Variable] | Large Groups |
| | | Community members | Home | | | |
| Extracurricular activities (that take place in schools) | No fee | Formally trained instructors | Internet | Maintenance | | One-on-One |
| | | Parents | Mail | | | |
| Hobbies and enrichment (that do not take place in schools) | Trade | Students | Open air | Remediation | | Small Groups |
| | | Teachers | Phone | | | |
| Other forms of out of school learning | | | School | Test preparation | | Theatres |
| | | | University | | | |

Despite the motivation, the quality of content covered in the private tutoring sessions remains the most difficult challenge to collect, especially in less visible locations and/or in environments where private tutoring is explicitly prohibited, even though it persists. The size of instructional groups can vary from one-on-one, small groups, large groups, or theatres. The most common combination of these modes of private tutoring utilizes centers, institutes, or academies with large groups of students memorizing academic content for test preparation (Bray, 1999). With these considerations, the next section investigates the systemic motivation for private tutoring services.

### 3.4 Motivation

According to Dang (2007), the reason for the persistence of private tutoring is focused on three motivations -- supplementary education, culture, and corruption. In both developed and developing countries, parents seek supplementary education as a means of

augmenting the child's base education in the form of remediation or enrichment. Rigorous empirical evidence exists that highlights private tutoring as an effective instructional mechanism. For example, Banerjee et al. (2007) found that remedial education for third and fourth graders in India increased the average test scores for children in the treatment group as compared to those in the control group. In Germany, Mischo and Haag (2002) documented improved academic performance for 5th through 11th graders, and in Kenya, Buchmann (2002) noted that children who participated in private tutoring had lower rates of grade repetition. Zhang (2011) found that in China private tutoring may have significant and positive effects on urban students with lower performance scores or schools with certain levels of quality. Country trends reveal interesting trends within the motivation for private tutoring. In China, for example, Zhang (2013) found that Chinese teachers cover the entire curriculum but tutoring is used to help students compete for better exam scores to obtain a seat in better schools and colleges. Similarly, in Korea, private tutoring is used as an enrichment strategy among primary and secondary students (Lee, 2013).

However, improved academic performance as a result of tutoring is not always found. Suryadarma, Suryahadi, Sumarto, and Rogers (2006) stated that there was no effect of the private tutoring intervention on children in Indonesia, and Cheo and Quah (2005) concluded that private tutoring negatively impacted academic outcomes of students in Singapore.[3] Bloom (1984) stated that when delivered under best learning conditions, private tutoring is the most effective instructional method. In his seminal article "The Sigma Two Problem," Bloom discusses the research of Anania (1982) and Burke (1984). These two University of Chicago doctoral students evaluated the impact of

[3]Ireson (2004) noted methodological challenges to this study. These included the difficult of identifying a representative sample of tutors and their students, measuring private tutoring that takes place in a clandestine fashion, capturing the variation in tutoring quality, and establishing a control group when attempting a longitudinal study.

performance using conventional classroom instruction, mastery learning courses, and tutoring. The results of this random assignment across multiple grades and various subjects yielded a differentiation of two standard deviations in student learning. The consistency of these findings led Bloom and his doctoral students to pursue further research to identify ways in which group learning could replicate the effects of private tutoring on student cognitive achievement and attitudes.[4]

The second motivation for private tutoring cited by Dang (2007) is culture. In countries where completion rates for upper secondary school are on the rise, students are motivated to continue their education at university. To do so, it can become commonplace in the culture to invest in private tutoring to help increase a student's odds of acceptance to their top tertiary education choice (Dang & Le, 1999; Dang & Rogers, 2008). However, these investments may not be justified. Lee (2013) found that while private tutoring had a short-term positive effect on middle school students' academic achievement, it had minimal long-term effects on a student's university entrance examination score.

The final motivation for private tutoring noted by Dang (2007) is corruption. The OECD (2005) reported that some developed countries offered teachers additional pay for management duties, which pushed their time on duty beyond 40 hours per week. However, this additional pay layers on top of a livable base wage. In developing countries, teachers often live below the poverty line and are forced to take second jobs as a means of survival. If teachers work in areas that contain households financially capable of paying for private tutoring classes, this becomes an attractive option, as teachers can often make more from this stream of income than from other part-time jobs or from their full-time teaching position (Bray, 1999; Dang & Rogers, 2008; Steiner-Khamsi,

[4]Anania (1982) and Burke (1984) did not include an evaluation of students requiring remedial instruction.

Mossayeb, S., & Ridge, 2007). In Central Asia, for example, private tutoring unquestionably provides more income for teachers than their teaching salary. The average teaching salary is $26 to $86 USD per month compared to a private tutoring income, which can range from $20 to $2,000 USD per month (Silova & Kazimzade, 2006; Steiner-Khamsi, 2007; UNICEF, 2011). Unfortunately, the Cambodian government has little motivation to reform the system given that they benefit from "the 'trickle-up' flow of illicit bribes, including private tutoring fees, which are paid to school officials and officials in the district offices to education and most likely flow to higher levels in the pyramid of political corruption" (Dawson, 2009, p. 21). Interestingly, instead of being considered corruption, private tutoring is deemed as a benefit of the job by some members of the Cambodian society (Brehm & Silova, 2014). This tension between corruption and standard practice is explored further in the section below as thresholds for tolerance by societies and government are detailed.

### 3.5 Threshold of Tolerance for Private Tutoring by Society and Governments

How societies and governments perceive private tutoring do not necessarily align. Milovanovich (2014) identified three categories denoting how societies can perceive private tutoring services. These include corruption offense, "soft" corruption, and acceptable practice. An example of a "corruption offense" is the act of teachers withholding grades unless a student can purchase private tutoring sessions. Similarly, teachers have the ability to hold students back should they be unwilling or unable to pay for private tutoring sessions and may favor children in class who do attend private tutoring sessions over those who do not (Cambodia, 1994; UNESCO, 1976). Under these circumstances, households are forced to allocate funds to education or risk their child falling behind academically, being held back, or dismissed from school entirely. Furthermore, teachers may purposefully withhold academic content as a means of forcing

students to pay for private tutoring in order to receive the balance of the lesson. Milovanovich (2014) defines this act as "soft corruption." An example of an "acceptable practice" is a teacher's remedial work with low-achieving students with or without pay.

While society may have varying levels of acceptance with regard to private tutoring and teacher behavior, governments, in some countries, may be more lenient than the public. Governments have a more liberal position on public school teachers providing private tutoring to students. These positions can be parceled into four categories -- prohibited, discouraged, permission if approved, and *laissez-faire*. A "prohibited" action is very clear. It restricts teachers from providing private tutoring to their own students, students in their schools, and/or students from other schools. An example of "discouraged" is when teachers shun the practice as unethical in nature, but private tutoring is still legally allowed. Slightly different, but similar in nature, is the category of "permission if approved." In this category, permission to conduct private tutoring is received at the school level on a case-by-case basis. This opens the door to allowing private tutoring if administration receives a portion of the fees or a one-time payment from the teachers offering the service. The final category is "*laissez-faire*." In these circumstances, neither governments nor schools have set policies on private tutoring (Bray & Kwo, 2014), and thus, by default, a not-prohibited stance is taken (see Table 2 below).

Table 2. Private Tutoring Categories as Defined by Societies and Governments

| Society | | Government | |
|---|---|---|---|
| **Category** | **Definition** | **Category** | **Definition** |
| Corruption offense | Private tutoring by the same teacher in exchange for grades | Prohibited | Teachers are prohibited from providing private tutoring to their own students, students in their schools, and/or students from other schools. |
| "Soft" corruption | Purposeful reduction of teaching effectiveness in regular class to stimulate tutoring demand | Discouragement | While the practice of private tutoring is not officially prohibited by the government, teachers' ethical codes may discourage the practice. |
| Acceptable practices | Remedial work with low achievers | Permission if approved | Permission may be granted at the school level under certain circumstances. |
| | | *Laissez-faire* | The government/schools do not have set policies on teachers providing private tutoring to students. |

Source: Milovanovich (2014); Bray & Kwo (2014)

There is a thin line between corruption and acceptable practices. As shown in Figure 1 below, Milovanovich (2014) illustrated the "threshold of tolerance" as a malleable line that divides socially acceptable or unacceptable teacher behavior in relation to private tutoring. Applying Bray and Kwo's (2014) categories to the same mapping used by Milovanovich (2014) reveals that governments, as a whole, may be more lenient on the subject of private tutoring than their own citizens. The figure below illustrates that of the four categories identified by Bray and Kwo (2014), only one, prohibited, lies fully above the threshold of tolerance line, and two, permission if approved and *laissez-faire*, fall squarely below the threshold of tolerance line. The fourth category, discouragement, has a more ambiguous nature and thus occupies space above and below the threshold of tolerance line. However, what is notably absent from Bray and Kwo's (2014) research is evidence that governments that prohibit or environments that discourage the practice of teachers providing private tutoring actually enforce these regulations. In India, for example, it is impossible to enforce tribal areas (which accounts for the majority of the land in the country), and in urban areas, the teachers support the

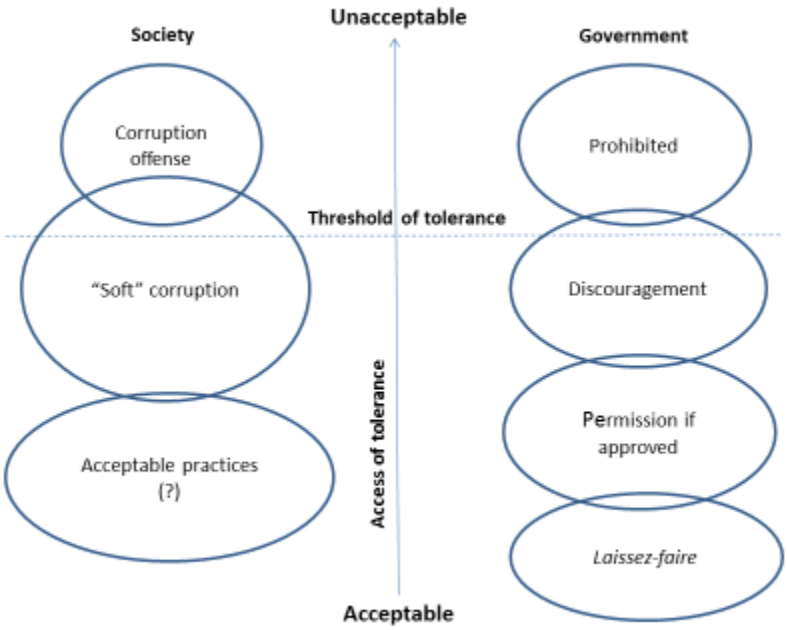


Figure 1. Private Tutoring and Threshold of Tolerance by Society and Governments. Adapted from Milovanovich (2014) and Bray & Kwo (2014)

ruling political party. As a result, there is no enforcement of private tutoring (Levin, private correspondence, 2015). One could argue that in the absence of such evidence, the positions adopted by governments or the teachers are discourse at best, and the threshold of tolerance embraced by society falls on deaf ears. To enforce the regulations set forth by governments and teachers that prohibit or discourage teachers from private tutoring requires additional resources. However, drawing additional resources from already limited education budgets is a reach if there is no compelling reason to do so. In fact, one might argue that it is not in a government's best interest to enforce or to discourage teachers from conducting private tutoring. Consider the former-socialist states that were previously discussed. In this instance, as the nascent states transitioned from socialism to market economies, governments allowed private tutoring as a strategy to supplement low teachers' salaries, and parents who had the financial means to pay for the services welcomed private tutoring as a means of offering their children a more customized

learning environment. Teachers, as mentioned, viewed this as an opportunity to increase their income, social status, and potential political influence. Currently, private tutoring remains in existence and the governments have little motivation to adjust the situation. The next section digs deeper into the concept of private tutoring as a shared public-government expenditure and the consequences of such a strategy.

### 3.6 Cost Sharing and Government Mechanisms for Funding Education

Government, schools, parents, and researchers have long known that public education is far from being cost-free. As previously discussed, investigating private tutoring as a form of corruption is a common method of analysis. However, it can also be evaluated as a cost-sharing method for education and a government mechanism for funding an otherwise unsustainable public education system. In fact, there has been a global shift in how donors, international agencies, and governments think about education. Bray (1998) notes that post-World War II movements promoted free public education as a means of reducing inequality and providing a mechanism for social mobility. Documents such as the 1948 United Nations Declaration of Human Rights and the 1959 Declaration of the Rights formalized the need for free public education and framing it as a "right" of the people. In the 1990s, donors and governments split from this tenet and instead advocated for fee-based higher education as a means of cost recovery and taxing those with greater financial means.[5] Donors argued that private rates of return for higher education justify individual investments, and most often, tertiary education is populated by the wealthiest members of a society, who can afford to absorb the associated costs. Not just at the tertiary level, but also at the kindergarten through 12th grade level, a dramatic shift occurred. The 1990 World Declaration on Education for All

[5]See as an example of promoting cost recovery in higher education.

(EFA), unlike earlier global documents, did not advocate for free education. Instead, it encouraged partnerships that may include individual households, communities, and collaboration with private or other public sector organizations (Bray, 1998). This could take the form of corporations investing in public education. For example, in Singapore, private sector corporations donate to public schools as a strategy for reducing their taxes, and in Manila, selected primary and secondary schools receive inputs from oil refiners, a detergent company, and a multinational hamburger franchise (Bray, 1998). In the United States, IBM offers lucrative competitions to assist innovative school districts to fund technology, and there is long tradition of private sector businesses offering internships and work study positions to public school students (Levin, 1999). More often, however, cost sharing heavily involves the community. In China, for example, people-run schools (or *minban* schools), commonly located in rural areas, have received community donations (either in cash or in-kind donations) as a means of supporting the *minban* teachers and constructing or maintaining the school building. Administration and education officials record "social contributions" from the community and non-governmental sources (Tsang, 2002). The influence of the private sector financing has risen to such an extent that the "state as the financer and provider of education [has become] a matter of debate and controversy" (Institute of Social and Policy Sciences, 2010, p. 1), and multilateral organizations such as the World Bank have expanded their role into establishing a regulatory environment for private sector funding (Lewis, 2013). However, burdening communities and households with educational costs has deep inequity implications. To best understand these implications, a word on how educational expenditures are parceled out is warranted.

Educational expenditures can be parceled into public and private costs (see Figure 2 below). Public costs include those items paid for by governments or institutions. These public costs can be further specified as recurring costs (i.e., teacher salaries, staff salaries, stipends, depreciation, and scholarships) and non-recurring expenses (i.e.,

building, equipment, furniture, and land) (Tilak, 1985). Alternatively, private costs are those items paid for by households or communities. Private costs are subdivided into direct (or "visible costs") and indirect costs (or "invisible costs"). Direct private costs, or DPC, associated with households include items such as tuition, books, uniforms, supplies, transportation, and parent association fees. The DPC associated with communities include the construction of school facilities and providing food and shelter for teachers (Tsang, 2002). Indirect costs include foregone income from the child working, foregone contribution of the child's production or work at home, and foregone earnings of parents to attend school functions (Tilak, 1985; Tsang, 1988). Indirect costs can be difficult to measure, as they include time parents spend volunteering at school to cook or serving as watchmen or conducting agricultural work to help produce meals (Carnoy & McEwan, 1997). Children, especially those in rural settings, can spend a significant amount of time on agricultural work to support the family (McEwan, 1998).

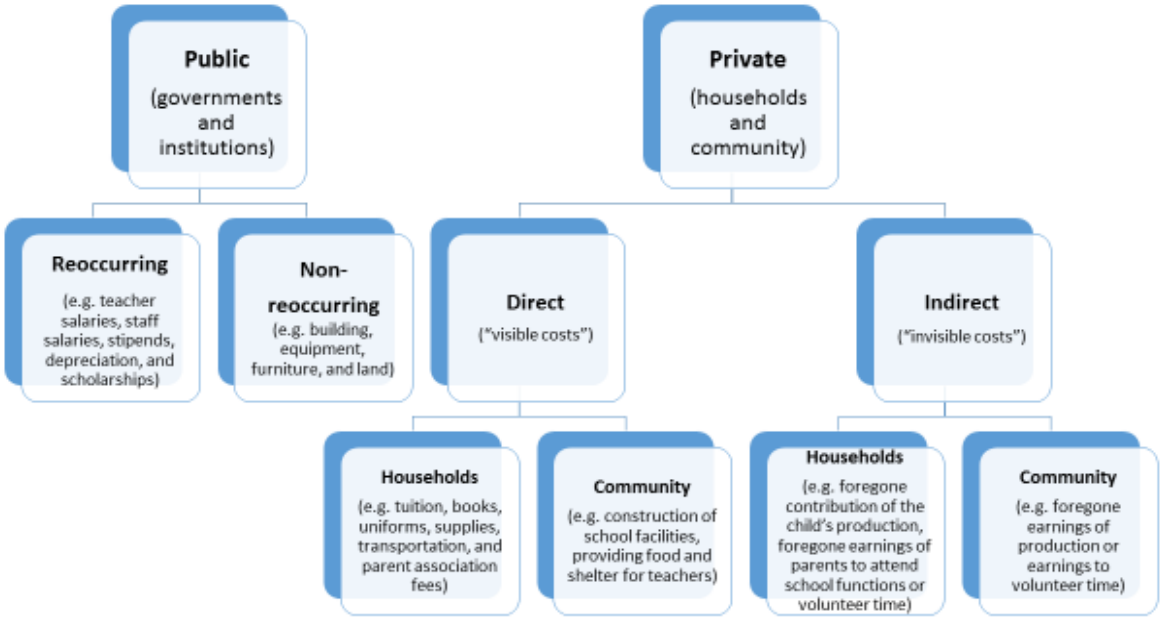


Figure 2. Educational Expenditures - Categories

Under these parameters, private tutoring falls within the private visible costs. Private costs are particularly important, as they can impact education from multiple angles. Tsang (1994) specifically notes five impact areas. They are as follows:

(1) Private costs constitute a substantial portion of the total cost for education;
(2) They impact quality related inputs such as access to textbooks or materials;
(3) Families with greater earnings spend more on private costs than do families in lower economic classes;
(4) Private educational expenditures are disequalizing and increase inequity (as their share of household income is negatively correlated with the overall household income); and
(5) Private costs can negatively impact the demand for education especially for girls and those in rural areas.

Traditionally, privatization can manifest into three categories -- private schools (i.e., *private provision paid for privately by households*), a combination of government and household funding such as vouchers (i.e., *private funding*), and monitoring by those receiving the services (i.e., *private regulation, decision-making and accountability*) (Belfield & Levin, 2002). Belfield and Levin (2005) define *private* (education) as "relating to schooling provided for and by individuals, groups, institutions and entities that are primarily devoted to meeting the private goals of participants and the sponsors of those institutions and that are closely related to the prerogatives of private property" (p. 5). Conversely, *public* (education) is described as "relating to entities and purposes that have a broader societal impact beyond that conferred upon the direct participants and is usually associated with a government role" (p. 5). Based upon these definitions, one might consider private tutoring to fall squarely within the private education as the teachers are hired to meet the needs of the participants. Dang and Rogers (2008) make a similar point as they present a framework for the supply of and demand for education as "a graphical representation of demand and supply for the formal and private tutoring

system" (Dawson, 2010, p. 21). They argue that private tutoring introduces "school choice," which may be more effective and economical alternative to private education (Dang & Rogers, 2008; Dawson, 2010). In these instances, private education may follow the rules of a free market. However, there are elements of public education embedded in the Cambodian scenario. Because MoEYS does not charge a fee for the use of its classrooms during off hours, the government can be seen as supporting private tutoring and a virtual extension of the public education system (Foondom, 2002). Ultimately, private tutoring does not qualify as a free market due to moral hazard or, in this example, the teacher's ability to promote or penalize students due to their private tutoring participation. The moral hazards involved in private tutoring are discussed in more detail below.

### 3.7 The Impact of Private Tutoring and Moral Hazard

I previously discussed how Dang (2007) argued that there are three motivations for private tutoring. These include supplementary education, culture, and corruption. I also discussed how teachers can make significantly more income in private tutoring fees than from their monthly teaching salary (Silova & Kazimzade, 2006; Steiner-Khamsi, 2007; UNICEF, 2011). However, despite the positive aspect of increasing teachers' salaries to a livable wage, teachers' supplementing their income with private tutoring fees paid for by the families of their students invites moral hazard, and students who do not participate in private tutoring may be negatively impacted. Before, I begin discussing the types of moral hazard, the important differences between private tutoring offered by a student's teacher and private tutoring offered by third party providers should be recognized. There are a wide range of private tutoring services offered in the marketplace. Previously, I detailed the different modes of private tutoring. These include advancement, maintenance, remediation, and test preparation courses. As a means of test preparation,

students can, for example, enroll in “cram courses.” In these classes, students prepare for their upcoming tests using previous high-stakes standardized exams. However, for third party providers to remain competitive in the market, more extreme measures are taken to obtain and offer the most current version of high-stakes tests to the public. Take, for example, the company called the New Oriental Education & Technology Group Inc., or the New Oriental. Headquartered in Beijing in 1993 by a former English teacher at Peking University, the New Oriental offers a variety of services for private tutoring. The services for children as young as three years old to adults include language training, test preparation, K-12 all subjects training, international study consulting, career services for overseas returnees, private schools, and online education (New Oriental Education & Technology Group, 2015). However, becoming “the largest provider of private educational services in China” has not been without controversy. Around 2000, the Educational Testing Service (ETS) advised “most American universities to treat all GRE and TOEFL scores from China ‘with caution’” (Walfish, 2001). The warning was given after a lawsuit was filed against New Oriental School by the ETS claiming that the New Oriental illegally reproduced ETS tests, including tests that were currently in use (Walfish, 2001). In the case of the New Oriental, the company was fined by ETS, but ultimately, its practices continued unabated.

Even in this extreme scenario, private tutoring offered by a third party provider is a different type of relationship than a teacher who charges his or her students for private tutoring services. One could argue that those who had the most to lose in the case of the New Oriental were the students who paid and studied for the exam. Similarly, those who have the most to lose when teachers provide private tutoring are the students. Coined originally in insurance and used frequently in financial markets, moral hazard is defined as “a situation in which one party gets involved in a risky event knowing that it is protected against the risk and the other party will incur the cost” (*Economic Times*, 2015). In other words, one person has the power to raise the level of risk, and another person

must suffer the consequences if things go badly. In the case of private tutoring offered by a student's teacher, the level of risk is set by the teacher, and the consequences are suffered by the student. There are, at least, three different types of moral hazard involved when teachers provide private tutoring to their students. The first manifestation of moral hazard is when teachers withhold parts of the curriculum or teach it poorly to stimulate the demand for their services. In Dawson's (2010) research, a Cambodian elementary school teacher explained this practice of withholding class content as "tricks of the teacher." The teacher explained that "tricks of the teacher … [is] the way we force the students to study private tutoring. The teacher says the new math formulas are only introduced in private tutoring" (p. 21).

Second, a student's participation in private tutoring can impact their ability to be promoted to the next grade level. Brehm and Silova (2014) found that private tutoring made an impact on student outcomes in Cambodia. In fact, students who participated in private tutoring every day scored higher in every subject (i.e., diction, math, reading, writing, and overall) than their peers who had low private tutoring attendance. Math had the largest disparity. Students who had high private tutoring attendance scored 12.4 percentage points higher than those students with low private tutoring attendance. In reading, students with high private tutoring attendance scored 10.9 percentage points higher. In the Brehm and Silova research, one parent flatly stated, "If you do not come to private tutoring, you will fail" (p. 110).

The third form of moral hazard comes in the form of teacher behavior, meaning that teachers can treat students differently according to whether or not they pay for private tutoring. In Cambodia, while corporal punishment is prohibited, research has shown that that teachers act differently toward students who attend private tutoring as compared to those students who do not attend private tutoring. For example, corporal punishment, in the form of digging nails into students' heads and twisting students' abdomens, typically occurs when a student cannot answer a question correctly. Students

who do not attend private tutoring were overwhelmingly "perceived to be unable to answer questions and therefore, punished more often than students who went to private tutoring" (Brehm et al., 2012, p. 33). Cambodian teachers stated that if students cannot afford private tutoring, they can come for free. However, the same research found no such students (Brehm et al., 2012). This could be due to the fact that students must approach the teacher and ask for permission to attend private tutoring for free. This act on the part of the student maybe too difficult for a child (Brehm et al., 2012). An early study found that students who do not have the financial means to pay for private tutoring do not say so because they "feel so ashamed" (Asian Development Bank, 1996, p. 107). Additionally, the impact of not attending private tutoring negatively affected how children felt about themselves. Students stated that they wanted to attend private tutoring so they would be perceived as being smart, clever, brave, and obedient (Brehm et al., 2012). Students who did not attend private tutoring were perceived by other students as being "poor,… lazy, scared, and/or dumb, and came from families that did not care about, or sacrifice enough for their education" (Brehm & Tuot, 2011, p. 14). In the most extreme case, the inability to attend private tutoring has been linked to one 12-year-old student's suicide (Rithy, 2011, in Brehm et al., 2012).

### 3.8 Private Tutoring and the Matthew Effect

In the *New Testament King James Bible*, the Gospel according to Matthew (25:29) states, "For unto every one that has shall be given, and he shall have abundance: but from him that has not shall be taken away even that which he hath." In less biblical verbiage, this verse has been translated and reduced to the concept of "the rich become richer and the poorer become poorer." So well-known is this phrase that it is simply referred to as the Matthew Effect. Merton (1968) applied this biblical teaching to describe the process of published scientists receiving greater levels of notoriety for publications than their

lesser known co-authors. Walberg was the first to use this concept in an educational context and specifically did so when evaluating academic achievement in reading (Walberg et al., 1984; Walberg & Tsai, 1983), but it was Stanovich (1986, 2000) who took this metaphor mainstream in literacy research and extended it because literacy affects all of the academic subjects including numeracy and areas of substantive knowledge. As noted by Kay (2014),

> There is ample evidence that students who do not make good initial progress in learning to read find it increasingly difficult to ever master the process. Stanovich (1986, 1988, 1993) outlines a model in which problems with early phonological skills can lead to a downward spiral where even higher cognitive skills are affected by slow reading development.

Therefore, if private tutoring does have a positive effect on student outcomes, then the practice affects repetition rates, dropout rates, and equity. Since Stanovich's research, the Matthew Effect has been applied by Lamb (2011), who found that English language acquisition of 11- and 12-year-old Indonesian students was attributed to three factors. These included early education experience, motivation, and current educational activities (see also Walberg & Tsai, 1983). Lamb (2011) stated that one of the obstacles to student achievement in English language studies was due to a student's inability to pay for private tutoring. The author did not make the distinction between private tutoring offered by the student's teacher or from private language schools. However, similarly to the research by noted above by Brehm and Tout (2011), Lamb (2011) said that students who did not have access to private English language classes were perceived by their teachers as being "less motivated." Instead, they simply lacked the financial means to obtain outside educational support. UNESCO (2014) stated, "To be sure, the Matthew Effect resonates loudly and across disciplines" (p. 10), but "those who cultivate [literacy] skills 'shall be given and … have abundance', those who do not face a much harder path" (p. 13). However, the impact of the Matthew Effect on literacy does not occur in a vacuum. Given that "reading affects everything" (Morris, 1984, in Stanovich, 1986,

p. 13), faltering literacy skills negatively impact other academic subjects. For example, struggles in third grade lead to what educators call the “fourth-grade slump.” This is when reading-to-learn becomes a necessary skill. More literate students grasp lesson content at an easier pace and steadily move ahead in their knowledge and learning, while poor readers may avoid reading entirely and fall farther behind. As a result, “classes in science, social studies, history and even math come to rely more and more on textual analysis, so that struggling readers begin to fall behind in these subjects as well” (Murphy Paul, 2012).

In private tutoring research, the Matthew metaphor is appropriate given that it is the more affluent families who can afford private tutoring services for their students. For example, Brehm et al. (2012) followed 444 students in grades 6 (n=162) and 9 (n=282) from January to December 2011. For their evaluation, the researchers analyzed academic achievement for students in grade 6 in mathematics and the Khmer language. Academic achievement for students in grade 9 focused on the subjects of mathematics, the Khmer language, and chemistry. Participation in private tutoring varied by subject and by grade. In grade 9, approximately 50% of student paid for classes in Khmer and mathematics, while roughly 35% participated in private tutoring in chemistry. In grade 6, about 40% of students participated in private tutoring. This research found that participation in fee-based private tutoring was associated with test scores that were at least one grade level higher than those of their peers who never attended private tutoring sessions. This is the Matthew Effect. The rich, who can afford private tutoring services for their students, become academically richer, while the poor, who cannot afford private tutoring for their students, become academically poorer. This research builds on the Brehm et al.'s research by inferring causality of private tutoring at a national level.

## 3.9 Private Tutoring in Cambodia

In Cambodia, there are five different types of private tutoring services offered. These services are either a function of the "public-private hybrid education system" or of the traditional "shadow education" (Brehm et al., 2012). To understand the differences, I will begin with a brief description of these two categories and then describe the types of tutoring offered within each category.

"Shadow education" was first coined by Stevenson and Baker in 1992. They defined it as "a set of educational activities that occur outside formal schooling and are designed to enhance the student's formal school career" (p. 1639). In order for shadow education to flourish, three characteristics of an educational system must exist. First, the education system must utilize a centrally administered exam; second, student advancement becomes increasingly more difficult as selectivity narrows (i.e., from upper secondary school to university) (Turner, 1960); and third, there are consequences of primary and secondary education on future outcomes such as additional education, occupations, or societal status (Stevenson & Baker, 1992). The use of the "shadow" metaphor was not used to imply that private tutoring activities took place in a clandestine manner. Instead, it "denote(s) the strong connection between [resource] allocation rules and non-formal schooling" (p. 1640). Bray (2009) believes that the metaphor of a shadow is a beneficial for four reasons. He states:

> First, private supplementary tutoring only exists because the mainstream education system exists; second, as the size and shape of the mainstream system change, so do the size and shape of supplemental tutoring; third, in almost all societies much more attention focuses on the mainstream than on its shadow; and fourth, the features of the shadow system are much less distinct than those of the mainstream system. (p. 13)

In Cambodia, there are three types of private tutoring that fall under the traditional shadow education category. These include extra special study, or *rien kuo pises*, private tutoring school, or *sala akchoan*, and English/French extra study, or *rien kuo*

*anglais/barang* (see Table 3 below). Extra special study encompasses lessons provided by a government school teacher to a small group of students or one-on-one. These lessons typically have an associated fee and can be designed for remediation, advancement, maintenance, testing, or in some cases, to replace the government school completely. The second activity, private tutoring school, has one particular activity that falls under shadow education. This activity involves students paying for lessons to help them "cram" for the national examination or university entrance exams. The final type of shadow education in Cambodia is English/French extra study. These languages are introduced to the public school curriculum in lower secondary school, and some students opt to pay for extra classes in centers, schools, or homes. However, not all types of private tutoring fall neatly within the shadow education definition created by Stevenson and Baker (1992), and therefore, Brehm et al. (2012) added a second category called "public-private hybrid education system." Public-private hybrid education system is defined below:

Table 3. Traditional Shadow Education in Cambodia

| **Term (English and Khmer)** | **Definition** |
|---|---|
| **Extra special study** ***(Rien kuo pises)*** | Government school teachers conduct private tutoring lessons one-on-one or for small groups of students, typically from the teachers' government class. These lessons are conducted after school hours either at the teacher's home or a student's home. This type of private tutoring is either used by students for remedial lessons or for replacing government school altogether. |
| **Private (tutoring) school** ***(Sala akchoan)*** | a) Private schools such as private universities to technology training centers.<br>b) Test preparation centers typically located in urban areas that prepare students for the university and/or national examinations taken in grade 12. Students often begin these sessions in grades 10 or 11 |
| **English/French extra study** ***Rien kuo Anglais/Barang*** | Beginning in lower secondary school, the national curriculum requires students to take foreign language, either English (***Anglais***) or French (***Barang***). Some students purchase extra classes outside of government school in private educational centers, schools or homes. |

> In the Cambodian context, private tutoring is best understood in terms of a public-private hybrid education system where public schooling and private tutoring seamlessly merge, casting its own shadow. This conceptualization implies that private tutoring is a compulsory (private) portion of public education, not a distorted shadow, and thus complements mainstream schooling where it is structurally deficient. (p. 15)

This category has two types of private tutoring activities (see Table 4 below). The first, *rien kuo,* or extra study, is the most common form of private tutoring and a defining feature of the Cambodian education system. Extra study activities are defined as those private tutoring lessons that are led by a student's own teacher after school hours but in the government school buildings or in the teacher's personal residence. These student-paid lessons focus on the government curriculum. However, the purpose is not for remediation, acceleration, or maintenance. Instead, new content is covered in the sessions, and as a result, a student cannot receive the entire government curriculum without paying for these extra studies. The potential impact of these unique extra study sessions on student equity is substantial and, as such, the focus of this research. Similarly, a second activity, *rien kuo pel vissakkal*, or extra study during holidays (vacation), focuses on covering the government curriculum either at the end of the academic year or before the next academic year commences. The purpose of these sessions is to cover academic content that was not omitted during the academic year. Brehm et al. (2012)

Table 4. Public-Private Hybrid Education System -- Cambodia

| **Term (English and Khmer)** | **Definition** |
|---|---|
| **Extra study (R*ien kuo*)** | Teachers provide fee-based private tutoring sessions covering required school curriculum which is not taught during school hours to their own students. |
| **Extra study during holidays (vacation) (*Rien kuo pel vissakkal*)** | Private tutoring lessons provided during summer break. Typically conducted by the student's teacher from the previous grade to finish the curriculum from that grade or by the student's teacher for the upcoming grade to start the curriculum before the next school year. |

argue that private tutoring in the Cambodian context has become more important than the formal education system to both teachers and students because of "its availability to generate higher incomes for teachers and provide a more complete (and individualized) education to students" (p. 7).

**Impetus**

This research previously cited motivation for private tutoring, such as supplementary education, culture, and corruption. In Cambodia, these explain, in part, the rise of private tutoring, but do not fully justify the birth of the public-private hybrid education system. Brehm and Silova (2014) provide a more nuanced perspective. They detail five additional reasons for the rise of the public-private hybrid education system in Cambodia. These include the introduction of double and triple shifts, the depreciation of the national currency, the government's limited investment in education, the overloaded curriculum, and student demand. Each of these is described below.

The first reason for the rise of the public-private hybrid education system is the emergence of multiple teaching shifts. Double and triple shifts were introduced into the Cambodian educational system for two reasons. Originally, during Cambodia's socialist years, the combined push for education and the lack of schools and teachers resulted in multiple shifts in schools (Postiglione & Tan, 2007). Later, double shifts in Cambodia spread due to the paradoxical relationship between the Education for All movement and neo-liberal policy pushed by development banks. While those attending Jomtein in 1990 urged for greater inclusion and goals designed to increase enrollment rates, simultaneously representatives of development banks wrapped fiscal conservatism into development loans, thus putting countries like Cambodia in the crossfire. Under these conditions, governments were "encouraged" to increase enrollment rates, but to do so with minimum spending. While double shifts were introduced to accommodate enrollment increases, international donors were more inclined to invest in inputs such as

books, schools, and materials and less apt to invest in spending on teacher salaries (Brehm & Tout, 2013). This provided a climate ripe for the rise of private tutoring. As one parent stated,

> [Education] is different compared to before. Now students in 9th grade are unable to read and write properly. Before there was good education… [but today] students learn more in private tutoring than government school because [the] government school has too many students. (p. 7)

A second reason for the rise of private tutoring is the depreciation of the national currency. Teachers found their classrooms filling and, due to inflation, their wages declining. In 1993, the riel depreciated by nearly 70%. The pedagogical tension of multiple shifts combined with the economic reality of a declining economy meant that teachers were overworked and paid virtually a pittance. Furthermore, the low pay teachers receive was often late in its arrival and inaccurate in that varying levels of the government receive a "cut" as the monies flow from MoEYS to the provincial offices to the district offices (World Bank PETS Cambodia, 2005). As a means of financial survival, teachers began instructing portions of the government curriculum during non-classroom hours. Beginning in 1991, private tutoring emerged as a tool for remedial math, but, by 1998, fees were common throughout the entire education system as an unofficial strategy to share the financial burden of teachers' salaries (Brehm et al., 2011).

Another reason for the birth of the hybrid public-private education system is the government's limited investment in education. Brehm et al. (2012) discussed supplemental teacher pay and noted that the decline in government expenditures contributed to the rise in private tutoring. As previously noted, the Cambodian government increased its investment in education to 2.6% of GDP in 2012. However, this still ranks it as 170th in the world and a far cry from the suggested 6% of GDP recommended by UNESCO. This lack of financial resources shifts a greater burden on households and often forces parents to invest more in their children than does the government. For example, in 2008, the government spent an average $50 USD per

student per year (Brehm & Silova, 2014; Ratcliffe, 2009), and households invested between $48 USD (in rural areas) and $157 USD (in urban areas) (Brehm & Silova, 2014; NEP, 2007).

The fourth reason for its rise in private tutoring is the combination of multiple shifts (i.e., two four-hour shifts) and the content of the curriculum. Teachers overwhelmingly felt, and still feel, that the national curriculum is too long to be taught in half-day increments. The teachers felt that they needed to rush through the curriculum in order to cover it. To instruct the students at a "high standard," extra time provided in private tutoring was necessary (Brehm et al., 2012). To accommodate, teachers divide content between regular classroom time and private tutoring sessions, and in order for students to succeed in this public-private hybrid education system, they must attend both. As stated by one Cambodian student,

> Government class is mostly about giving introductions, theories, and a little bit of practice, while private tutoring has a lot of problem solving and practice…. However, having private tutoring alone is difficult too…, because practice alone is not enough. Learning theoretical introductions during school hours and practicing applications during private tutoring lessons is better. (Brehm & Silova, 2014, p. 108)

The fifth, and final, reason for the rise of the public-private hybrid education system is demand. Brehm et al. (2012) found that teachers employed a more individualized instruction in private tutoring due to the reduced numbers of students in attendance. Also, the reduced class size allowed students to ask more questions and learn to a greater degree than during regular school hours (Brehm & Silova, 2014).

**Consequences**

There are at least three positive results of the public-private hybrid education system in Cambodia. These include customized learning and increased parental input (Silova et al, 2006), increased academic achievement (Brehm et al., 2012), and increased teacher income (Bray, 1999; Dang & Rogers, 2008; Steiner-Khamsi et al., 2007).

However, the impact of the public-private hybrid education system also has long-term negative repercussions that may outweigh the aforementioned gains. These negative impacts include the increased inequity in student achievement and self-esteem, increased financial burdens on families, long-term impact on economic growth, and compromising the entire education system due to moral hazard.

The first negative consequence of the hybrid education system is the increase in inequity in student achievement and self-esteem. To the first point, inequity in student achievement, Cambodian teachers, by introducing new concepts in their private tutoring session and withholding academic content from the classroom, are negatively affecting student achievement. Additionally, this inability to attend private tutoring affects students' self-worth and fosters a belief of not being "clever, smart, or obedient" (Brehm et al., 2012).

The second negative repercussion of the public-private hybrid education system is the financial burden placed on families. In 2000, the Priority Action Plan (PAP) was launched by the Cambodian government on a pilot basis in the ten most economically disadvantaged provinces in Cambodia. The plan was designed "to reduce the cost burden on the poorest families to increase participation of their children in grades 1-9" (MoEYS, 2001, p. 1, in Bray & Bunly, 2005). Prior to the implementation of PAP, total educational costs placed a staggering financial burden on the poorest families. The expenses associated with public education consumed 26% of household budgets for a single child to attend primary school and 57% of household budgets for a single child to attend lower secondary school (Bray & Bunly, 2005, p. 51-52).[6] The PAP program eliminated registration charges as well as fees for monthly exams and learning materials, and officially prohibited private tutoring in primary and lower secondary education. According to the authors, the program reduced household expenditures for education

[6]These household budgets do not include food expenses.

from 1997/98 and 2004 by 33% (for Grade 1) and 41% (for Grade 6). Furthermore, they claim that this cost reduction, in conjunction with a strong public enrollment campaign, had a significant effect on enrollment rates. Between 1996 and 2004, primary enrollment rates soared by over 30%, and the effect on lower secondary enrollment was even more dramatic, increasing by nearly 50% (p. 20).[7,8] Despite the legal restrictions imposed on private tutoring, the practice still openly exists across all grade levels and associated fees remain prohibitive. Private tutoring for one child can cost a family, on average, 21,000 riels ($5 USD) for first (1st) grade, 211,000 riels ($50 USD) for ninth (9th) grade, and close to a million riels ($337 USD) for twelfth (12th) grade (Bray & Bunly, 2005; Harris-Van Keuren, 2010). With an average gross national income (GNI) per capita of less than $900 per year, the cost of private tutoring can quickly consume a family's income and force difficult decisions, especially when more than one child in the family is school-aged. The results of these choices are revealed, in part, in the country's enrollment rates. In 2012, primary net enrollment stood at 96% and dropped precipitously to 35% and 20% for lower and upper secondary school, respectively.

The third negative consequence of the hybrid education system is the collective impact of academic achievement on the economic development of a country. There is strong evidence that improving cognitive skills, beyond grade level attainment, is related to individual earnings, the distribution of income throughout the population, and the economic growth of the country (Hanushek, Lavy, & Hitomi, 2006). Therefore, despite

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[7]Still almost 70% of fees remained for primary school and 60% of fees for secondary school. Furthermore, there is a lack of evidence that some of the fees which remained were incrementally increased in an attempt by school administration and teachers to recapture lost finances or that new fees were not created or that the directive was selectively ignored and business proceeded as usual. It is likely that a complicated acceptance, implementation and fee adjustment to the new policy took place. See Tonini (2010), which showed that schools imposed contributions at the student level to account for fees lost by government policy changes.

[8]No alternative explanations were provided by the authors. This might explain at least in part these increases in enrollment.

the short-term savings in teachers' salaries, the government may be cultivating a larger drag on economic growth of the country as a result.

The fourth, and final, negative repercussion is the introduction of moral hazard. Private tutoring, as a form of supplemental income, is problematic when teachers, legally or illegally, tutor their current students. This invites moral hazard and complicates the relationship between the student and the teacher in ways that may compromise equality, quality, and achievement. Teachers can be financially incentivized to withhold critical content from their classroom discussion and then, in essence, sell it for a fee in private tutoring classes (Foondum, 2002). For example, in South Asia and portions of Africa and South America, high rates of teacher absenteeism exist (Chaudhury et al., 2004; Chaudhury et al., 2006; Steiner-Khamsi, Harris-Van Keuren, Omoeva, & Shiotani, 2009) and when present in the classroom, teachers often do not teach the full curriculum (Abadzi, 2007; Chaudhury et al., 2006). This was a key finding in the Brehm et al. (2012) research. Indeed, Cambodian public school teachers are withholding government-required curriculum content and teaching it during for-pay private tutoring sessions.

With an eye toward these negative repercussions, in the mid-1990s, the Cambodian government stepped off of its *laissez-faire* platform and began to adopt a prohibitive stance on the practice of private tutoring in government schools (Dawson, 2009). Because this stance was fundamentally unsuccessful, the Ministry of Education, Youth, and Sport (MoEYS) included a clause in the code of teacher ethics stating that "teachers shall not raise money or collect informal fees or run any business inside the class" (Kingdom of Cambodia, 2008). Private tutoring is considered prohibited at the primary level, but only discouraged at the lower and upper secondary level. Despite this, private tutoring continues unabated in public schools at all levels.

## 3.10 Chapter Conclusion

This chapter detailed the policies and practices associated with private tutoring as a global phenomenon and in the Cambodian context. The prevalence of private tutoring varies by country but generally trends upward as the stakes for educational attainment increase. For example, as students approach high school graduation and entry into tertiary education, the frequency of private tutoring increases. However, there are exceptions to this trend, such as the case of Hong Kong in which Lee (1996) reported that primary school students had higher levels of private tutoring participation than lower secondary or upper secondary students. This can be explained by the strict admittance rules and, thus, the increased pressure to secure a seat in the high demand middle school. This chapter also explored the role of private tutoring in a larger political context. For example, prior to the dismantling of the former Soviet Union, private tutoring existed in the public school system. However, the government turned a blind eye as acknowledging the existence of this practice would have shaken the foundation of the socialist agenda. In the post-socialist states, the practice is accepted by the government as a strategy to augment the strapped federal education budget. The limitations of researching private tutoring, as noted by Dang (2007), include the challenges of collecting the data (in the absence of a large database with private tutoring questions included in the questionnaire or survey) and stakeholders' unwillingness to discuss the practice. Despite these challenges, the modes of private tutoring identified by researchers vary by content, cost, instructor, location, motivation, and class size. And yet, quality remains a plaguing variable for researchers. In many instances, it is difficult to assess if the quality of the instruction justifies the sacrifices incurred by a family. The motivation for parents to send their child or children, if feasible, to private tutoring include the need for supplementary education and cultural pressures (Dang & Rogers, 2008). The motivation for governments to regulate private tutoring is less clear. Regulatory action on private tutoring ranges from

prohibited to *laissez-faire*, but there is no substantial evidence that governments enforce regulations and instead may willfully permit the practice as a means to subsidize the education budget. Permitting private tutoring to exist as a private household cost has inequity consequences, but there is still no compelling reason for a government to take any type of action to mitigate the prevalence of the practice. The inability for all students to access the new content taught in the private tutoring sessions increases the educational attainment gap between the socio-economic classes of society and, thus, fosters a Matthew Effect. The educational statistics related to the educational gap are detailed in the next chapter.

# Chapter IV

# CAMBODIA EDUCATION STATISTICS

This chapter provides details on select economic and education indicators for Cambodia. The chapter begins with an economic snapshot of Cambodia as compared to its neighbors. This includes gross domestic product (GDP), Gross National Income (GNI), educational spending, and school life expectancy. Next, education finance is explored, and the structure of the education system is outlined. The fourth section describes the curriculum, and the final section explores repetition and dropout rates.

## 4.1 Cambodia Economic Snapshot

Bordered by Viet Nam, Thailand, and Burma (Myanmar), Cambodia is located in the heart of Southeast Asia. It is roughly the geographic size of the state of Washington but home to over twice the number of inhabitants. The country is currently comprised of 4 municipalities and 20 provinces. The provinces are further subdivided into 185 districts with approximately 13,400 villages. It is a highly homogeneous country with 90% Khmer, 5% Vietnamese, 1% Chinese, and 4% other smaller ethnic groups (CIA, 2013).

Cambodia has enjoyed peace for the past two decades and, as a result, has made positive economic strides.

Table 5 displays the similarities and differences in the region. While Cambodia falls well below emerging Asian Tigers, Thailand and Viet Nam, in terms of gross domestic product (GDP), when evaluated in isolation, the gains are notable. In 2008,

Cambodia's GDP exceeded $10 billion and grew at an impressive 40%, propelling the GDP to $14 billion in 2012.

Table 5. Regional GDP in Billions USD ($) (2008-2012)

| | 2008 | 2009 | 2010 | 2011 | 2012 |
|---|---|---|---|---|---|
| **Cambodia** | 10,352 | 10,402 | 11,243 | 12,830 | 14,062 |
| **Laos** | 5,444 | 5,833 | 7,181 | 8,227 | 9,299 |
| **Thailand** | 272,578 | 263,711 | 318,908 | 345,672 | 365,966 |
| **Viet Nam** | 91,094 | 97,180 | 106,427 | 123,679 | 141,669 |

Source: World Bank (2013)

Cambodia's Gross National Income (GNI) still falls far below that of its neighbors, as do its educational spending and school life expectancy. Despite posting a higher GDP than Laos, Cambodia is still a year behind in school life expectancy (7.3 years as compared to 8.3 years) and fully 0.7% behind in educational spending as a percentage of GDP (see Table 6 below).

Table 6. Regional Vital Statistics (2012)

| | Cambodia | Laos | Thailand | Viet Nam |
|---|---|---|---|---|
| **Population (in millions)[a]** | 14.8 | 6.6 | 66.8 | 88.8 |
| **Size (square miles)[a]** | 69,900 | 91,400 | 198,000 | 127,200 |
| **GDP (in billions)[a]** | $14.0 | $9.3 | $366.0 | $141.7 |
| **GNI per capita (Atlas method)[a]** | $880 | $1,260 | $5,210 | $1,400 |
| **Education spending (% of GDP)[a]** | 2.6 | 3.3 | 5.8 | 6.6 |
| **School life expectancy (in years)[b]** | 7.3 | 8.3 | 10.4 | 10.8 |

Sources: a) World Bank (2013), b) Nation Master (2013).

### 4.2 Education Finance

As shown in Figure 3 below, from 2000 to 2012, the Cambodian government's investment in public education demonstrated a notable gain from 1.7% to 2.6% of GDP (approximately $165.8 billion to $824.9 billion USD in constant dollars). However, despite these increases, this percentage is still well below UNESCO's World Education Forum suggested 6% of GDP, resulting in the low rank of 170th in the world.

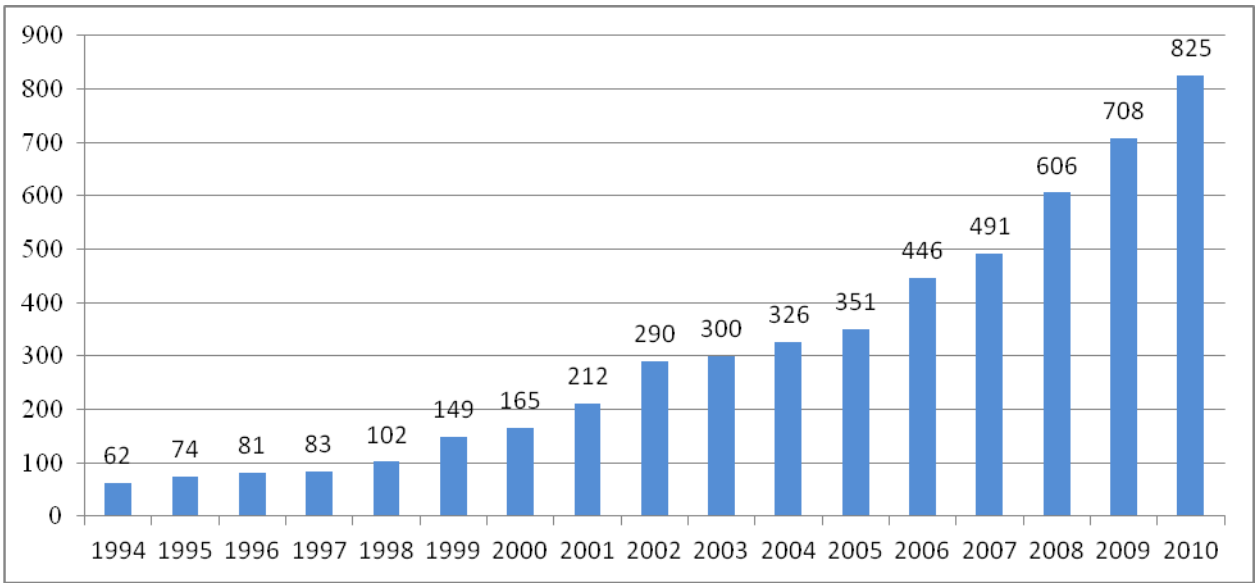


Figure 3. Spending for Ministry of Education (in billions of riels) (1994-2010). Source: Cambodian Ministry of Economy and Finance (2013)

Education financing has been decentralized, with more than three-quarters of the funding allocated from the local government's budget. The government states that it is currently operating at a net deficit of 100 million riels for the education sector. Decentralized finance strategies, combined with the shortage of GDP allocated education funds, place additional pressure on the most remote schools and increase disparity for those children who are most in need of a high-quality, safely accessible education. Also problematic in the government's education financing strategy is that fully one-third of its entire education budget is derived solely from foreign aid (UNICEF &World Bank,

2006). The dependency upon this level of funding calls the sustainability of their projects and donor motivations into question.

### 4.3 Structure

Currently, the Cambodian government provides a 6-3-3 education system, with 9 years assigned as compulsory education. The school year is 38 weeks and runs from October to May. Primary school educates children ages 6 through 11 (grades 1 through 6), lower secondary ages 12 through 14 years (grades 7 through 9), and upper secondary, lyceum, professional lyceum, gymnasium or vocational school ages 15 through 17 (grades 10 through 12). Cambodian schools run Monday through Saturday in two sessions. The morning session is conducted from 7:00 am-11:30 am, and the afternoon session from 1:00 pm-5:30 pm. Upper secondary students in grades 10 through 12 have morning sessions, while lower secondary students in grades 5 through 9 are assigned to the afternoon sessions. Primary schools run both morning and afternoon sessions for grades 1 through 4 (Brehm, 2010).

### 4.4 Curricula

All education levels have a set national curriculum and local life skills. The national curriculum lessons and the hours dedicated to each subject are set by the government. However, the local life skills are variable and open to input from the local community and NGOs. For lower grades, local life skills include cleaning the playground and classrooms. Upper secondary students also care for the classroom and school grounds but also might have more advanced duties, such as participating in student council. Primary school students, grades 1 through 3, have four subjects in the national curriculum (Khmer language and history, mathematics, science and social studies, and physical and

health education and sport) and local life skills. Primary school students, grades 4 through 6, have five subjects in the national curriculum (Khmer language and history, mathematics, science, social studies, and physical and health education and sport) and local life skills. Lower secondary students have six lessons in the national curriculum (Khmer language and history, mathematics, social studies, science, foreign languages, and physical and health education and sport) plus local life skills. Upper secondary students have four compulsory lessons (Khmer language and history, literature, math, and physical and health education and sport) and then select either three or four electives (sciences, social studies, and Elective Educational Vocational Program, EVEP) dependent on their level of math. All lessons are 40 minutes in length for primary school and 50 minutes for lower and upper secondary school. Students often refer to private tutoring as "open classes," reflecting the fact that they typically take place in the open air (Brehm, 2011). These classes have three unofficial periods (6:00-7:00 am, 2:00-4:00 pm, and 4:00-5:00 pm). Therefore, a primary school student who pays for private tutoring will typically go to school from 6:00 am to 5:00 pm Monday through Saturday. The importance of private tutoring grows as students progress from primary school into lower and upper secondary school. The national 12th grade exam is taken in July, and results are received in August. Grades range from A (+/-), B (+/-), C (+/-), D (+/-), F (+/-), and E and the subjects include Khmer and math. Physics, chemistry, biology, and English are seen as solid skills for getting jobs after school. These six subjects are also the most popular for private tutoring. Students who score an A can receive a full scholarship to university. Students who receive a B can have half of their university tuition paid for by the government, and students who receive a C can have 10% of their university tuition paid by the government. For the vast majority of Cambodians, university tuition, fees, and supplies prove to be out of reach. In the 2010-2011 academic year, tuition to a university in Siem Reap cost, on average, $400 per year or $1,600 for four years (Harris-Van Keuren, 2010). For many families, the critical role of private tutoring begins with

enrollment in primary school. Without participation in private tutoring, the odds of repeating a grade or dropping out of school are increased. These are discussed below.

### 4.5 Repetition and Dropout Rates

Research shows that students who attend private tutoring courses daily have higher academic score in school than their peers who never attend private tutoring sessions (Brehm et al., 2012). This is a particularly important fact, as lower academic scores place the student at risk of repeating a grade.

Figure 4 below shows that for each academic year, from 2001 to 2012, there is a larger percentage of students who repeated a grade in primary school than in lower and upper secondary school combined. For example, in 2004-2005, the percentage of students who repeated a grade in primary school reached nearly 14%, while the percentage of students who repeated a grade in lower and upper secondary school summed to approximately 9%.

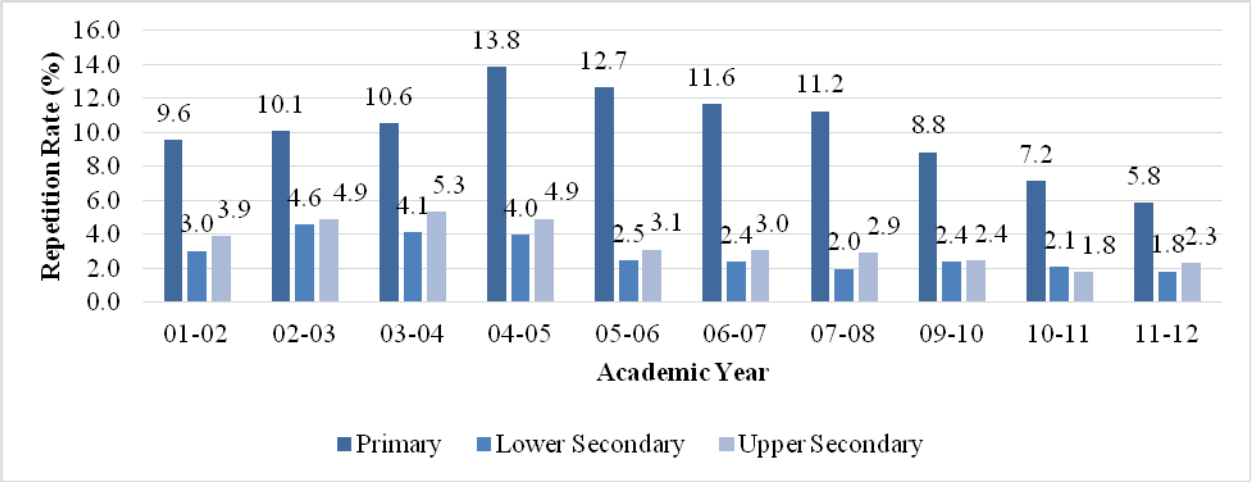


Figure 4. Repetition Rates by Education Level (2001-2012) (%). Source: MoEYS (2012)

Research shows that “the inability to attend private tutoring can at times cause so much stress that dropping out of school all together is a realistic option for some student” (Brehm et al., 2012, p. 33).

Figure 5 below illustrates the change in dropout rate overtime in Cambodian primary school. In 2004-2005, dropout rates in primary school were relatively flat, with the largest difference between grades at roughly 2%. The Kingdom-wide dropout rate in fifth grade was 12.5% compared to the Kingdom-wide dropout rates in sixth grade at 10.6%. By 2012-2013, the most current dropout data available show a much more erratic pattern. The difference in dropout rates for each grade increased to over 14%. The Kingdom-wide dropout rate for second grade was 5.3%, and the Kingdom-wide dropout rate for fifth grade was 19.5%. While some of the dropout rates are notably lower in 2012-2013 compared to the dropout rates in 2004-2005, this increased heterogeneity suggests that the educational system is more volatile. If private tutoring has a causal impact on learning outcomes, then it also contributes to the quality of education a student receives. Therefore, students who are not receiving private tutoring are receiving a lower quality education and are at a higher risk of repeating a grade or dropping out. This is discussed further in Chapter VIII: Empirical Results.

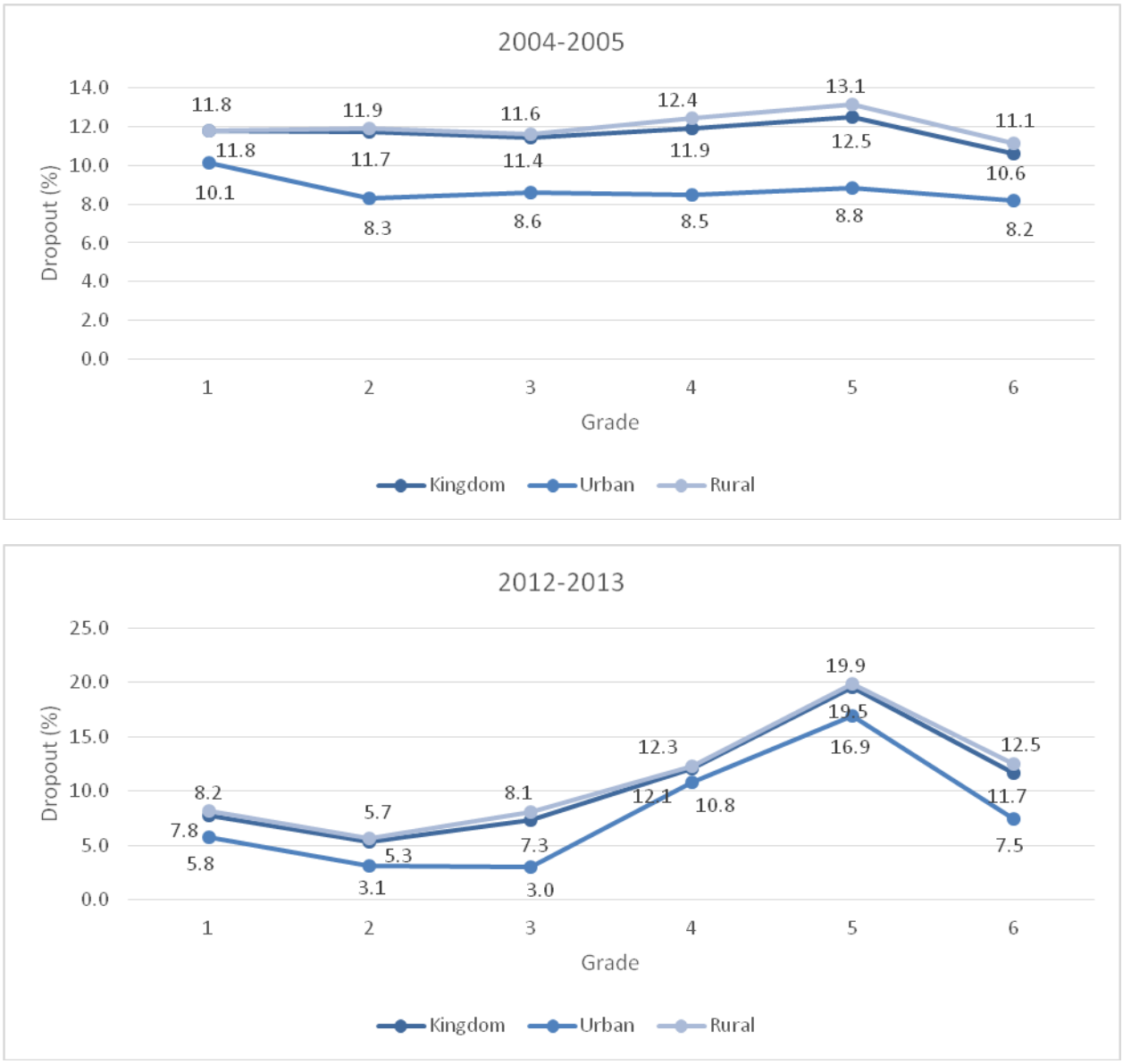


Figure 5. Dropout Rates Grades One (1) – Six (6) (2004-2005 and 2012-2013) (%). Source: MoEYS (2005-2006); MoEYS (2013-2014)

## 4.6 Inputs

In Cambodia, the government is still attempting to reverse the effects of the Khmer Rouge by working to rebuild destroyed schools and build new schools where none previously existed. In Cambodia, there remain close to 10,000 schools that have reported unsafe roofs, floors, and walls. While access challenges may exist, even if a school is functioning, its quality may be so low that parents see no benefit to the lost child wages and necessary financial investment. For example, MoEYS tracks the number of teachers' instruction manuals sent to schools. In 2010, the government recorded 6,120 schools that included a fourth grade. Of those schools, only 2,611 were sent manuals (see Table 7 below). There is no mention if teachers who were sent manuals received training on their use (MoEYS, 2010). This lack of materials and inadequate teacher training can impact the quality of the education received during school time and drive the need for supplementary lessons in private tutoring.

Table 7. Instructional Manuals (2009-2010)

| | Schools (n) | Manuals sent (n) | Schools that did not receive instructional manuals (n) |
|---|---|---|---|
| **Urban** | 577 | 261 | 54.8% |
| **Rural** | 6,120 | 2350 | 61.6% |
| **Kingdom** | 6,120 | 2611 | 57.3% |

Source: MoEYS (2010)

## 4.7 Chapter Summary

This chapter provided vital statistics on Cambodia’s economic and educational status. It showed that despite higher GDP rates, Cambodia still lags behind its neighbors in terms of education life expectancy and spending on education as a percentage of GDP.

In 2012, Cambodia ranked 170th in the world in terms of the percentage of spending on education. Further problematic is the percentage of the education budget that is derived from foreign aid. In 2006, fully one-third of the education budget was from outside sources, calling the future sustainability of projects and policies into question. The structure of the education system and the curricula were both explored, and the role of private tutoring in mitigating repetition rates and dropout rates was discussed. The final section described select inputs assigned to education. These include facilities, education manuals, and teacher training. With a brief introduction of the history of Cambodia viewed through an educational lens complete, and an exploration of private tutoring and the educational and economic statistics detailed, this research now turns to the theoretical and conceptual frameworks that serve as the foundation for this study.

# Chapter V

# THEORETICAL AND CONCEPTUAL FRAMEWORK

This chapter lays the theoretical and conceptual foundation used for this research. The chapter begins by detailing the theoretical framework, inclusive of the mathematical representation and statistical relationship between school inputs and school outputs. Then, the conceptual framework is illustrated, and, finally, the alternative hypotheses are outlined.

## 5.1 Theoretical Framework

This research utilizes the education production function as its theoretical framework. An education production function is an equation that measures the statistical relationship between school inputs and school outputs (Hanushek, 1986). This relationship can be mathematically illustrated as:

$$A_{it} = f(P_i^{(t)}, T_i^{(t)}, S_i^{(t)}, F_i^{(t)})$$

$A_{it}$= the educational output level, such as student test scores, for student *i* in time *t* $(A_1, A_2 \ldots A_f)$

$P_i^{(t)}$=inputs, such as student participation in private tutoring, for student *i* in time *t* $(P_1, P_2 \ldots P_m)$

$T_i^{(t)}$= a vector for teacher characteristics, such as experience, for student *i* in time *t* $(T_1, T_2 \ldots T_n)$

$S_i^{(t)}$= a vector for school characteristics, such as resources, for student *i* in time *t* *($S_1$, $S_2$…$S_n$)*

$F_i^{(t)}$= a vector of student and family characteristics, such as student's gender and parent's education, for student *i* in time *t ($F_1$, $F_2$…$F_l$)*

This theoretical framework provides a lens through which to analyze the determinants of student achievement on the PETS (2004) numeracy and literacy test. Furthermore, it allows for a more direct examination of the impact of private tutoring on test scores and, ultimately, on student equity. In this research, the student output is represented by the combined numeracy, literacy, and combined scores on the PETS exam. School-level inputs include data on the school location and size, parent participation, school budget, and strategies to accommodate short-term teacher absenteeism. School-level inputs also include information about the school director, such as gender, age, education, years of experience, motivation, and if he or she still teaches in the classroom. The teacher-level data include gender, location of birth, distance to school, years of teaching experience, motivation, if the teacher provides tutoring services, in-service training, delays in pay, and if the teacher has a second job. The student-level and family inputs include gender, age, location of birth, family participation in fishing, frequency the student eats breakfast, travel time to school, parental education, and if the student receives help on his or her homework at home.

The purpose of an education production function is to infer a causal relationship between the inputs and the outputs. However, education production functions are limited in their capacity to capture the complex relationship between school inputs and outputs (illustrated in the conceptual framework below) and instead can, at best, provide a snapshot of a small portion of the causal relationship or, at worst, inaccurately measure an incorrect relationship. Therefore, in addition to education production functions, statistical procedures must be utilized to infer causality. This research utilizes propensity score matching. This methodology is discussed in depth in the following chapter.

## 5.2 Conceptual Framework

The conceptual framework for this research is based upon the inputs-outputs model. As shown in Figure 6 below, the learning process for a single student is complex. This conceptual framework notes three primary inputs -- family, school, and private tutoring, and a single student output -- test scores. Family characteristics that can influence student achievement include parental education, income, and socio-economic status. However, the student, nested within the family setting, has individual characteristics that also affect his or her outcomes. These characteristics include gender, age, and health. School inputs that impact student achievement include resources, leadership, and location. Classroom inputs, nested within the school, include teacher effectiveness, resources, and experience. In this conceptual framework, private tutoring is situated between the family and the school acting as a third input. It does not fall under the jurisdiction of the school or the family, as it is influenced by both schools and

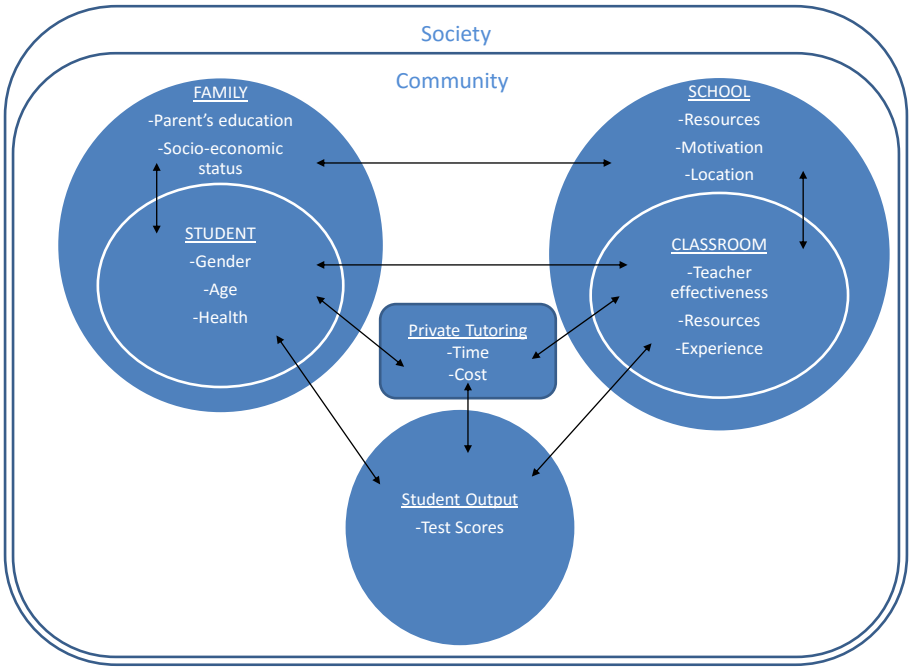


Figure 6. Conceptual Framework

families. Students can access private tutoring if it is offered by the teacher and if the student's family has the financial means to pay for the sessions.

### 5.3 Alternative Hypotheses

The hypothesis for this research is that fourth grade students who participate in private tutoring every day have higher numeracy, literacy, and total scores on the PETS (2004) exam as compared to their peers who never participate in private tutoring. There are three alternative hypotheses for this analysis. The first is that there might be a negative relationship between private tutoring and student outcomes. The second reason, the null hypothesis, is that there is no relationship between private tutoring and student outcomes, and the third alternative hypothesis is that there is a positive relationship between private tutoring and student outcomes but for reasons that have nothing to do with private tutoring. There are several reasons why these hypotheses might be true. These reasons are described in turn below.

One possible hypothesis for this research is that there is a negative relationship between private tutoring and fourth grade student outcomes. There are several plausible explanations for this hypothesis. The first reason is the absence of baseline data. Although the World Bank exercised an in-depth methodological approach to the PETS (2004) data collection process, it did not include a pre-test for the research. Therefore, if parents are sending their weakest students who require remediation to private tutoring, it is plausible that the relationship may be negative. However, because there are no baseline data with which to compare, it is impossible to ascertain if this is the case for the students tested using the PETS exam. Second, the quality of the private tutoring instructor is unknown. As previously described in the literature review section of this research, it is most common for Cambodian students to take private tutoring from their teachers instead of third party providers. With little choice who they can hire, the students might be

paying for low-quality or detrimental instruction. Additionally, the PETS parent's survey did not specify the motivation for sending their child to private tutoring classes. Therefore, it is unclear if motivation was for remediation, acceleration, or test preparation. The final plausible explanation is the composition of the type of private tutoring instruction provided. In addition to motivation, there are five different types of private tutoring in Cambodia, and the PETS surveys did not ask what type of private tutoring the student was participating in. As with the absence of baseline data and motivation, greater information is required.

Alternatively, the null hypothesis (i.e., there is no relationship, positive or negative, between private tutoring and student outcomes) is plausible for four reasons. The first reason is because of a content mismatch. Simply put, the private tutoring provided may not have addressed the same content as that which was covered on the PETS (2004) exam. There is no information on the subjects covered in the private tutoring sessions, and while it seems likely that numeracy and literacy were covered in fourth grade private tutoring sessions, the specific content taught may have varied to such an extent that it rendered the private tutoring sessions is ineffective for the PETS exam. The second reason why the null hypothesis is likely is that private tutoring may not make a noticeable difference in student outcomes at this grade level. There is an abundance of evidence demonstrating the effects of private tutoring on student outcomes (Bray, 2009; Brehm et al., 2012; Lee, 1996; Machingaidze et al., 1998). However, perhaps in Cambodia, the difference in student outcomes for students who participate in private tutoring every day as compared to their peers who never participate in private tutoring is, at this grade level, too small to measure. The third reason this null hypothesis might be plausible is due to the timing of the data collection. The data collected for PETS (2004) spanned a year. Therefore, the students who responded positively may have been interviewed and tested during the early portions of the data collection before the private tutoring sessions had a

sufficient amount of time to instruct on the material. Thus, the timing of the data collection could impact the results.

A positive relationship between academic outcomes and private tutoring may exist, but for reasons that are not associated with private tutoring. The first reason is that students who participate in private tutoring may differ from their non-participating peers in family, income, academic achievement, motivation, and location. Because students who participate in private tutoring are not randomly selected, a positive relationship between private tutoring and academic outcomes might exist, but the result could be due to unobservable variables such as student motivation. Finally, a positive relationship between private tutoring and academic outcomes may exist because parents select their best students to attend tutoring. Given scarce resources and the foregone opportunity cost of children not working at home, parents may select their most promising student to go to private tutoring. Recent research has found no evidence of gender discrimination in parental selection of students to attend private tutoring. However, it did find that families who are located in rural or remote locations do spend less on private tutoring for all their students (Dang, 2007). These findings suggest that, in the face of acute poverty, families are forced to make difficult choices on how to afford education and still survive (Bray, 1999).

# Chapter VI

# RESEARCH DESIGN AND METHODS

This chapter details the research design and methods used to assess if private tutoring impacts student outcomes on the PETS (2004) exam. Specifically, the differences in numeracy, literacy, and total scores for fourth grade Cambodian public school students who participate in private tutoring every day as compared to their peers who never participate in private tutoring are evaluated. This chapter is structured into 13 different sections. The first section describes the research questions, method of analysis, and data sources. Next, a detailed description of the dataset is provided, including sampling procedures and adjustments made by the World Bank on the raw and final microdata. I then discuss how I selected the variables to be included in this analysis and the key variables that were missing from the PETS (2004) dataset. I also include some thoughts on the structure of the World Bank questionnaires and challenges that arose due to questions being included on one stakeholder questionnaire and not another stakeholder questionnaire. Following this, I detail how I selected the student-level observations to be included in my analysis, a description of the outcome, and the definition of the causal estimand and treatment. I spend some time discussing the use of a binary variable as the treatment variable, and the chapter continues with the strategies I used for missing data, protocol for recoding the variables used as predictors, and building the basic ordinary least squares model. I also detail the collinearity of the independent variables and the method of propensity score matching. The chapter concludes with the threats to validity and limitations.

## 6.1 Research Questions

For this research, I was interested in the effects of private tutoring on fourth grade Cambodian students who self-reported that they participated in these sessions every day as compared to their peers who self-reported that they never participated in these sessions. I was interested in this division of private tutoring participation because of what I witnessed while I was in Cambodia and ultimately wondered if these practices affected equity. Table 8 below provides details on the research questions, including the method of analysis and data source underlying this research.

Table 8. Research Questions, Method of Analysis, and Data Sources

| Research Question | Method of Analysis | Data Source |
|---|---|---|
| 1. What are the factors that influence the pattern of student tutoring and its outcomes on the PETS (2004) numeracy, literacy, and total test scores? | Ordinary Least Squares (OLS) Regression | World Bank (2004), Public Expenditure Tracking Survey (PETS) |
| 2. What is the impact of tutoring in Cambodia (both effectiveness and equity)? | Ordinary Least Squares (OLS) Regression | |
| | Propensity Score Matching | |
| | Probit Regression | |

## 6.2 Description of the Dataset

The research questions previously listed are answered by evaluating quantitative data from the Cambodia Public Expenditure Tracking Survey (PETS, 2004) gathered by the World Bank. PETS is defined as "quantitative exercises that aim to track the flow of public resources across various layers of the administrative hierarchy, from the allocating agency to the intended beneficiary, and determine inefficiencies in the system and their magnitude" (Edgberg-Peterson, Kaiser, Kisunko, Kushnarova, & Lindelow, 2005, p. 4).

The first World Bank PETS project was conducted in Uganda in the health and education sectors. The research was motivated by the desire to understand "how education spending could have increased in Uganda without demonstrably improving enrollment and attainment" (Savedoff, 2008, p. 2). The study found that only 13% of the funds designated to provide educational supplies in primary schools were being used for this purpose (Albo & Reinikka, 1998). Used as a research tool, PETS allowed researchers to identify "leaks" and inefficiencies in a country's system of finance. Since 1996, approximately 40 such studies have been conducted in over 30 countries, and PETS has been used as a diagnostic tool when reliable administrative or financial data are unavailable.[9]

The Royal Government of Cambodia was motivated to conduct PETS due to difficulties in channeling funds down to the front-line service providers in their health and education sectors. In response to these challenges, the government of Cambodia implemented the Priority Action Program (PAP), which was designed to drive funds to the front-line service providers in a timely manner. The PAP funds shifted the focus of education policy toward demand-side constraints in basic education (World Bank, 2005). PETS was, therefore, designed to assess to what extent the PAP funds made it to the schools and if the funds made a difference in student outcomes. Ultimately, the World Bank found that the percentage of leakage of PAP funds was low, but also noted that record-keeping throughout each level of educational management was poor, thus limiting the robustness of the leakage findings.

The Cambodia PETS 2004 is a comprehensive dataset that includes responses from each level of educational management inclusive of the Provincial Treasuries (PT), Provincial Education Offices (PEOs), District Education Offices (DEOs), school

[9]See World Bank for more information on PETS http://web.worldbank.org/WBSITE/EXTERNAL/TOPICS/EXTSOCIALDEVELOPMENT/EXTPCENG/0,,contentMDK:20507700~pagePK:148956~piPK:216618~theSitePK:410306,00.html

directors, parents, and students. Ten questionnaires were reviewed that related to this research. These are listed below in Table 9 below.

Table 9. Cambodia PETS (2004) Questionnaires

| FILE | OBSERVATIONS | VARIABLES | DESCRIPTION |
|---|---|---|---|
| ***Administrative Questionnaires*** | | | |
| Provincial Education Office | 7 Offices | 389 | This questionnaire asks questions about budgets and expenditures. |
| Provincial Treasury | 7 Officials | 1,869 | [Incorrect definition in World Bank report] |
| District Education Office | 21 Offices | 4,327 | This questionnaire asks questions about budgets and expenditures. |
| School Support Committee | 350 Committee Members | 113 | This questionnaire asks questions about budgets and expenditures. |
| School Director | 200 Directors | 1,525 | [Left blank in World Bank report] |
| Parents | 1,198 Parents | 179 | This questionnaire about their education levels, if they have to pay for their children to go to school, etc. |
| Teacher | 1,069 Teachers | 175 | This questionnaire asks about their pay, the supplies they have in the classroom, etc. |
| ***Students' Assessments*** | | | |
| Background | 7,170 Students | 46 | This questionnaire asks about background information such as about their parents and education. |
| Literacy | 7,170 Students | 29 | This questionnaire asks students literacy questions. |
| Numeracy | 7,170 Students | 29 | This questionnaire asks students numeracy questions. |

Source: World Bank (2005)

The World Bank designed the sample selection as a three-stage process. First, the 2002-2003 school census data were used to create a stratified random sample. Each province was weighted according to its size or, in this case, the number of schools

selected. The original Cambodian PETS sample was designed to include 220 elementary schools located within one of 12 provinces and 34 districts. The final sample included 200 elementary schools located within 7 provinces and 21 districts. Some schools were not included in the final sample due to inaccessibility and the inability to find a replacement. This may bias the sample of schools toward rural and semi-urban populations, with less representation of remote sites. In the final sample, each province and district were weighed according to size or the number of schools (see Appendix A for a map of the Cambodian provinces and districts).

Second, once the provinces and districts were selected, a random selection of villages was chosen based upon the 2003-2004 Cambodian household survey (HSES). The household survey design categorized over 900 villages and 15,000 households stratified on five geographic characteristics (Phnom Penh, Plain, Tonle Sap, Coastal, and Plateau and Mountain) and then further sub-divided them into rural and urban categories. From each stratum, four independent samples of villages were chosen. Third, at the school level, one director, one teacher, six students, three representatives from the School Support Committee, and six parents rounded out the sample.

The World Bank designed ten separate assessments to collect data for the PETS 2004 dataset. Eight of these assessments included administrative surveys given to provincial education officers, provincial treasury officials, district education offices, school support committee members, school directors, teachers, parents, and students. Two student instruments were created to assess literacy and numeracy skills. All data were collected through personal interviews in 2004. Once collected, all 10 raw data files were tested by the World Bank in a rigorous process to produce the final, corrected dataset used for these analyses. (See Appendix B for the step-by-step explanation of the World Bank's data cleaning process.) The final, corrected dataset differs from the raw data set in a couple of ways. The raw data are provided as they were collected in the field. While the World Bank maintains high standards in their survey protocol, the raw data

have not been checked for internal coherence across questions, nor have outliers or any other data anomalies been evaluated. In the final dataset, these issues have been addressed as well as ensuring consistency within and across observations. Any edits that were made by the World Bank staff to the final dataset were done if the edited value was identified as being closer to the "true" value than the original entry (World Bank, n.d.).

### 6.3 Selecting Key Variables and Missing Variables

As previously mentioned, all of the variables used in this research originated from the World Bank PETS Cambodia (2004) dataset and the corresponding questionnaires. To determine which variables were most appropriate for this analysis, I reviewed each question in the Cambodia PETS questionnaires. After printing out each questionnaire, I crossed out those items that did not relate to my research and circled those that had potential to fit within my production function model and impact the outcome variable. I relied upon previous research in private tutoring to help guide my choices.

Starting with the survey for the Provincial Treasury Office, I considered each of the 58 separate questions, not including the sub-questions such as month-by-month details for each year. Nearly all of the questions focused exclusively on the amount of funds received and distributed over the course of several years. This is unsurprising given that the intent and design of the PETS Cambodia (2004) was to assess to what extent designated funds made it to the schools. I was a little surprised that none of the questions targeted teacher compensation. I had hoped I could specifically track the flow of funds designated for teacher compensation from the Provincial Offices to the teachers. I thought this information could prove to be valuable in the teacher vector of my production function. For example, I hypothesized that a decrease in the intended teacher compensation could impact teacher behaviors in important ways that might impact the students and private tutoring. However, in the absence of these and other relevant data, I

chose not to use the items from the Provincial Office questionnaire in my research and, instead, found another variable to use as a proxy. I'll describe this further below.

Next, I turned to the Provincial Education Office (POE) Questionnaire and the District Education Office (DEO) Questionnaire. This POE questionnaire contained 97 separate questions, and the DEO questionnaire was more extensive with 275 items. I found both of these questionnaires to be similar to the Provincial Treasury and determined that none of the content was directly relevant to my research.

The School Support Committee (SSC) Questionnaire contained 68 questions. Questions such as participation in SSC and SSC election protocol fell outside the scope of my research, and, therefore, these items were crossed out. I had hoped one question might be important in the school characteristics vector. This question was "What are the three major issues discussed by the SCC?" However, the answers to this question related generically to how to spend school funds, motivate students, improve school construction, and fund raise. None of the SSC questions related to my research and were, therefore, eliminated.

The School Director Questionnaire proved to be more helpful than the previous questionnaires. Eighty-three pages long and containing almost 400 questions, this was by far the most exhaustive questionnaire of the Cambodia PETS (2004) instruments. To build the school characteristics vector, I circled many items on this questionnaire. Some of the questions related to the school characteristic in my production function. These included the school location, number of shifts taught at the school, separate toilet facilities for male and female students, director age, director gender, prior teaching experience of the director, if the director was still teaching in the classroom, and highest level of education achieved by the director. Most of the questions related to the school budget, for example, if the school received its entire allocated school operational budget for the previous year and delays in base salary and basic allowances.

At slightly over 100 questions, the Teacher Questionnaire was extensive but not as exhaustive as the School Director questionnaire. I focused my attention on those variables that may influence student outcomes, paying careful attention to data related to private tutoring. In this questionnaire, in addition to standard demographic variables (e.g., age, gender, education, years of experience, etc.), I also identified data related to a teacher's participation in private tutoring, how many students the teacher tutored, their private tutoring fee, and the amount earned from this practice.

The Parents Questionnaire included 74 items. There were two surprising omissions from this instrument. The first omission was any type of question related to the parent's highest level of education, and the second omission was a question related to their student's participation in private tutoring. Instead, both of these questions were included in the Background Questionnaire designed for students to answer. The Parents Questionnaire was surprisingly unhelpful, as it discussed subjects outside the scope of my research, such as their knowledge of the school development plan and who designed the plan.

The Background Questionnaire was designed for the students' responses. Only five pages long and 40 questions, this was, understandably, the shortest of all of the data collection instruments. This questionnaire included items related to demographics, parental education level, home possessions, private tutoring, and working. I circled all of the questions on this instrument given their applicability to my research. I will discuss further below how I determined which variables to retain in my model and which to eliminate.

The Literacy Questionnaire and Numeracy Questionnaire contained the specific testing items for each academic subject, the student's response, and a total score for the exam. I only retained the final scores for each subject from these questionnaires. A total score was created by summing the literacy and numeracy final scores. These three scores were used as the educational outputs in my production function.

As previously mentioned, there were three key variables that were missing from the dataset. Shown in Table 10 below, by far the most startling were questions related to parental education and student participation in private tutoring. Both questions were omitted from the Parents Questionnaire and instead included in the Background Questionnaire for the student to answer.

Instead of asking parents about their student's participation in private tutoring, the World Bank posed this question to the students. In the absence of these potentially more reliable data, I used the Background Questionnaire data and coded the responses from the students as *st_xlessons_allnothing*. The variable is used as the treatment variable in this analysis.

Asking fourth graders to state their parents' highest level of education was an open invitation for missing data. In the fourth grade cohort (n= 2,894), nearly 50% of students (n=1,417) did not know their mother's education level, and over 50% did not know their father's education level (n= 1,517). Given the absence of such a high number of responses, I decided to use the students who did not know either of their parents' educational level as the comparison group to the students who had some knowledge of their parents' educational level. I generated over 30 different combinations of parent's education level including evaluating the mother's education separately from the father's education and combining and separating the different educational levels. After fitting these in the models, which I describe further below, the strongest variables were generated by identifying the parent with the higher education level and creating three groups -- students who did not know either parent's education level, the highest level of education by either parent is no school, and the highest level of education is at least primary or secondary school. I coded these as *st_phighested_noed* for parents with no education according to their student and *st_phighested_primsec* for parents who had attended at least primary or secondary education according to their student. As reported by their students, parents with no education included 262 observations, one parent with at

least some education included 1,115 observations, and the comparison group included 1,517 observations.

The third variable that was missing from the dataset was one that helped measure the percentage of funds that were earmarked for teachers' salaries but did not reach the school or the teachers. While the purpose of the Cambodia PETS (2004) work was to measure the leakage of funds from the Provincial Office to the schools and the teachers, it did not specifically target teachers' salaries. As a proxy for this variable, I selected a variable from the Director Questionnaire regarding the school budget. This question asked if the school had received its entire "school operational budget" in the previous year. Fifty-three percent (n=1,530) of directors stated that they did receive their entire school budget from the previous year, while the remaining 47% (n= 1,364) stated that they did not. Satisfied with the variation, I coded this variable *d_schoolbudget* and included it in the school-level vectors of the production function model.

Table 10. Variables Missing from the Cambodia PETS (2004) Dataset

| **Production Function Vector** | **Desired Variable and Description** | **Proxy Variable(s) and Descriptions** |
|---|---|---|
| $P_i^{(t)}$=inputs (i.e. student participation in private tutoring) | *Private tutoring*: Student participation in private tutoring form the Parents Questionnaire | *st_xlessons_allnothing*: Participation in private tutoring from the Background Questionnaire |
| $F_i^{(t)}$= a vector of student and family characteristics | *Parental education*: Mother or father's highest level of education from the Parents Questionnaire | *st_phighested_noed*: Parent's highest education is no school as reported in the Background Questionnaire |
| | | *st_phighested_primsec*: Parent's highest education is at least primary or secondary school as reported in the Background Questionnaire |
| $T_i^{(t)}$= *a vector for teacher characteristics* | *Teachers' salary expenditures (changes in)*: Fiscal leakage or corruption in the flow of educational funds from the Provincial Treasury Office to the teacher | *d_schoolbudget*: School received its entire "school operational budget" from the previous year as reported in the Director Questionnaire |

### 6.4 Identifying Fourth-Grade Students

As previously discussed, this research focuses on the effects of private tutoring on the outcome of the PETS 2004 exam for fourth grade students only. Because the PETS 2004 student (or "background") dataset included data for fourth grade, but the teacher and director datasets included data for first through sixth grade, the datasets needed to be harmonized for consistency. First, I limited the student dataset to those students who were in fourth grade at the time the questionnaire was being administered.[10] This reduced the dataset from 7,170 to 3,466 observations. Then, I isolated the data to just those students who "always" participated in private tutoring classes or "never" participated in private tutoring classes. This reduced the student dataset from 3,466 to 3,093. Omitting the students who stated that they occasionally participated in private tutoring allowed for the cleanest definition of the treatment variable and better addressed my research interests. Turning to the teacher dataset, I reduced these data to those teachers who taught fourth grade during the same time period. Because 20% (n=218) of the teachers taught two classes (not necessary both being fourth grade), I retained all of the teachers in the sample who stated that they taught fourth grade as their first or second class.[11] Of the total sample of teachers (n=1,069), 212 (or 20%) teachers stated that they taught fourth grade. Most of the schools only had one fourth grade teacher. However, there were 14 schools (about 7%) that had two fourth grade teachers. To avoid these schools having more weight than the others, the data for the two teachers at the 14 schools were averaged. The final dataset used in this research has one teacher for each school. I further restricted the sample to only those data that included an identifiable school code.

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[10]Student "Background" Questionnaire Section 1 Question No. 3 "What grade are you in?"

[11]Teacher Questionnaire Section 3 Question No. 2. "Starting from the lowest grade, name each grade you teach at this school."

Directors, teachers, or students that were missing identifying school codes were eliminated from the analysis. The final dataset includes 174 teachers and directors, and 2,894 fourth grade students.

## 6.5 Description of Outcome

Included in this extensive nationwide survey are data on education expenditures inclusive of private tutoring. Importantly, PETS (2004) Cambodia also includes a literacy exam and a numeracy exam for fourth grade students. In this analysis, the numeracy and literacy scores are evaluated separately and then combined for a single student score. The numeracy and literacy exams each have a score range of 0 to 25, and the total score has a score range of 0 to 50. These three scores – numeracy, literacy, and total score (*numscore4*, *litscore4*, and *tscore4*) – are used as the outcomes for this research (see Table 11 below).

Table 11. Variables Used as Outcome Variables

| Dataset | Section | Question | Wording | Original Coding | Modified Coding | Variable Abbreviation |
|---|---|---|---|---|---|---|
| Student "Background" Dataset | NA | NA | *Littotal* | Continuous | No change | *litscore4* |
| | | | *Numtotal* | | | *numscore4* |
| | | | NA | NA | Generated by adding *littotal* and *numtotal* | *tscore4* |

## 6.6 Definition Causal Estimand and Treatment

The causal estimand for this paper is *average treatment effect on the treated (ATT)*. Specifically, this research evaluates the average effect of treatment variable (Z) for fourth grade students who self-report that they participated in private tutoring lessons every day (*st_xlessons*=1) on the outcome variable (Y) PETS (2004) numeracy (*numscore4*),

literacy (*litscore4*), and total scores (*tscore4*) compared to their fourth grade peers who self-reported that they never engaged in extra lessons (*st_xlessons*=0). Equation (1) below illustrates the estimand used in this research:

$$E\,[\mathbf{Y(1)} - \mathbf{Y(0)} \mid \mathbf{Z = 1}\,] = \mathbf{E}\,[\,\mathbf{Y(1)} \mid \mathbf{Z = 1}] - \mathbf{E[Y(0) \mid Z = 1]} \quad (1)$$

Z= Private Tutoring
Y= PETS (2004) Numeracy, Literacy, and Total Scores Grade 4
X= Variables

### 6.7 Treatment as a Binary Variable

For this analysis, the "treatment" variable, participation in private tutoring, was transformed into a binary variable (see Table 12 below). The choice to divide students into two distinct groups, those who participated in private tutoring every day as compared to those who never participated in private tutoring, was done for three reasons. The first reason was because I was primary interested in investigating equity. As compared to equality, which is a state of being equal, equity is interested in that which is impartial, fair, or just (Merriam-Webster, 2015). Investigating the most extreme cases is an examination into the most impartial private tutoring scenarios. Second, analyzing the impact of private tutoring on these cases fit well into the Matthew Effect of "the rich becoming richer and the poor becoming poorer," and third, as I was standing in the schoolyard in Cambodia, I was struck by the clear division of those going to private tutoring classes and those who were not. The treatment group could have consisted of students who participated in private tutoring at any level of frequency (i.e., every day, four days a week, three days a week, two days a week, or one day a week) and compared to students who self-reported that they never participated in private tutoring. The decision to divide students into the most extreme categories reduced the number of observations by approximately 10% (n=350), and it suited the motivation for my research.

Table 12. Coefficient Used as the Treatment Variable

| Questionnaire | Section | Question | Wording | Original Coding | Modified Coding | Variable Abbreviation |
|---|---|---|---|---|---|---|
| Student "Background" Questionnaire | 1 | 36 | How many times per week do you take extra lessons after school? | Ordinal (1=never; 2=1 to 2 days; 3=3 to 4 days; 4=every day) | 0=never; 1=ever day | *st_xlessons* |

The binary coding of the treatment variable generated a treatment group of 961 fourth grade students and a comparison group of 1,933 fourth grade students for a total sample size of 2,894 students. Because students did not specify for which subjects they received private tutoring (i.e., numeracy, literacy, both, or neither), the number of students in the treatment and comparison groups remain unchanged when evaluating numeracy and literacy outcomes. While students were not asked for which subjects they received private tutoring, this distinction may not be critical due the impact of literacy upon all academic subjects. Because all academic subjects contain a literacy component, a student who may be taking extra lessons in math may still have limited success due to their literacy levels (Brown, 2005). Morris (1984), as noted in Stanovich (1986) who applied the Matthew Effect to education, stated that "reading affects everything you do" (p. 13). The difference in the treatment and comparison groups is to be expected given the cost associated with private tutoring sessions. The next section describes the protocol for missing data and recoding rules.

## 6.8 Strategies for Missing Data

Because some of the variables had missing data and the original coding did not always align with my analysis (e.g,, some variables were originally coded as *continuous* when *categorical* was a better fit for my research), some of the variables used were necessarily recoded. I will first describe the strategies utilized for missing data and then move to discuss how the variables with complete data were recoded.

Of the variables utilized in this analysis, the variables measuring parental education had the most missing data. This is not unexpected given that the question was directed toward fourth grade students, and the Parents Survey did not include a question about their education. To rectify the missing data problem, I first divided the responses into two categories -- if the student responded or if the response was missing. I found that about half of the fourth grade students did not know their mother's or father's educational level, and over 30% didn't not know either parent's educational level. Because of the large number of missing data, I chose to make those students who did not know either of their parents' educational level the control group. With the remaining observations, I created over 30 different combinations of variables using the mother's and/or father's education and individually tested them in the model. I then divided the observations into two categories -- no education or education. I found that creating wider educational bands allowed for the most parsimonious and stable model. The education category includes all levels, such as primary, secondary, certificate, or university. If both of the parents' education was missing, the student's parental education was coded as "unknown" (*st_phighested_dnkn*). If the student answered that neither of his or her parents went to school, the answer was coded as "no education" (*st_phighested_noed*). If both parents had some education, the answer was coded as "education" (*st_phighested_primsec*). Because mothers and fathers can have different levels of education, I coded the parent with the highest level of education. For example, if the mother had no education and the father had secondary education, the student's parental education was coded as "education." The group of students who did not know either parent's level of education (*st_phighested_dnkw*) then became the comparison group to the "no education" (*st_phighested_noed*) or "education" groups (*st_phighested_primsec*).

The PETS 2004 questionnaire included an item in the Director Questionnaire pertaining to the director's desire to stay at the same school next year.[12] In the reduced sample used for this analysis, only two (or 1%) of the school directors chose not to answer the question. These non-responses were coded as "no." This resulted in 142 (or 82%) "yes" responses and 32 (or 18%) "no" responses. A different question in the Director Questionnaire was captured if the director still taught in the classroom (*d_stillteach*). Of the 174 schools, there was missing data for only two directors (or approximately 1%). These two missing observations were matched with directors with similar profiles in terms of school location, director age, education level, and school size and given the same code for teaching in the classroom. Both observations were given a "0" or "no."

The three outcome variables and the balance of the variables utilized in the research did not have any missing data. The next section will discuss the protocol used for recoding the variables. This includes the binary, categorical, and ordinal coding utilized in this research.

### 6.9 Protocol for Recoding the Variables Used as Predictors

The section describes the protocol employed for recoding the variables used as predictors in this analysis. While numerous variables were evaluated during this research, only those that were selected for the final OLS model will be described below. I start by describing the variables that were coded in a binary fashion for students, teachers, and directors.

[12]Director Questionnaire Section 2 Question No. 19 "Do you want to stay at this school next year?" 1- Yes, 2- No, 8- Don't know.

**Binary Variables**

Table 13 below details the binary variables used as predictors in this analysis. From the student or Background Questionnaire, five binary variables were used as predictors. These include gender, if the family primarily engaged in fishing, educational attainment of the father, educational attainment of the mother, and if the student was born in the village he or she currently resided in. There were six binary variables used as predictors from the Teacher Questionnaire. These included teacher gender, if the teacher tutors students, if the teacher was born in this or a neighboring village, if the teacher attended in-service teacher training since 2000, if the teacher has a second job (other than tutoring) after school, and if the teacher experiences delays in base pay or allowances. The Director Questionnaire had six binary variables used as predictors. Similarly to the Background and Teacher Questionnaires, gender was included for the director as well as the location of the school, the director's desire to remain at the school next year, if the director is still teaching in the classroom, and if the school received its entire school operational budget from the previous year. All of the variables listed were originally binary except for two. As previously discussed, parent's education was converted from a categorical variable into three binary variables. Also, the geographic location of the school (i.e., rural, urban, or remote) from the Director Questionnaire was adjusted to three binary variables. For conformity purposes, a "0" and "1" binary coding scale was utilized for all of the variables.

Table 13. Binary Variables Used as Predictors

| Questionnaire | Section | Question | Wording | Original Coding | Modified Coding | Variable Abbreviation |
|---|---|---|---|---|---|---|
| **Student or "Background" Questionnaire (n=5)** | 1 | 1 | Are you a boy or a girl? | 1=boy<br>2=girl | 0=boy<br>1=girl | *st_girl* |
| | 1 | 21 | Is your family primarily engaged in fishing? | 1=yes<br>2=no | 0=no<br>1=yes | *st_fishing* |
| | 1 | 35 | What is the education of your father/male guardian? | 1=never been to school<br>2=primary school (G1 to G6)<br>3=secondary school (G7 to G12)<br>4=certificate<br>5=university<br>6=other<br>7=(omitted)<br>8=don't know | 0=no education or education 1=don't know | *st_phighested_dnkw* |
| | | | | | 0= don't know or education 1= no education | *st_phighested_noed* |
| | 1 | 34 | What is the education of your mother/female guardian? | | 0= don't know or no education 1= education | *st_phighested_primsec* |
| | 1 | 7 | Were you born in the village you currently live in? | 0=yes<br>1=no | 0=no<br>1=yes | *st_bornhere* |
| **Teacher Questionnaire (n=6)** | 2 | 1 | Gender | 1=male<br>2=female | 0=male<br>1=female | *t_female* |
| | 4 | 8 | Do you tutor students after school? | 1=yes with pay<br>2=yes without pay<br>3=no | 0=no<br>1=yes[1] | *t_tutor* |
| | 2 | 6 | Born in this village or neighboring villages? | 1=yes<br>2=no | 0=no<br>1=yes | *t_bornhere* |
| | 2 | 16 | Have you attended any in-service teacher training activity since 2000? | 1=yes<br>2=no | 0=no<br>1=yes | *t_inservice* |
| | 4 | 13 | Do you have another job outside the school other than tutoring? | 1=yes<br>2=no | 0=no;<br>1=yes | *t_secondjob* |

Table 13 (continued)

| Questionnaire | Section | Question | Wording | Original Coding | Modified Coding | Variable Abbreviation |
|---|---|---|---|---|---|---|
| **Teacher Questionnaire** (continued) | 4 | 6c | (Have you had) delays in base salary and basic allowances received? | 1=yes<br>2=no | 0=no<br>1=yes | *t_delaysinpay* |
| **Director Questionnaire (n=5)** | 2 | 1 | Gender | 1=male<br>2=female | 0=female<br>1=male | *d_male* |
| | 2 | 8 | Rural, Urban, or Remote | 1=rural<br>2=urban<br>3=remote | 0= urban and remote<br>1=rural | *d_rural* |
| | | | | | 0= rural and remote<br>1=urban | *d_urban* |
| | | | | | 0= rural and urban<br>1=remote | *d_remote* |
| | 2 | 19 | Do you want to stay at this school next year? | 1=yes<br>2=no<br>8=do not know | 0=no<br>1=yes | *d_motivation* |
| | 2 | 9 | Are you still teaching in the classroom? | 1=yes<br>2=no | 0=no<br>1=yes | *d_stillteach* |
| | 6 | 5 | In 2002/03, did you receive all the "school operation budget" from PAP2 that you were [legally] entitled to? | 1=yes<br>2=no | 0=no<br>1=yes | *d_schoolbudget* |

1. None of the teachers in the final sample answered that they provided tutored without pay.

## Continuous Variables

In this research, there are five predictors coded as continuous variables. One of the variables was from the Background Questionnaire and the remaining four were from the Director Questionnaire. As shown in Table 14 below, these variables include both of the variables for age, the number of classrooms, and the number of times parents attend meetings at school other than the opening ceremony.

Table 14. Continuous Variables Used as Predictors

| Variable Level | Section | Question | Wording | Original Coding | Modified Coding | Variable Abbreviation |
|---|---|---|---|---|---|---|
| **Student "Background" Questionnaire (n=1)** | 1 | 3 | How old are you? | Continuous | No change | *st_age* |
| **Director Questionnaire (n=3)** | 2 | 2 | Age | Continuous | No change | *d_age* |
| | 3 | 3 | Total number of classrooms | Continuous | No change | *d_ssize* |
| | 5 | 13 | How many times per year do parents attend meetings at the school other than the opening ceremony? | Continuous | No change | *d_parentpart* |

## Ordinal Variables

There are nine ordinal variables used as predictors in this research, including three variables from the Background, Teacher, and Director Questionnaires. Two of the student variables -- one regarding the frequency the student ate breakfast (*st_breakfast*), and one regarding travel time to school (*st_traveltime*) -- remained unchanged from the original PETS 2004 dataset structure. The third variable (*st_hwhelp*) was slightly modified from four categories to three. The first three categories -- "never," "often," and "sometimes" -- were retained, and the fourth category -- "only when I get stuck" -- was merged into the category "sometimes."

In the Teacher Questionnaire, there are three variables structured in an ordinal fashion. The first pertains to a teacher's years of experience in the profession (*t_expyrs*) and contains four levels (i.e., 1= less than one year to five years; 2= six to ten years; 3= eleven to twenty years; 4= twenty or more years). The second captures the teacher's travel time to school (*t_travelrain*). This coefficient was adjusted from a continuous variable to an ordinal to match the corresponding student travel time to school variable (*st_traveltime*). Both the student and the teacher coefficient have four levels (i.e., 1= less

than fifteen minutes; 2= between thirteen to thirty minutes; 3= between thirty to sixty minutes; 4= more than sixty minutes). The difference between these two variables is that the teacher coefficient specifies travel time during the "rain" season (versus the "dry" season), whereas the student coefficient for travel time to school does not specify the season. The coefficient that measures the teacher's travel time in the rain season was selected as it represents the greatest inconvenience to teachers and could affect student outcomes. The final ordinal variable measures the teacher's original motivation when they selected teaching as profession. Teachers could offer up to three reasons. While most of the answers revealed positive motivations, there were several reasons that were not directly related to aspects of teaching. For example, individuals stated that they entered into the teaching profession due to educational restrictions, avoidance of other careers, or limited options as a whole. These reasons were categorized as "negative motivation."

Table 15 below details the answers I associated with "positive" or "negative motivations. Positive answers were coded with a "1," and negative answers were coded with a "-1." Therefore, if a teacher answered with two positive reasons and one negative reason, their motivation score would equal 1, while a teacher who answered with three positive reasons had a motivation score of 3. The teacher motivation scale ranges from a low of -2 to a high of 3. This continuous scale was renamed in an ordinal fashion as -2= Very Low; -1=Low; 0= Average; 1= High; 2= Very High; and 3= Exceptionally High.

The final three ordinal variables originated from the Director Questionnaire. The first captures the school director's years of experience in this capacity (*d_expyrs*) and is structured in a similar ordinal fashion to a teacher's years of experience (*t_exprys*). The second coefficient measures the director's highest level of education (*d_highed*). In the PETS 2004 dataset this variable contains four levels (i.e., 1=Primary, 2=Lower secondary, 3=Upper secondary, 4=University) and, in this analysis, two of the levels (i.e.,

Table 15. Motivation for Entering the Teaching Profession

| Positive | Negative |
|---|---|
| I like teaching<br>The importance of education for the society<br>Job security/stability<br>Social respect and recognition<br>Family tradition<br>Have time to do other jobs<br>Good pay<br>Able to work close to residence | Lack of better options<br>Escape from military conscription<br>Unable to pursue further study |

lower and upper secondary education) into one category. Therefore, for the purpose of this research, this coefficient has three levels (i.e., 1=Primary; 2= Lower or upper secondary; 3= University). The final ordinal coefficient addresses the strategies school directors employ for short-term teacher absenteeism. Originally structured categorically (i.e., 1=Use relief teacher; 2=Combine classes; 3=Unsupervised; 4=Unsupervised assignment; 5=Let them play sports; 6=Send students home; 7=Other (specify); 9=not applicable), this coefficient was transformed into a ordinal variable with three levels. As shown in Table 16 below, answers that related to sending students home or not receiving instruction were coded as "-1." Answers that related to keeping the students at school but lacking any teacher instruction were coded as "0," and responses that included solutions with a teacher present were coded as "1." Because 98% (n=172) of the school directors in this final dataset had teaching experience, school directors and deputy school directors were also included this category.

Table 16. Strategies for Dealing with Short Term Teacher Absenteeism

| - 1 | 0 | 1 |
|---|---|---|
| Sent students home<br>Instruction at a later time (undesignated) | Administration or librarian<br>Unsupervised assignments | Relief teacher<br>Combined classes<br>Teachers from other schools<br>School director or deputy school director |

Table 17 summarizes the ordinal variables previously described and included in this analysis. The next section describes the process of building a basic OLS model and matching these constructed treatment and comparison groups on a single generated propensity score.

### 6.10 Building the Basic OLS Model

To analyze the effects of private tutoring on Cambodian student success on the PETS (2004) numeracy score, literature score, and total score, I built a basic OLS model adjusted by weights and clustered standard errors at the school level. I considered using hierarchical linear modeling but was unable do to so because there are only one classroom and six students per school in the World Bank PETS data. Below are the steps I utilized to generate the OLS model:

1. *Treatment Variable*: I first utilized private tutoring as the only predictor of student achievement (students who self-reported that they participated in private tutoring every day as compared to students who self-reported that they never participated in private tutoring (*st_xlessons*).
2. Student Level Predictors: Next, I combined private tutoring and student level variables. I included student level demographics (i.e., student gender (*st_girl*), student age (*st_age*), and location of birth (*st_bornhere*). Three family level descriptors that specifically measured socio-economic status were added. These included if the family is primarily engaged in fishing (*st_fishing*), the frequency that a student eats breakfast (*st_breakfast*), and the time it takes to travel from home to school (*st_traveltime*). Three variables were added as measures of household education. These included the highest level of education by one or both the parents (*st_phighested_noed* and

Table 17. Ordinal Variables Used as Predictors

| Questionnaire | Section | Question | Wording | Original Coding | Modified Coding | Variable Abbreviation |
|---|---|---|---|---|---|---|
| **Student "Background" Questionnaire (n=3)** | 2 | 31 | How many times per week do you eat breakfast? | Ordinal (0=never; 1= 1 to 2 days a week; 2=3 to 4 days a week; 3= 5 to 6 days a week; 4=everyday) | No changes | *st_breakfast* |
| | 2 | 37 | How often do you get help with your homework at home? | Ordinal (1=never; 2=sometimes; 3=often; 4=only when I get stuck) | Ordinal (0=never; 1= sometimes; 2=often) | *st_hwhelp* |
| | 2 | 38 | How long does it take to get to school?[1] | Ordinal (1= less than 15 minutes; 2= between 13 to 30 minutes; 3= between 30 to 60 minutes; 4= more than 60 minutes) | No changes | *st_traveltime* |
| **Teacher Questionnaire (n=3)** | 2 | 18 | When did you start teaching? | Continuous | Ordinal (1= less than one year to 5 years; 2= 6 to 10 years; 3= 11-20 years; 4= 20 more years) | *t_expyrs* |
| | 2 | 9 | Usual time to get to the school every day [2] | Continuous | Ordinal (1= less than 15 minutes; 2= between 13 to 30 minutes; 3= between 30 to 60 minutes; 4= more than 60 minutes) | *t_travelrain* |
| | 2 | 21 | Why did you decide to become a teacher? | Categorical (1=I like teaching; 2=The importance of education for the society; 3=Job security/stability; 4=Social respect and recognition for the profession; 5=Good pay; 6=Lack of a better option; 7=Family tradition; 8=Other (Specify)) | Ordinal (-2= Very Low; -1=Low; 0= Average; 1= High; 2= Very High; and 3= Exceptionally High) | *t_motivation* |

Table 17 (continued)

| Questionnaire | Section | Question | Wording | Original Coding | Modified Coding | Variable Abbreviation |
|---|---|---|---|---|---|---|
| **Director Questionnaire (n=3)** | 2 | 6 | Since what year have you been in your current position at this school? | Continuous | Ordinal (1= less than one year to 5 years; 2= 6 to 10 years; 3= 11-20 years; 4= 20 more years) | *d_expyrs* |
| | 2 | 15 | What is your highest level of education attended? | Ordinal (1=Primary; 2=Lower secondary; 3=Upper secondary; 4=University) | Ordinal (1=primary; 2= lower or upper secondary; 3= university) | *d_highed* |
| | 7 | 14 | If teachers are absent for a short time how do you cover classes? | Categorical (1=Use relief teacher; 2=Combine classes; 3=Unsupervised; 4=Unsupervised assignment; 5=Let them play sports; 6=Send students home; 7=Other (specify); 9=not applicable) | Ordinal (-1= students sent home; 0= unsupervised in-class assignment or supervision of a non-teacher; 1= substitute teacher or combine classes)[3] | *d_teacherabsent* |

1. Unlike the Teacher Questionnaire, the Background Questionnaire and corresponding data set did not specify if the travel time was during the rain or dry season.
2. On the questionnaire the wording does not specify rain or dry season, but the answers are structured as such in the data files. S2Q9a in the data files states "Usual time to get to school every day a. dry season (minutes)." S2Q9b in the data files states "usual time it takes to get to school every day b. rain season (minutes)."
3. In the final sample, answers 5 and 7 were not selected by those being interviewed.

*st_phighested_primsec*), and the amount of homework help the student received at home (*st_hwhelp*).

3. *Teacher and Classroom Level Predictors*: Then, I introduced teacher and classroom-level predictors to student-level predictors and the treatment variable. I started with demographic data. These include if the teacher is a female (*t_female*), if the teacher was born in the area (*t_bornhere*), and travel time to school in the rain season (*t_travelrain*). Predictors related to the teacher's specific experience in teaching were added. These include years of teaching experience (*t_expyrs*), the original motivation of the teacher to enter the profession (*t_motivation*), if the teacher provides tutoring for a fee (*t_tutor*), and if the teacher had received in-service training in the last five year (*t_inservice*). Two economic predictors were finally added. These include if the teacher has a second job outside of teaching other than tutoring (*t_second job*) and if the teacher experienced delays in pay (*t_delaysinpay*).
4. *Director and School Level Predictors*: The final step was adding the school director and school-level variables to the model. These were added in a similar order. First, demographic data were added (i.e., director's gender, *d_male*, and director's age, *d_age*). Then, descriptors related to the school director's position were included. These include the director's highest level of education (*d_highed*), years of experience as a school director (*d_expyrs*), if the director wants to remain at the current school next year (*d_motivation*), and if the director still teaches in the classroom (*d_stillteach*). Finally, school descriptors were added (i.e., location of the school, *d_rural*, school size as measured by the number of classrooms, *d_ssize*, level of parental participation, *d_parentpart*, if the school received its entire budget from the previous year, *d_schoolbudget*, and strategies for dealing with short-term teacher absenteeism, *d_teachabsent*).

This methodical approached, while susceptible to collinearity, allowed me to evaluate the sensitivity of each of the predictors and the effect of one predictor on the others. Table 18 below lists the final variables used as predictors in the base OLS model for this research. These are described further in Chapter VIII: Descriptive Statistics.

### 6.11 Collinearity of Independent Variables

The previously described steps allowed me to generate a basic model. To minimize the potential for collinearity, I examined the relationship between the selected predictors. As a criterion to determine collinearity, I utilized the Pearson product-moment correlation coefficient. The Pearson product-moment correlation coefficient, or also called Pearson's r, was the first formal correlation measure and still one of the most widely utilized in research. Pearson's r measures the linear dependency of two variables. The measurement ranges from 0, or no correlation, to 1, or a perfect correlation (Rodgers & Nicewander, 1988), with coefficients between .50 and 1.00 being highly correlated. Due to a high level of collinearity (i.e., a Pearson coefficient greater than 0.50), some of the variables were necessarily dropped. For example, a teacher's level of education (*t_highed*) was highly correlated with a teacher's years of experience (*t_expyrs*), and therefore, the former was removed. Teacher in-service training (*t_inservice*) was highly correlated with a teacher's pre-service training (*t_training*), and the former was retained. Variables denoting the school's geographic location were also highly correlated. Schools located in remote (*d_remote*) or urban (*d_urban*) areas were highly correlated with the treatment variable and were necessarily dropped.

Table 19 details the final Pearson variables for the coefficients used as predictors as I examined the relationship between student achievement on the PETS (2004) exam and private tutoring.

Table 18. Description of the Treatment and Independent Variables

| Variable Level | Variable Abbreviation | Description | Type |
|---|---|---|---|
| **Treatment (n=1)** | *st_xlessons_allnothing* | Participation in extra lessons | Binary |
| **Student (n=9)** | *st_girl* | Student is a girl | Binary |
| | *st_age* | Age | Continuous |
| | *st_bornhere* | Born in or close to this village | Binary |
| | *st_fishing* | According to the student, the family is primarily engaged in fishing | Binary |
| | *st_breakfast* | Frequency a student eats breakfast | Ordinal (0=never; 1= 1 to 2 days a week; 2=3-4 days a week; 3= 5-6 days a week; 4=everyday) |
| | *st_traveltime* | Travel time from home to school one way in minutes | Ordinal (1= less than 15 minutes; 2= between 13 to 30 minutes; 3= between 30 to 60 minutes; 4= more than 60 minutes) |
| | *st_phighested_noed* | Parent's highest education is no school | Binary |
| | *st_phighested_primsec* | Parent's highest education is at least primary or secondary school | Binary |
| | *st_hwhelp* | Frequency a student receives help on homework at home | Ordinal (0=never; 1= sometimes; 2=often) |
| **Teacher (n=9)** | *t_female* | Teacher is female | Binary |
| | *t_bornhere* | Born in or close to this village | Binary |
| | *t_travelrain* | Time in minutes it take to get to school during the rainy season | Ordinal (1= less than 15 minutes; 2= between 13 to 30 minutes; 3= between 30 to 60 minutes; 4= more than 60 minutes) |
| | *t_expyrs* | Years of teaching experience | Ordinal (1= less than one year to 5 years; 2= 6 to 10 years; 3= 11-20 years; 4= 20 more years) |

Table 18 (continued)

| Variable Level | Variable Abbreviation | Description | Type |
|---|---|---|---|
| **Teacher** (continued) | *t_motivation* | Motivation for joining teaching | Ordinal (-2= Very Low; -1=Low; 0= Average; 1= High; 2= Very High; and 3= Exceptionally High) |
| | *t_tutor* | Tutors students after school | Binary |
| | *t_inservice* | Attended in-service teacher training since 2000 | Binary |
| | *t_delaysinpay* | Has had delays in base salary and basic allowances | Binary |
| | *t_secondjob* | Second job outside of work other than tutoring | Binary |
| **School Director (n=11)** | *d_male* | Director is male | Binary |
| | *d_age* | Age | Continuous |
| | *d_highed* | Highest level of education | Categorical (1=primary; 2= lower or upper secondary; 3= university) |
| | *d_expyrs* | Years of experience in directing schools | Ordinal (1= less than one year to 5 years; 2= 6 to 10 years; 3= 11 to 20 years; 4= 20 more years) |
| | *d_motivation* | Director wants to stay at the school next year | Binary |
| | *d_stillteach* | Director still teaches in the classroom | Binary |
| | *d_rural* | School is in a rural environment | Binary |
| | *d_ssize* | Number of classes at the school | Continuous |
| | *d_parentpart* | Number of times parents attend meetings at the school other than the opening ceremony | Continuous |
| | *d_schoolbudget* | School received its entire "school operational budget" from the previous year | Binary |
| | *d_teacherabsent* | Strategies for dealing with short term teacher absenteeism | Ordinal (-1= students sent home; 0= unsupervised in-class assignment or supervision of a non-teacher; 1= substitute teacher or combine classes) |

Table 19. Pearson Correlation Coefficients, Final OLS Model

| | *st_xlessons* | *st_girl* | *st_age* | *st_bornhere* | *st_fishing* | *st_breakfast* | *st_traveltime* | *st_phighested_noed* | *st_phighested_primsec* | *st_hwhelp* | *t_female* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *st_xlessons* | 1.00 | | | | | | | | | | |
| *st_girl* | 0.03 | 1.00 | | | | | | | | | |
| *st_age* | -0.16 | -0.09 | 1.00 | | | | | | | | |
| *st_bornhere* | -0.01 | 0.04 | -0.02 | 1.00 | | | | | | | |
| *st_fishing* | -0.06 | -0.05 | 0.15 | 0.03 | 1.00 | | | | | | |
| *st_breakfast* | 0.15 | 0.04 | -0.04 | 0.00 | -0.01 | 1.00 | | | | | |
| *st_traveltime* | 0.11 | 0.02 | 0.04 | -0.03 | -0.02 | 0.01 | 1.00 | | | | |
| *st_phighested_noed* | -0.02 | 0.00 | 0.07 | -0.02 | 0.05 | 0.01 | -0.01 | 1.00 | | | |
| *st_phighested_primsec* | 0.02 | -0.01 | 0.00 | -0.02 | 0.02 | 0.07 | -0.02 | -0.25 | 1.00 | | |
| *st_hwhelp* | 0.17 | 0.04 | -0.11 | -0.02 | -0.07 | 0.07 | 0.03 | -0.09 | 0.12 | 1.00 | |
| *t_female* | 0.15 | 0.05 | -0.12 | -0.04 | 0.03 | 0.11 | -0.04 | -0.02 | 0.05 | 0.06 | 1.00 |
| *t_bornhere* | -0.01 | 0.00 | -0.09 | 0.16 | 0.06 | 0.05 | -0.03 | 0.02 | 0.04 | 0.04 | -0.02 |
| *t_travelrain* | -0.03 | 0.01 | 0.04 | -0.01 | 0.06 | -0.04 | 0.04 | 0.02 | -0.04 | -0.02 | 0.05 |
| *t_expyrs* | -0.01 | 0.01 | 0.03 | -0.08 | 0.03 | 0.01 | 0.02 | 0.04 | 0.02 | -0.02 | 0.08 |
| *t_motivation* | -0.16 | 0.03 | 0.03 | 0.02 | 0.02 | -0.15 | -0.03 | -0.04 | -0.06 | -0.04 | 0.04 |
| *t_tutor* | 0.27 | 0.01 | -0.15 | -0.11 | -0.10 | 0.01 | 0.01 | -0.06 | 0.04 | 0.06 | 0.23 |
| *t_inservice* | -0.05 | 0.03 | -0.04 | 0.03 | -0.02 | -0.09 | -0.02 | -0.04 | 0.05 | 0.03 | 0.03 |
| *t_delaysinpay* | -0.01 | 0.02 | -0.03 | -0.05 | 0.04 | 0.11 | -0.04 | 0.02 | 0.08 | 0.04 | 0.12 |
| *t_secondjob* | -0.01 | 0.00 | -0.04 | 0.10 | 0.07 | -0.01 | -0.03 | -0.01 | 0.03 | 0.01 | -0.14 |
| *d_male* | -0.09 | 0.01 | 0.09 | 0.09 | 0.11 | -0.01 | 0.05 | 0.00 | -0.01 | -0.05 | -0.03 |
| *d_age* | 0.02 | 0.00 | -0.09 | 0.16 | 0.00 | -0.08 | -0.02 | -0.07 | 0.02 | 0.02 | 0.01 |
| *d_highed* | 0.01 | 0.01 | -0.04 | -0.06 | -0.08 | 0.01 | -0.01 | -0.01 | 0.05 | 0.08 | 0.01 |
| *d_expyrs* | 0.00 | -0.02 | 0.03 | -0.07 | -0.07 | 0.07 | -0.01 | 0.01 | -0.01 | 0.05 | -0.08 |
| *d_motivation* | -0.06 | 0.04 | 0.07 | -0.04 | 0.04 | -0.03 | 0.00 | 0.03 | 0.06 | 0.02 | 0.04 |
| *d_stillteach* | -0.04 | 0.00 | 0.10 | -0.04 | -0.02 | -0.07 | 0.05 | 0.01 | -0.01 | -0.07 | -0.08 |
| *d_rural* | -0.16 | 0.01 | 0.07 | 0.09 | 0.08 | -0.01 | -0.04 | -0.02 | -0.01 | -0.04 | -0.06 |
| *d_ssize* | 0.15 | -0.01 | -0.08 | -0.03 | -0.10 | -0.01 | 0.02 | -0.04 | 0.02 | 0.05 | 0.15 |
| *d_parentpart* | 0.06 | -0.02 | 0.03 | -0.10 | 0.08 | -0.01 | -0.02 | 0.01 | -0.04 | 0.00 | -0.07 |
| *d_schoolbudget* | -0.07 | 0.01 | 0.08 | -0.05 | 0.07 | -0.04 | 0.02 | 0.00 | 0.05 | -0.03 | -0.06 |
| *d_teacherabsent* | -0.01 | 0.04 | 0.02 | -0.09 | -0.02 | 0.01 | 0.02 | 0.00 | 0.02 | -0.01 | 0.15 |

Table 19 (continued)

| | *t_bornhere* | *t_travelrain* | *t_expyrs* | *t_motivation* | *t_tutor* | *t_inservice* | *t_delaysinpay* | *t_secondjob* | *d_male* | *d_age* | *d_highed* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| *t_bornhere* | 1.00 | | | | | | | | | | |
| *t_travelrain* | -0.13 | 1.00 | | | | | | | | | |
| *t_expyrs* | -0.31 | 0.17 | 1.00 | | | | | | | | |
| *t_motivation* | -0.01 | -0.05 | -0.31 | 1.00 | | | | | | | |
| *t_tutor* | -0.17 | -0.15 | 0.09 | -0.07 | 1.00 | | | | | | |
| *t_inservice* | 0.10 | -0.05 | -0.12 | 0.06 | 0.08 | 1.00 | | | | | |
| *t_delaysinpay* | 0.06 | -0.01 | 0.11 | -0.05 | 0.01 | 0.10 | 1.00 | | | | |
| *t_secondjob* | 0.38 | -0.01 | -0.29 | 0.12 | -0.09 | 0.09 | -0.01 | 1.00 | | | |
| *d_male* | 0.08 | 0.07 | 0.05 | 0.03 | -0.29 | 0.04 | -0.06 | 0.07 | 1.00 | | |
| *d_age* | 0.26 | -0.02 | -0.27 | 0.03 | -0.07 | 0.01 | -0.03 | 0.21 | -0.01 | 1.00 | |
| *d_highed* | -0.05 | -0.05 | 0.07 | 0.00 | 0.09 | -0.03 | -0.01 | -0.03 | -0.05 | -0.15 | 1.00 |
| *d_expyrs* | -0.06 | -0.02 | 0.00 | 0.00 | 0.03 | 0.00 | 0.01 | -0.04 | -0.02 | -0.37 | 0.19 |
| *d_motivation* | 0.12 | -0.06 | 0.11 | 0.05 | -0.12 | 0.08 | 0.12 | 0.08 | 0.29 | -0.16 | 0.14 |
| *d_stillteach* | -0.11 | 0.05 | -0.01 | 0.02 | -0.03 | 0.00 | -0.18 | -0.06 | 0.00 | -0.07 | -0.26 |
| *d_rural* | 0.17 | 0.10 | -0.24 | 0.05 | -0.41 | -0.05 | 0.02 | 0.17 | 0.17 | 0.20 | 0.02 |
| *d_ssize* | -0.02 | -0.11 | 0.00 | -0.04 | 0.46 | -0.08 | 0.01 | -0.10 | -0.07 | 0.13 | 0.07 |
| *d_parentpart* | -0.13 | -0.04 | -0.14 | 0.08 | -0.03 | -0.03 | 0.00 | 0.09 | 0.02 | 0.05 | 0.00 |
| *d_schoolbudget* | 0.02 | -0.01 | 0.16 | -0.07 | 0.07 | 0.04 | 0.04 | 0.00 | 0.01 | -0.15 | -0.08 |
| *d_teacherabsent* | -0.07 | -0.06 | 0.08 | 0.06 | 0.09 | 0.07 | 0.07 | -0.02 | -0.02 | -0.06 | -0.03 |

| | *d_expyrs* | *d_motivation* | *d_stillteach* | *d_rural* | *d_ssize* | *d_parentpart* | *d_schoolbudget* | *d_teachabsent* |
|---|---|---|---|---|---|---|---|---|
| *d_expyrs* | 1.00 | | | | | | | |
| *d_motivation* | 0.04 | 1.00 | | | | | | |
| *d_stillteach* | 0.09 | 0.08 | 1.00 | | | | | |
| *d_rural* | -0.10 | 0.08 | -0.02 | 1.00 | | | | |
| *d_ssize* | -0.06 | -0.03 | -0.21 | -0.16 | 1.00 | | | |
| *d_parentpart* | -0.02 | 0.01 | 0.01 | 0.06 | -0.05 | 1.00 | | |
| *d_schoolbudget* | -0.05 | 0.13 | 0.18 | -0.13 | -0.03 | -0.09 | 1.00 | |
| *d_teacherabsent* | 0.00 | 0.01 | 0.02 | -0.04 | 0.00 | 0.05 | 0.17 | 1.00 |

### 6.12 Propensity Score Matching

Developed by Rosenbaum and Rubin (1983) over two decades ago, the objective of propensity score matching is to attempt to eliminate selectivity bias by matching on background characteristics and generating a single propensity score. In the process of generating a single propensity score, the chances of experiencing selection bias are reduced because observable background variables are incorporated into both the treatment and the comparison groups. However, even if a sufficient number of counterfactuals and overlap are achieved, the attempt to reduce selection bias is only achieved on the observable variables and not non-observable variables. These non-observable variables may bias the effect of tutoring because private tutoring is not random. Parents with both the financial means and the motivation are more likely to send their students to private tutoring sessions than their parental peers who lack one or both of these capacities. Also, parents who send their children to tutoring are likely to have higher achievement in the absence of tutoring. While matching variables does not eliminate the influence of such unobservable variables or errors in measurement, it does strengthen the argument for making a causal inferences on the specified estimand (Hill & Thomas, 2000; Rosenbaum & Rubin, 1983; Rubin, 2001). Equation (2) below illustrates the propensity score matching methodology used in this research:

$$E\,[Y(0) \mid Z=1, e(X)] = E\,[Y(0) \mid Z=0, e(X)] \qquad (2)$$

$$E[Y(1) \mid Z=1, e(X)] \text{ with } \bar{Y}_{Z=1,e(x)}$$

$$E[Y(0) \mid Z=1, e(X)] \text{ with } \bar{Y}_{Z=0,e(x)}$$

Z= Private Tutoring
Y= PETS (2004) Numeracy Score, Literacy Score, and Total Score
X= Confounding Covariates

In propensity score matching, for the treatment effects to be valid, four assumptions must hold true. The first assumption is *ignorability*. Ignorability states that

the treatment assignment is conditional on covariates in the model. In other words, the outcomes [y(0) and y(1)] are the same for both the treatment and control groups (Hill, 2009). The second assumption is that there is a sufficient number of *counterfactuals* (i.e., overlap) for each case in the control group, and the third assumption is that a *linear relationship* exists between the treatment and the outcome (Hill, 2009). The final assumption is SUTVA, or the *stable unit treatment value*. SUTVA asserts that a participant's response or lack of response to a treatment is not dependent on or affected by others in the program (Rubin, 1980).

To generate propensity scores, I ran a *probit regression* using the treatment variable (i.e., private tutoring coded as a binary variable) as the dependent variable and included all of the predictors as the confounding covariates. This equation generates the predicted probability that each person received the treatment and these predicted probabilities are the propensity scores. Next, I plotted the propensity scores of the treatment and comparison groups to evaluate if there was *sufficient overlap* and *balance* to proceed with the analysis. Had there not been sufficient overlap between the treatment and comparison groups, the analysis may have been halted, as the difference between the two groups would have simply been too great (Gelman & Hill, 2007). The process of balancing the constructed treatment and comparison groups to achieve a sufficient overlap is the most laborious aspect of this methodology. In this process of creating balance, higher order variables (e.g., logged and squared variables, and interaction terms) were added and removed from the model to assess the impact on the other variables and the overall model. Also, variables with insufficient overlap in the treatment and comparison groups or lesser impact on the outcome variable can be removed from the model. In the process of matching the constructed groups, I utilized the option of *matching with replacement*. In this option, an observation in the comparison group can be used as many times as it is the best match for observations in the treatment group. The

benefit of using matching with replacement is that it tends to reduce bias, although it may increase standard errors (Gelman & Hill, 2007). To determine if all of the variables were *balanced*, I looked for overlap between the treatment and comparison groups. I observed if the treatment and comparison groups had approximately the same number of counterfactual and no extrapolation beyond the treatment group (Gelman & Hill, 2007; Omoeva, 2012).

Figure 7 below illustrates the balance between the constructed treatment (red bars) and comparison (blue bars) groups before and after balancing for the three outcome variables.

Once sufficient balance and overlap were achieved, I utilized propensity scores in three different ways to measure the effect of private tutoring on the treatment group as compared to the constructed comparison group. First, I compared the difference in *mean outcomes across the matched groups*; second, I evaluated the *propensity score weighted outcomes*; and third, I analyzed propensity scores in a *regression-adjusted matched estimate*. The findings of these analyses are described further in Chapter VIII: Empirical Findings.


Figure 7. Before and After Balancing -- Numeracy, Literacy, and Total Score

### 6.13 Threats to Validity and Limitations

There are eight notable threats to the validity of this research. Three of these threats are directly associated with the PETS (2004) survey design, and five are more general threats. I begin with the threats associated with the PETS (2004) survey design. First, the survey did not ask the parents about their level of education; instead the question was posed to the students. While some students may know this information, it seems unlikely that all fourth graders would be able to accurately report their parent's education level. Asking students about their parent's level of education resulted in high levels of missing data on this variable, and it is unclear how accurate the student answers, when provided, may have been. Second, the survey did not ask parents about their student's participation in private tutoring; instead this question was posed to the students. The survey data would have been much stronger had the private tutoring question been presented on the parent's survey, and the level of specificity would have been increased had questions regarding the cost of private tutoring been included and from whom the student received private tutoring (i.e., his or her teacher or some other party). Given the absence of these data in the surveys, they were necessarily omitted from this analysis. The third limitation is regarding the teacher survey. Although private tutoring questions were included in the teacher survey, a greater level of specificity regarding to whom the teachers provided private tutoring (i.e., their own students or other students) was omitted from the questions asked. Furthermore, as I previously discussed, even if these questions were included in the surveys, teachers may have a motivation to provide inaccurate answers for fear of retribution.

In addition to the validity threats associated with the PETS (2004) survey, there are also limitations regarding education and private tutoring in general. First, on the supply side, any differences in student outcomes may be due in part to private tutoring and in part by unobserved family and school characteristics. This is a classic problem of

endogeneity of the treatment variable, in this research, the private tutoring variable. While propensity score matching is designed to infer causality by matching treatment and control groups with a single score, the covariates included in the analysis may not control for the endogeneity due to measurement error and omitted non-observable variables. Second, the timing of the surveys serves as a limitation to this research. The data collection process spanned a year, and, therefore, the schools that were surveyed later in the process may have different results than those schools that were surveyed toward the beginning of the data collection process. This means that it is plausible that a larger number of students who participated in private tutoring were tested and surveyed earlier in the data collection process, in which case the effects of private tutoring may not have had sufficient time to make a measurable difference between the treatment and comparison groups. Third, it is impossible to ascertain if the difference in mean scores between the constructed groups is fundamentally different across time. Because there are no baseline data with which to compare, one cannot measure the quality and impact of the private tutoring students received. Thus, the quality of the tutoring is an unknown variable. The final threat to validity of this research is that there is no information from whom the students received their tutoring and the content of the tutoring.

# Chapter VII

# DESCRIPTIVE STATISTICS

This chapter provides details on the selected descriptive statistics for the three outcome variables, the treatment variable, and 29 control variables. The final model was used to evaluate the reduced World Bank PETS (2004) Cambodia dataset containing data from school directors (n=174), fourth grade teachers (n=174), and fourth grade students (n=2,894) who either always or never participated in private tutoring. The teachers retained in the model were those who specified that they taught fourth grade as either their first or second class. First, I provide a description of the outcome and treatment variables and then provide descriptive statistics for the covariates.

## 7.1 Outcome Variables

The three outcome variables were numeracy score, literacy score, and total score for fourth graders who self-reported that they always participated in private tutoring (treatment group) or never participated in private tutoring (comparison group). For the sample (n=2,894), the mean numeracy score was 12.18 and the mean literacy score was slightly lower at 11.86. Summing the numeracy and literacy scores allowed for a total possible score of 50. However, no fourth grade student in the sample achieved a perfect score. Instead the maximum score achieved was 48 and the minimum score was 0. The mean total score was 24.04 with a standard deviation of 8.70. See Table 20 below.

Table 20. Descriptive Statistics for Outcome Variable

| Outcome | Obs. | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| *numscore4* | 2,894 | 12.18 | 4.95 | 0 | 25 |
| *litscore4* | 2,894 | 11.86 | 4.80 | 0 | 25 |
| *tscore4* | 2,894 | 24.04 | 8.70 | 0 | 48 |

Figure 8 below illustrates the density for fourth grade numeracy, literacy, and total scores. The solid line represents the normal density, and the dashed line represents the kernel density. This figure shows that for the three outcomes there is no evidence of ceiling effect and test scores being truncated.

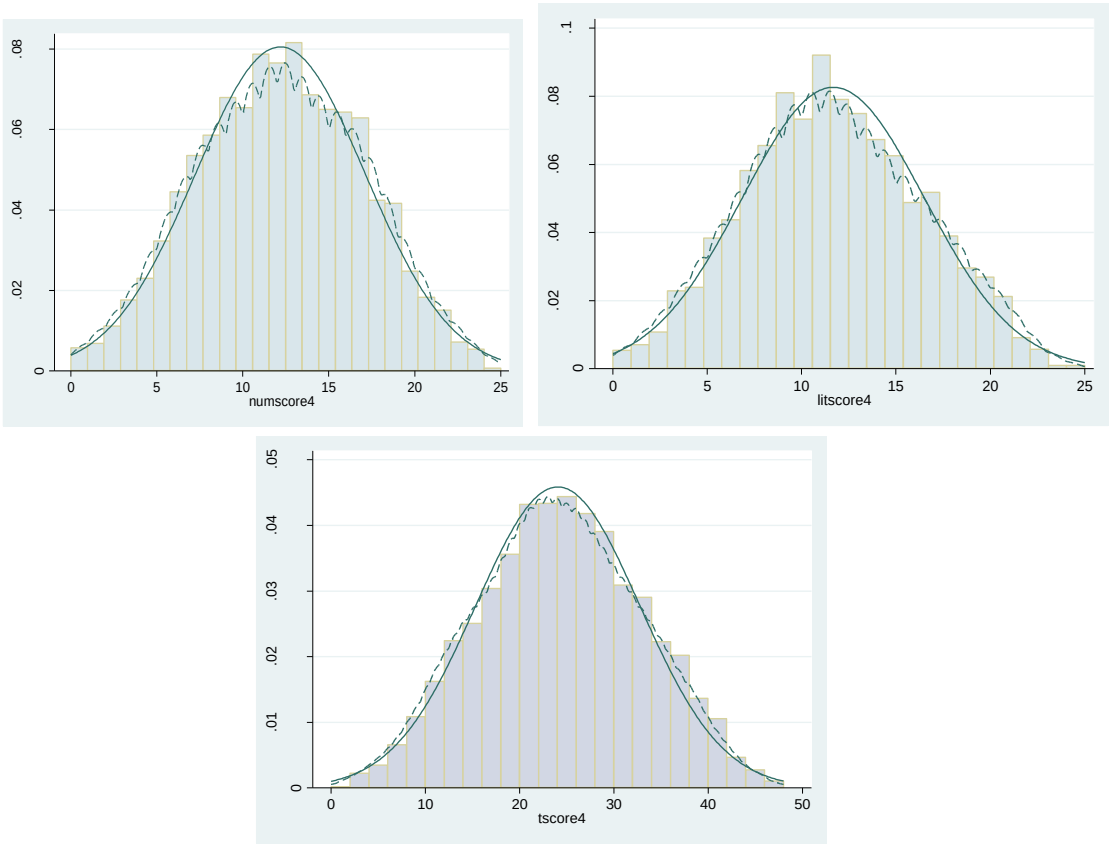


Figure 8. Density of Numeracy, Literacy, and Total Scores

## 7.2 Treatment Variable

As mentioned, the treatment variable used for this research is private tutoring. Specifically, the treatment group consists of students who self-reported that they participated in private tutoring every day, and the comparison group is comprised of students who self-reported that they never participated in private tutoring. The binary coding of the treatment variable generated a treatment group of 961 fourth grade students and a comparison group of 1,933 fourth grade students for a total sample of 2,894 students. The number of students who stated that they never participated in private tutoring was more than twice the number of students who self- reported that they engaged in private tutoring every day. Because students did not specify for which subjects they received private tutoring (i.e., numeracy, literacy, both, or neither), the number of students in the treatment and comparison groups remain unchanged despite the use of different metrics for the outcome variable.

Table 21 below shows the difference in the treatment and comparison groups based upon the three outcome variables. Students who participated in private tutoring experienced higher outcomes for all three outcomes. Approximately a quarter of a standard deviation higher, literacy scores were 1.30 points higher for the treatment group, nearly a point higher for numeracy scores, and almost 2.25 points higher in the average total score.

Table 21. Descriptive Statistics for Outcome Variables by Treatment

| Variable | Assignment | Obs. | Mean | Difference | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|---|---|
| *litscore4* | Comparison | 1,933 | 11.41 | 1.30 | 4.72 | 0 | 25 |
| | Treatment | 961 | 12.71 | | 4.84 | 0 | 25 |
| *numscore4* | Comparison | 1,933 | 11.87 | 0.95 | 4.96 | 0 | 24 |
| | Treatment | 961 | 12.82 | | 4.88 | 0 | 25 |
| *tscore4* | Comparison | 1,933 | 23.30 | 2.24 | 8.63 | 0 | 47 |
| | Treatment | 961 | 25.54 | | 8.65 | 3 | 48 |

## 7.3 Variables Used as Predictors

This section will provide some details for the 29 variables used as predictors in the final OLS base model. There are 9 variables at both the student and teacher level, and 11 variables at the school director level. Shown in Table 22 below, each variable at the student and teacher level had 2,894 observations, and the variables at the director level contained 174 observations. The reason for this dramatic decline in observations between students/teachers and administrators is because the latter refer to schools and school averages. At the student level, the reduced PETS 2004 data used for this analysis contained slightly more girls (*st_girls*) than boys, with the youngest 8 years of age and the oldest 19 years of age. The mean age for the sample is a little over 12 years old (*st_age*), and over 80% of the students were born in or near the village where they currently live (*st_bornhere*). There are three variables designed to capture a student's socio-economic status. The first coefficient is fishing (*st_fishing*). A quarter of the students in the sample stated that their family was primarily engaged in fishing as an occupation, as opposed to other occupations such as farming. The second variable to capture a student's socio-economic status is the frequency that a student eats breakfast each week (*st_breakfast*). Structured as an ordinal variable with five levels (i.e., 0=Never; 1= one to two days a week; 2= three to four days a week; 3= five to six days a week; 4=everyday), the students in this analysis have a mean frequency of eating breakfast of slightly more than five to six days a week. The final coefficient was included to measure socio-economic status, a student's travel time one way to school at any time of the year (e.g., rain season or dry season) (*st_traveltime*). I witnessed in my work in Cambodia that even in the rural areas, there were better built homes and families working in small businesses within the village, and as I traveled away from the school, the homes became less sturdy and the likelihood of families being engaged in agriculture or fishing increased. I considered this as a sign of a family's socio-economic status. An ordinal

Table 22. Descriptive Statistics of Treatment and Independent Variables

| Variable | Obs. | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|---|
| *st_xlessons* | 2,894 | 0.33 | 0.47 | 0 | 1 |
| *st_girl* | 2,894 | 0.52 | 0.50 | 0 | 1 |
| *st_age* | 2,894 | 12.61 | 1.51 | 8 | 19 |
| *st_bornhere* | 2,894 | 0.83 | 0.37 | 0 | 1 |
| *st_fishing* | 2,894 | 0.25 | 0.44 | 0 | 1 |
| *st_breakfast* | 2,894 | 3.74 | 1.60 | 1 | 5 |
| *st_traveltime* | 2,894 | 1.68 | 0.87 | 1 | 4 |
| *st_phighested_noed* | 2,894 | 0.09 | 0.29 | 0 | 1 |
| *st_phighested_primsec* | 2,894 | 0.39 | 0.49 | 0 | 1 |
| *st_hwhelp* | 2,894 | 0.69 | 0.69 | 0 | 2 |
| *t_female* | 174 | 0.34 | 0.47 | 0 | 1 |
| *t_bornhere* | 174 | 0.43 | 0.50 | 0 | 1 |
| *t_traveltrain* | 174 | 1.53 | 0.84 | 1 | 4 |
| *t_expyrs* | 174 | 2.70 | 1.09 | 1 | 4 |
| *t_motivation* | 174 | 1.48 | 1.23 | -2 | 3 |
| *t_tutor* | 174 | 0.16 | 0.37 | 0 | 1 |
| *t_inservice* | 174 | 0.23 | 0.42 | 0 | 1 |
| *t_delaysinpay* | 174 | 0.83 | 0.38 | 0 | 1 |
| *t_secondjob* | 174 | 0.61 | 0.49 | 0 | 1 |
| *d_male* | 174 | 0.94 | 0.23 | 0 | 1 |
| *d_age* | 174 | 49.71 | 7.85 | 24 | 63 |
| *d_highed* | 174 | 1.97 | 0.21 | 1 | 3 |
| *d_expyrs* | 174 | 2.91 | 0.89 | 1 | 4 |
| *d_motivation* | 174 | 0.82 | 0.39 | 0 | 1 |
| *d_stillteach* | 174 | 0.15 | 0.36 | 0 | 1 |
| *d_rural* | 174 | 0.76 | 0.43 | 0 | 1 |
| *d_ssize* | 174 | 8.94 | 4.65 | 2 | 30 |
| *d_parentpart* | 174 | 2.49 | 9.21 | 0 | 120 |
| *d_schoolbudget* | 174 | 0.52 | 0.50 | 0 | 1 |
| *d_teacherabsent* | 174 | 0.47 | 0.84 | -1 | 1 |

variable with four levels (1= less than fifteen minutes; 2= between fifteen to thirty minutes; 3= between thirty to sixty minutes; 4= more than sixty minutes). In this sample, the average travel time for a student one way to school is between fifteen to thirty minutes, typically by bicycle. Three variables are included in the model to capture the educational level of the adults in the student's house. The first two are binary variables. The first coefficient (*st_phighested_noed*) identifies those mothers and fathers that do not have any education. The second coefficient (*st_phighested_primsec*) identifies those households that have at least one parent with either a primary or secondary education. In the sample, 9% of the households have a parent with no education, and almost 40% have at least one parent with a primary or secondary education. The remainder of the sample comprises students who did not know their parent's education (*st_phighested_dnkw*), and because it serves as the comparison group, it is not listed in the table below. The third coefficient to measure the educational level of the household is the frequency that a student receives help on his or her homework (*st_hwhelp*). This variable is structured in an ordinal fashion (i.e. 0=Never; 1=Sometimes; 2=Often). In this sample, the mean for the frequency that a student receives help on his or her homework at home is 0.69, which means between "never" and "sometimes."

There are nine teacher-level covariates used as predictors in this analysis. In terms of gender, about a third of the teachers are female (*t_female*) with six to ten years of teaching experience (*t_expyrs*). Teaching experience is categorized as an ordinal variable (i.e. 1=Less than one year to five years; 2=Six to ten years; 3=Eleven to twenty years; 4=More than twenty years), and therefore, the mean of 2.7 equates to the second level of six to ten years of experience. The original motivation for entering the profession of teaching is also structured as an ordinal variable. As described in Chapter VI: Research Design and Methods, the teacher motivation scale ranged from a low of -2 to a high of 3. This continuous scale was renamed as -2=Very low; -1=Low; 0= Average; 1= High;

2= Very high; and 3=Exceptionally high. The mean value in this revised scoring system suggests that the typical teacher has average to high motivation. Approximately 16% of the teachers in the sample stated that they provided tutoring for a fee (*t_tutor*). As I previously stated, I consider this to be biased downward given the potential negative repercussions for teachers to discuss their private tutoring activities. About 25% of teachers stated that they had received in-service training in the past five years (*t_inservice*). Similarly structured to the variable measuring the distance students travel to school, teachers, on average, travel a little more than fifteen minutes each way to school during the rain season (*t_travelrain*), and over 80% have experienced delays in receiving their pay (*t_delaysinpay*). Over half of the teachers have a second job (*t_secondjob*) aside from tutoring students, and about 40% were born in or close to the village where they live (*t_bornhere*).

The last 11 variables capture the school director and school-level characteristics. This sample is comprised of almost 95% male directors (*d_male*), with an average age of nearly 50 years (*d_age*). Together, they have an upper secondary education level, and over 80% would like to teach at their school for the following year (*d_motivation*). This level of education is above average for primary school teachers in Cambodia in 2004. In 2003, the MoEYsS reported that 7% of primary school teachers possessed a primary school education, nearly 70% had a lower secondary school education, and 23% achieved an upper secondary school education. Less than 0.2% possessed a university-level education. MoEYS also stated that less than 5% of the entire teaching cadre did not have some form of pedagogical training, although specifics were not provided on the type of training (e.g., training at a teacher training center or in-service training only) (Geeves & Brendenberg, 2004). Only 15% still teach in the classroom (*d_stillteach*). In terms of the school-level characteristics, over three-quarters of the schools in the sample are located in a rural setting (*d_rural*) as opposed to urban (*d_ruban*) or remote (*d_remote*), which

serve as the comparison groups and are not listed in the table below, and the average school in the sample has just shy of nine classrooms (*d_ssize*). Parents, on average, attend about 2.5 meetings at year at the school (*d_parentpart*), and half of the schools received their entire budget for the previous year (*d_schoolbudget*). The last coefficient measures the strategies school directors use to address short-term teacher absenteeism (*d_teachabsent*). As described in Chapter VI: Research Design and Methods, this ordinal covariate has three levels (i.e. -1=Students sent home; 0=Unsupervised in-class assignment or supervision of a non-teacher; 1=Substitute teacher or combine classes). In the sample, most of the strategies school directors employed to deal with short-term teacher absences fell into the second category of "unsupervised in-class assignment or the supervision of a non-teacher." The next chapter details the empirical findings for the research. The findings are structured under each of my research questions.

# Chapter VIII

# EMPIRICAL RESULTS

The purpose of this chapter is to discuss the empirical results of my analyses. As described in Chapter VI: Research Method and Design, the goal of this chapter is to investigate the effects of private tutoring on Cambodian fourth grade students who self-reported that they participated in private tutoring every day as compared to their peers who self-reported that they never participated in private tutoring. Using ordinary least squares (OLS), I began by analyzing the determinants of success on the PETS (2004) numeracy, literacy, and total scores. This provided me with insight into the relationship of the variables in my production function with the outcome variables of interest. Still using OLS as my statistical method, I moved to investigate those factors that influence student participation in private tutoring. By restricting my analysis to the most extreme private tutoring scenarios (i.e. "all or nothing") and only losing a small percentage of observations in the process, I was able to see the relationship between variables in my production function and student success on the PETS (2004) exam. To capture a causal relationship between the binary treatment variable and the outcome variables, I selected propensity score matching as my statistical method. More robust than OLS, propensity score matching is designed, in theory, to provide an unbiased treatment effect by matching on background variables that affect both the treatment and the outcomes. Propensity score matching has been shown to yield accurate estimations of the effect of the treatment even when the treatment and control groups differ substantially (Dehejia &

Wahba , 2002). Also, this method allows for a more accurate estimate of the effect size of a treatment than do non-propensity score methods, such as OLS (Glazerman, Levy, & Myers, 2003). However, propensity score matching does not completely eliminate selection bias since I could only match on observable background variables. Therefore, even if a sufficient number of counterfactuals are identified, non-observable variables are not captured in this analysis. Consider motivation for example. This unobservable variable, if it was measurable and captured in this analysis, could impact the findings substantially. It would not be enough to include student motivation. Instead, parental and teacher motivation would also need to be included and as well as subcategories that categorize or define the type of motivation present. Teacher motivation might include altruistic intentions such as the desire for students to have a fuller understanding of the curriculum, or helping students who might be behind in their understanding of the curriculum. However, it could also include less admirable, but still understandable motivations, such as the need for more income because of the low pay or delays in receiving their monthly pay. Parental motivation would likely include similar altruistic motivations (e.g., the desire for the student to succeed or for remediation). Equally though, it could include intentions that more reflect the goals of the parent instead of the student, such as the parent's unfulfilled desire to pursue a particular career path. Student motivation might overlap with teacher and parent academic intentions, but also, it could include social pressures such as the student's desire to fit in with the other students who are able to afford private tutoring or the fear of being singled out by their teacher for not attending private tutoring sessions.

This chapter, structured by research question, discusses my findings and my interpretations of those findings. I start with my first research question and then work my way through the remaining. As this chapter will discuss, I found a small effect of private

tutoring on the PETS (2004) student outcomes. I explain these effect sizes at the conclusion of the chapter with my interpretation of these results.

## 8.1 Factors that Influence Student Tutoring and Its Outcomes on the PETS (2004) Numeracy, Literacy, and Total Test Scores

To answer my first research question -- *What are the factors that influence the pattern of student tutoring and its outcomes on the PETS (2004) numeracy, literacy, and total test scores?* -- I started my analysis by examining the relationship between private tutoring and test scores by using the treatment coefficient coded as a binary variable. Using a simple OLS regression model adjusted with weights and robust, clustered standard errors at the school level, my goal was to see which variables influenced the students' test scores. Bearing in mind that the coefficients represent not only the variable that I retained in my analysis, but also the potential influence of the collinear variables that were omitted, I will describe the results using numeracy scores as the outcome variable, then move to literacy score and total score. These results are presented in Table 23 below**.**

### Numeracy Outcomes

There were seven variables that had a statistically significant association on numeracy outcomes. Four of the variables were at the student level, one was at the teacher level, and the remaining two were at the director level. Investigating the student-level variables, two of the three variables that measured family socio-economic status (i.e., if the student's family was primarily involved in fishing, *st_fishing*, and the number of times in the week that a student ate breakfast, *st_breakfast*) were both statistically significant. Fishing, as a family's primary occupation, was negatively associated with numeracy outcomes, while the frequency that a student ate breakfast was positively

associated with numeracy outcomes. The third variable measuring a family's socio-economic status, student travel time (*st_traveltime*), showed a negative association but was not statistically significant. The coefficient measuring parents with no education (*st_phighested_noed*) was a negative predictor of numeracy outcomes. Students who reported that neither of their parents were formally educated scored over a point lower than their peers who did not know their parent's education level. Students who reported that either one or more of their parents had a least a primary or secondary education (*st_phighested_primsec*) scored approximately a half point higher than their peers who did not know their parent's education level. However, it was not statistically significant at a probability value of 5%. Similar to parental education is homework help (*st_hwhelp*), or the frequency that a student receives help on his or her homework at home. Homework help (*st_hwhelp*) was positively associated with numeracy scores, with students who received help on homework scoring almost a half point higher than their peers who had no help or less help on their homework. In the PETS (2004) survey, this question did not ask the student to specify who helped him or her on homework. Because the individual(s) are not identified, one cannot assume that it is the parent. The individual could just as easily be an older sibling, a relative, or a neighbor.

In this analysis, I found that only one teacher-level variable was statistically significant for numeracy outcomes. This was if the teacher experienced delays in pay (*t_delaysinpay*). Students whose teachers experienced delays in pay scored on average a point and third lower on their numeracy exam. Structured as a binary variable, a negative statistically significant association with numeracy score may suggest an increase in teacher absenteeism. While more investigation is necessary, it seems plausible that a teacher who experiences a higher frequency of delayed pay or the longer wait for a single paycheck may have higher rates of absenteeism than their counterparts who do not experience delays in pay. For example, in our report for USAID on teacher accountability

and absenteeism, we state that "delayed [salary] payments … contribute to teacher absenteeism by forcing teachers to take second and third jobs in order to survive" (Steiner-Khamsi et al., 2009, p. 6). This is a topic that could be further explored in Cambodia.

Two director-level variables influenced numeracy outcomes. The first measured if the director still taught in class (*d_stillteach*). Interestingly, this variable showed the largest impact of all of the variables, with students scoring over two points lower on their numeracy exam. One potential explanation for this finding is the location of the schools. About three-quarters of the schools in my sample were located in a rural area, and typically, directors and teachers posted to these areas have weaker skillsets. Therefore, although the directors in this sample possessed a higher level of education than the average director, this variable could be capturing weaker teaching skillsets possessed by the school directors.

The second variable measured school resources, specifically if the school received their entire budget from the previous academic year (*d_budget*). Students whose school received their entire budget from the previous year scored on average a point and a quarter higher than their peers who attend schools that did not receive their entire budget from the previous year. This positive association may reflect additional resources purchased by the school and available to the teachers and students. The PETS (2004) report's primary finding was that there was a high level of leakage of funds moving from the source to the intended source. However, it also noted that the reason this might be the case was due to poor recordkeeping at all government levels (World Bank, 2005). Therefore, this variable could be reflecting the difficulty in accounting in other areas of the country, for example, in the more remote areas. More research is required to more fully test this association.

**Literacy Outcomes**

There were five variables at the student level that provided statistical evidence of a potential relationship with literacy outcomes. All three of the variables measuring a family's socio-economic status were statistically significant. Breakfast (*st_breakfast*) had a positive association with literacy outcomes, and fishing (*st_fishing*) and student travel time (*st_traveltime*) both had negative associations with literacy outcomes. Homework help (*st_hwhelp*) also had a statistically significant relationship to literacy scores, but the coefficient was slightly lower than the coefficient for numeracy scores. Help on homework is associated with approximately a half point higher numeracy score, while help on homework is associated with about a third of a point higher on literacy scores. This variable could be capturing the lower adult literacy rates as a result of the Khmer Rouge.

Turning to the teacher-level variables, there were two that proved to have a statistically significant relationship with literacy scores. The first was tutoring (*t_tutor*). A teacher who offered tutoring services was linked to students who scored over two points higher on their PETS 2004 literacy exam. Similarly to numeracy outcomes, students whose teachers experienced delays in pay (*t_delaysinpay*) produced lower scores than students whose teachers had fewer instances of delayed pay.

In literacy scores, only one coefficient was statistically significant at the director level. This was the director's gender (*d_male*). Students whose directors were male scored on average two points less than their peers who had female directors. This may be caused by lower competencies and qualifications caused by a bias in favor of males.

**Total Score Outcomes**

There were seven variables that demonstrated a statistically significant influence on a fourth grader's total score. At the student level, all three socio-economic variables -- fishing (*st_fishing*), breakfast (*st_breakfast*), and travel time (*st_traveltime*) -- were

statistically significant. Fishing and travel time were both statistically significant and negatively related to a student's total test score. Eating breakfast was statistically significant and positively related to a student's total test score. Additionally, students who reported that parents did not have formal education (*st_phighested_noed*) scored on average two points lower in their total score, and students who received help on their homework at home scored higher on their total score (*st_hwhelp*).

Students whose teachers experienced delays in pay (*t_delaysinpay*) on average scored over two and three-quarters points lower on their total score. This was the only teacher-level coefficient that was statistically significant for a student's total score.

Finally, at the director level, similarly to numeracy scores, a student whose director still teaches (*d_stillteach*) scored on average approximately two and a half points lower than students who did not have directors who still taught in the classroom.

My overall interpretation of these patterns is that the family's socio-economic status, parent's educational status, delays in teacher payments, and if the director still teaches in the classroom are associated with a student's academic outcomes. This information was carried into the next levels of analysis.

## 8.2 Impact of Private Tutoring on PETS (2004) Numeracy, Literacy, and Total Scores

Answering my second research question -- *What is the impact of tutoring in Cambodia (both effectiveness and equity)?* -- I began by investigating effectiveness and found that private tutoring was positively associated with a student's numeracy score, literacy score, and total score. Students who self-reported that they attended private tutoring every day, as compared to their peers who self-reported that they never participated in private tutoring, were associated with higher numeracy, literacy, and total scores. For numeracy scores, fourth grade students who self-reported that they

participated in private tutoring every day (*st_xlessons*) scored on average three-quarters of a point higher than their fourth grade peers who self-reported that they never participated in private tutoring. For literacy scores, the difference in fourth grade students who participated in private tutoring was slightly higher at 0.81 points, and a student's total score was over a point and a half higher.

Other than the covariates that captured a student's socio-economic status, the only other student level predictor that was statistically significant for all three outcomes was homework help (st_hwhelp). The predictors for parent's education level were not statistically significant for the three outcomes. This may imply that homework help is an important predictor for student outcomes in addition to parental education. There are two possible reasons why homework help showed a positive relationship with student outcomes. First, homework help demonstrates an understanding of content by the person assisting the student, and second, it implies an interaction with the student on educational matters. Taken together, homework help may be a stronger predictor of fourth grade exam outcomes than parental educational achievement. However, it is worth repeating that students were asked about their parent's education level, and the parents were not. Therefore, there may be a large margin of error on student accuracy for these variables. Additionally, students were not asked who provided the help on schoolwork at home. It is implied that it is the parents, but without further testing there is no way to confirm or deny this assumption. Finally, it may be the case that parents, or whoever is providing the assistance on homework, is only assisting the best student in the family. Therefore, the variable can be endogenous with an upward biased coefficient. It is customary in the Asian culture to favor the child who is perceived to be the smartest, but it has not been tested or confirmed in Cambodia. The next section explores the causal relationship between private tutoring and student outcomes on the PETS (2004) exam.

Table 23. OLS Estimates - Numeracy, Literacy and Total Score (n=2,894)

| | numscore4 | | litscore4 | | tscore4 | |
|---|---|---|---|---|---|---|
| | **Coeff.** | **Std. E.** | **Coeff.** | **Std. E.** | **Coeff.** | **Std. E.** |
| *st_xlessons* | 0.728* | *-0.365* | 0.809* | *-0.377* | 1.537* | *-0.673* |
| *st_girl* | 0.048 | *-0.299* | 0.071 | *-0.266* | 0.119 | *-0.504* |
| *st_age* | -0.032 | *-0.096* | -0.128 | *-0.079* | -0.159 | *-0.154* |
| *st_bornhere* | -0.534 | *-0.373* | 0.056 | *-0.381* | -0.479 | *-0.698* |
| *st_fishing* | -0.903* | *-0.351* | -0.810** | *-0.304* | -1.713** | *-0.590* |
| *st_breakfast* | 0.367*** | *-0.100* | 0.390** | *-0.119* | 0.757*** | *-0.198* |
| *st_traveltime* | -0.263 | *-0.165* | -0.384* | *-0.184* | -0.646* | *-0.320* |
| *st_phighested_noed* | -1.138** | *-0.391* | -1.012 | *-0.593* | -2.150* | *-0.850* |
| *st_phighested_primsec* | 0.481 | *-0.308* | 0.007 | *-0.323* | 0.488 | *-0.566* |
| *st_hwhelp* | 0.453* | *-0.217* | 0.342* | *-0.152* | 0.794* | *-0.328* |
| *t_female* | 0.037 | *-0.571* | -0.381 | *-0.599* | -0.344 | *-1.070* |
| *t_bornhere* | -0.342 | *-0.559* | -0.523 | *-0.599* | -0.865 | *-1.028* |
| *t_travelrain* | -0.031 | *-0.349* | -0.082 | *-0.344* | -0.113 | *-0.641* |
| *t_expyrs* | 0.269 | *-0.299* | 0.288 | *-0.317* | 0.557 | *-0.571* |
| *t_motivation* | 0.064 | *-0.251* | 0.193 | *-0.259* | 0.258 | *-0.468* |
| *t_tutor* | 0.520 | *-1.153* | 2.220* | *-0.977* | 2.740 | *-2.029* |
| *t_inservice* | 0.919 | *-0.701* | 0.057 | *-0.756* | 0.976 | *-1.375* |
| *t_delaysinpay* | -1.373* | *-0.649* | -1.368* | *-0.623* | -2.741* | *-1.150* |
| *t_secondjob* | -0.667 | *-0.571* | 0.418 | *-0.545* | -0.248 | *-1.010* |
| *d_male* | -2.549 | *-1.690* | -2.329* | *-1.163* | -4.878 | *-2.780* |
| *d_age* | -0.021 | *-0.042* | -0.022 | *-0.042* | -0.043 | *-0.079* |
| *d_highed* | -1.810 | *-0.980* | 0.527 | *-0.967* | -1.283 | *-1.657* |
| *d_expyrs* | 0.139 | *-0.312* | -0.041 | *-0.308* | 0.098 | *-0.562* |
| *d_motivation* | 1.014 | *-1.022* | 1.531 | *-0.986* | 2.545 | *-1.930* |
| *d_stillteach* | -2.164** | *-0.699* | -0.262 | *-0.629* | -2.426* | *-1.194* |
| *d_rural* | 0.290 | *-0.717* | 0.494 | *-0.669* | 0.783 | *-1.234* |
| *d_ssize* | 0.029 | *-0.077* | -0.059 | *-0.081* | -0.030 | *-0.148* |
| *d_parentpart* | -0.005 | *-0.020* | -0.010 | *-0.016* | -0.015 | *-0.034* |
| *d_schoolbudget* | 1.232* | *-0.611* | 0.344 | *-0.647* | 1.575 | *-1.171* |
| *d_teacherabsent* | 0.332 | *-0.345* | 0.034 | *-0.335* | 0.366 | *-0.640* |
| *_cons* | 17.100*** | *-3.802* | 13.320*** | *-3.566* | 30.420*** | *-6.667* |

*$R^2$= 0.15*
*Standard errors in italics*
** p<0.05, ** p<0.01*

To more specifically evaluate the effects of private tutoring on student outcomes, I utilized propensity score matching. As I previously discussed, propensity score matching is a quasi-experimental statistical methodology used to infer causality in the absence of a randomized control trial. More robust that OLS, propensity score matching attempts to eliminate selection bias by matching on select background variables. However, a challenge with this method is that one can only match on observable variables, and non-observable

variables are excluded from the analysis. This is particularly important for my analysis because the PETS (2004) surveys did not ask the student, parents, or teachers about the motivation for participating in or providing private tutoring services. Therefore, justifiable, yet different, motivations exist for both poorly performing students and better performing students to be enrolled in these services, but this analysis cannot capture these differences.

I started with my base OLS model, as previously described, and dropped variables that had minimal overlap between the treatment and comparison groups. Also, I generated higher order variables and interactions to generate more balanced treatment and comparison groups. I repeated this process three separate times, testing many different models to produce the final propensity score models for the three outcomes. As shown in Table 24, the final propensity score model for numeracy (*numscore4*) includes 20 variables used as predictors of the propensity scores and in the production function. Eight of these variables were at the student level, and six were at both the teacher and director levels.

The student-level predictors included age (*st_age*), the family's participation in fishing (*st_fishing*), the frequency a student eats breakfast (*st_breakfast*), student's parents have no education (s*t_phighest_noed*), student's parents have at least a primary or secondary education (*st_phighest_primsec*), student receives help on his or her homework at home (*st_hwhelp*), an interaction variable between homework help and parents who have at least a primary or secondary education (*st_sthwhelp_primsec*), and travel time from home to school one way (*st_traveltime*).

The teacher-level predictors included if the teacher tutored students after school (*t_tutor*), years of teaching experience (*t_expyrs*), years of teaching experience squared (*t_expyrs2*), if the teacher attended in-service training since 2000 (*t_inservice*), travel time from home to school during the rainy season one way (*t_travelrain*), and the teacher's motivation for joining the profession (*t_motivation*).

Table 24. Final Propensity Score Model, Numeracy (*numscore4*)

| Variable Abbreviation | Description | Type |
|---|---|---|
| *st_age* | Age | Continuous |
| *st_fishing* | Family is primarily engaged in fishing | Binary |
| *st_breakfast* | Frequency a student eats breakfast | Ordinal (0=never; 1= 1 to 2 days a week; 2=3-4 days a week; 3= 5-6 days a week; 4=everyday) |
| *st_phighested_noed* | Parent's highest education is no school | Binary |
| *st_phighested_primsec* | Parent's highest education is at least primary or secondary school | Binary |
| *st_hwhelp* | Frequency a student receives help on homework at home | Ordinal (0=never; 1= sometimes; 2=often) |
| *st_hwhelp_primsec* | Interaction variable for *st_hwhelp* and *st_phighested_primsec* | Interaction |
| *st_traveltime* | Travel time from home to school one way | Ordinal (1= less than 15 minutes; 2= between 13 to 30 minutes; 3= between 30 to 60 minutes; 4= more than 60 minutes) |
| *t_tutor* | Tutors students after school | Binary |
| *t_expyrs* | Teaching experience | Ordinal (1= less than one year to 5 years; 2= 6 to 10 years; 3= 11-20 years; 4= more than 20 years) |
| *t_expyrs2* | Teaching experience squared | Continuous |
| *t_inservice* | Attended in-service teacher training since 2000 | Binary |
| *t_travelrain* | Travel time from home to school during the rainy season one way | Ordinal (1= less than 15 minutes; 2= between 13 to 30 minutes; 3= between 30 to 60 minutes; 4= more than 60 minutes) |
| *t_motivation* | Motivation for joining teaching | Continuous |
| *d_rural* | School is in a rural environment | Binary |
| *d_expyrs* | Experience in directing schools | Ordinal (1= less than one year to 5 years; 2= 6 to 10 years; 3= 11-20 years; 4= more than 20 years) |
| *d_expyrs2* | Experience in directing schools squared | Continuous |
| *d_highed* | Highest level of education | Categorical (1=primary; 2= lower or upper secondary; 3= university) |
| *d_ssize* | Number of classes at the school | Continuous |
| *d_schoolbudget* | School received its entire school operational budget from the previous year | Binary |

The six director-level variables used as predictors for the final propensity score model for numeracy (*numscore4*) included if the school was located in a rural environment (*d_rural*), years of experience directing schools (*d_expyrs*), experience directing schools squared (d_expyrs2), highest level of education achieved by the director (*d_highed*), the size of the school as measured by the number of classes (*d_ssize*), and if the school received its entire school operational budget from the previous academic year (*d_schoolbudget*).

All 20 variables used as predictors were balanced between the treatment and control groups in the unmatched and matched samples. When obtaining a balance between the treatment and control groups, careful consideration is given to the mean score and standard deviations. This final model for numeracy scores displayed the closest match between the treatment and control groups in terms of the similarity of the mean scores. To obtain this balance, variables were added and removed one by one from the model while the effect on the overlap and changes in the mean scores of all of the variables were observed. However, as previously discussed, propensity score matching cannot adjust for non-observables. Also, variables that might have been omitted from the surveys or from my final analysis (e.g., due to lack of overlap) may be important to the propensity function. Given these caveats, the final balance for the 20 variables included in this research is presented in Table 25 below.

Table 25. Balance on Key Covariates, Numeracy Score (*numscore4*)

| Variable | Sample | Mean | | Std. Dev. | |
|---|---|---|---|---|---|
| | | Treated | Control | Treated | Control |
| *st_age* | Unmatched | 12.278 | 12.775 | 1.5 | 1.5 |
| | Matched | 12.278 | 12.299 | 1.5 | 1.5 |
| *st_fishing* | Unmatched | 0.217 | 0.272 | 0.4 | 0.4 |
| | Matched | 0.217 | 0.229 | 0.4 | 0.4 |
| *st_breakfast* | Unmatched | 4.091 | 3.569 | 1.4 | 1.7 |
| | Matched | 4.091 | 4.073 | 1.4 | 1.4 |
| *st_phighested_noed* | Unmatched | 0.080 | 0.096 | 0.3 | 0.3 |
| | Matched | 0.080 | 0.094 | 0.3 | 0.3 |
| *st_phighested_primcert* | Unmatched | 0.401 | 0.378 | 0.5 | 0.5 |
| | Matched | 0.401 | 0.383 | 0.5 | 0.5 |
| *st_hwhelp* | Unmatched | 0.853 | 0.605 | 0.7 | 0.7 |
| | Matched | 0.853 | 0.821 | 0.7 | 0.8 |
| *hwhelp_primcert* | Unmatched | 0.393 | 0.264 | 0.7 | 0.5 |
| | Matched | 0.393 | 0.352 | 0.7 | 0.7 |
| *st_traveltime* | Unmatched | 1.822 | 1.613 | 1.0 | 0.8 |
| | Matched | 1.822 | 1.864 | 1.0 | 1.0 |
| *t_tutor* | Unmatched | 0.278 | 0.081 | 0.4 | 0.3 |
| | Matched | 0.278 | 0.265 | 0.4 | 0.4 |
| *t_expyrs* | Unmatched | 2.662 | 2.686 | 1.1 | 1.1 |
| | Matched | 2.662 | 2.661 | 1.1 | 1.1 |
| *t_expyrs2* | Unmatched | 8.271 | 8.410 | 5.5 | 5.7 |
| | Matched | 8.271 | 8.311 | 5.5 | 5.7 |
| *t_inservice* | Unmatched | 0.201 | 0.254 | 0.4 | 0.4 |
| | Matched | 0.201 | 0.188 | 0.4 | 0.4 |
| *t_travelrain* | Unmatched | 1.479 | 1.541 | 0.8 | 0.8 |
| | Matched | 1.479 | 1.417 | 0.8 | 0.8 |
| *t_motivation* | Unmatched | 1.218 | 1.625 | 1.3 | 1.1 |
| | Matched | 1.218 | 1.160 | 1.3 | 1.3 |
| *d_rural* | Unmatched | 0.659 | 0.801 | 0.5 | 0.4 |
| | Matched | 0.659 | 0.699 | 0.5 | 0.5 |
| *d_expyrs* | Unmatched | 2.899 | 2.915 | 0.9 | 0.9 |
| | Matched | 2.899 | 2.915 | 0.9 | 0.9 |
| *d_expyrs2* | Unmatched | 2.919 | 2.922 | 0.8 | 0.9 |
| | Matched | 2.919 | 2.896 | 0.8 | 0.8 |
| *d_highed* | Unmatched | 1.972 | 1.961 | 0.2 | 0.2 |
| | Matched | 1.972 | 1.972 | 0.2 | 0.2 |
| *d_ssize* | Unmatched | 9.707 | 8.295 | 5.3 | 4.0 |
| | Matched | 9.707 | 10.121 | 5.3 | 5.7 |
| *d_schoolbudget* | Unmatched | 0.477 | 0.555 | 0.5 | 0.5 |
| | Matched | 0.477 | 0.427 | 0.5 | 0.5 |

The final propensity score model for literacy (*litscore4*) included five more variables than did the numeracy score model, for a total of 25 variables. This model included nine variables at the student level, eight variables at the teacher level, and eight

variables at the director level. The nine student-level variables utilized in this literacy score model were the same used for the numeracy score model. These include age (*st_age*), the family's participation in fishing (*st_fishing*), the frequency a student eats breakfast (*st_breakfast*), student's parents have no education (s*t_phighest_noed*), student's parents have at least a primary or secondary education (*st_phighest_primsec*), student receives help on his or her homework at home (*st_hwhelp*), an interaction variable between homework help and parents who have at least a primary or secondary education (*st_sthwhelp_primsec*), and travel time from home to school one way (*st_traveltime*).

The teacher-level predictors were also the same for the literacy score model (*litscore4*) as the numeracy score model with the addition of the variable measuring if the teacher was born in the village or a neighboring village (*t_bornhere*). The other variables included if the teacher tutored students after school (*t_tutor*), years of teaching experience (*t_expyrs*), years of teaching experience squared (*t_expyrs2*), if the teacher attended in-service training since 2000 (*t_inservice*), travel time from one to school during the rainy season one way (*t_travelrain*), and the teacher's motivation for joining the profession (*t_motivation*).

Six of the director-level variables used as predictors for the final literacy model (*litscore4*) were the same as the variables used in the numeracy model. These included if the school was located in a rural environment (*d_rural*), years of experience directing schools (*d_expyrs*), experience directing schools squared (*d_expyrs2*), highest level of education achieved by the director (*d_highed*), the size of the school as measured by the number of classes (*d_ssize*), and if the school received its entire school operational budget from the previous academic year (*d_schoolbudget*). There were two additional variables in the literacy model. These were the director's motivation to stay at the school for the following year (*d_motivation*) and strategies for dealing with short-term teacher

absenteeism (*d_teacherabsent*). These 25 variables used as predictors are shown in Table 26 below.

Table 26. Final Propensity Score Model, Literacy Score (*litscore4*)

| Variable Abbreviation | Description | Type |
|---|---|---|
| *st_girl* | Gender | Binary |
| *st_age* | Age | Continuous |
| *st_fishing* | According to the student, the family is primarily engaged in fishing | Binary |
| *st_breakfast* | Frequency a student eats breakfast | Ordinal (0=never; 1= 1 to 2 days a week; 2=3 to 4 days a week; 3= 5 to 6 days a week; 4=everyday) |
| *st_phighested_noed* | Parent's highest education is no school | Binary |
| *st_phighested_primsec* | Parent's highest education is at least primary or secondary school | Binary |
| *st_hwhelp* | Frequency a student receives help on homework at home | Ordinal (0=never; 1= sometimes; 2=often) |
| *st_help_primsec* | Interaction variable of *st_hwhelp* and *st_phighested_primsec* | Interaction |
| *st_traveltime* | Travel time from home to school one way in minutes | Ordinal (1= less than 15 minutes; 2= between 13 to 30 minutes; 3= between 30 to 60 minutes; 4= more than 60 minutes) |
| *t_tutor* | Tutors students after school | Binary |
| *t_expyrs* | Teaching experience | Ordinal (1= less than one year to 5 years; 2= 6 to 10 years; 3= 11 to 20 years; 4= more than 20 years) |
| *t_expyrs2* | Teaching experience squared | Squared |
| *t_bornhere* | Born in or close to this village | Binary |
| *t_inservice* | Attended in-service teacher training since 2000 | Binary |
| *t_travelrain* | Time in minutes it take to get to school during the rainy season | Ordinal (1= less than 15 minutes; 2= between 13 to 30 minutes; 3= between 30 to 60 minutes; 4= more than 60 minutes) |
| *t_motivation* | Motivation for joining teaching | Continuous |
| *t_delaysinpay* | Has had delays in base salary and basic allowances | Binary |
| *d_rural* | School is in a rural environment | Binary |
| *d_motivation* | Director wants to stay at the school next year | Binary |

Table 26 (continued)

| Variable Abbreviation | Description | Type |
|---|---|---|
| *d_expyrs* | Experience in directing schools | Ordinal (1= less than one year to 5 years; 2= 6 to 10 years; 3= 11-20 years; 4= 20 more years) |
| *d_expyrs2* | Experience in directing schools squared | Squared |
| *d_highed* | Highest level of education | Categorical (1=primary; 2= lower or upper secondary; 3= university) |
| *d_ssize* | Number of classes at the school | Continuous |
| *d_schoolbudget* | School received its entire "school operational budget" from the previous year | Binary |
| *d_teacherabsent* | Strategies for dealing with short term teacher absenteeism | Ordinal (-1= students sent home; 0= in-class assignment or supervision of a non-teacher; 1= substitute teacher or replacement teacher) |

Similar to the process utilized when creating the final propensity score model for numeracy scores, all 25 variables used as predictors were balanced between the treatment and control groups in the unmatched and matched samples. The final propensity score model displayed the closest match between the treatment and control groups in terms of the similarity of the mean scores. To obtain this balance, variables were added and removed one by one from the model while the effect on the overlap and changes in the mean scores of all of the variables were observed. The final balance for all 25 variables is shown in Table 27 below.

Table 27. Balance on Key Covariates, Literacy Score (*litscore4*)

| Variable | Sample | Mean | | Std. Dev. | |
|---|---|---|---|---|---|
| | | Treated | Control | Treated | Control |
| *st_girl* | Unmatched | 0.539 | 0.505 | 0.5 | 0.5 |
| | Matched | 0.539 | 0.509 | 0.5 | 0.5 |
| *st_age* | Unmatched | 12.278 | 12.775 | 1.5 | 1.5 |
| | Matched | 12.278 | 12.226 | 1.5 | 1.5 |
| *st_fishing* | Unmatched | 0.217 | 0.272 | 0.4 | 0.4 |
| | Matched | 0.217 | 0.241 | 0.4 | 0.4 |
| *st_breakfast* | Unmatched | 4.091 | 3.569 | 1.4 | 1.7 |
| | Matched | 4.091 | 4.003 | 1.4 | 1.5 |
| *st_phighested_ned* | Unmatched | 0.080 | 0.096 | 0.3 | 0.3 |
| | Matched | 0.080 | 0.082 | 0.3 | 0.3 |
| *st_phighested_primsec* | Unmatched | 0.401 | 0.378 | 0.5 | 0.5 |
| | Matched | 0.401 | 0.407 | 0.5 | 0.5 |
| *st_hwhelp* | Unmatched | 0.853 | 0.605 | 0.7 | 0.7 |
| | Matched | 0.853 | 0.852 | 0.7 | 0.7 |
| *st_hwhelp_primsec* | Unmatched | 0.393 | 0.264 | 0.7 | 0.5 |
| | Matched | 0.393 | 0.393 | 0.7 | 0.7 |
| *st_traveltime* | Unmatched | 1.822 | 1.613 | 1.0 | 0.8 |
| | Matched | 1.822 | 1.854 | 1.0 | 1.0 |
| *t_tutor* | Unmatched | 0.278 | 0.278 | 0.4 | 0.3 |
| | Matched | 0.278 | 0.278 | 0.4 | 0.5 |
| *t_expyrs* | Unmatched | 2.662 | 2.686 | 1.1 | 1.1 |
| | Matched | 2.662 | 2.690 | 1.1 | 1.1 |
| *t_expyrs2* | Unmatched | 8.271 | 8.410 | 5.5 | 5.7 |
| | Matched | 8.271 | 8.372 | 5.5 | 5.5 |
| *t_bornhere* | Unmatched | 0.438 | 0.457 | 0.5 | 0.5 |
| | Matched | 0.438 | 0.452 | 0.5 | 0.5 |
| *t_inservice* | Unmatched | 0.201 | 0.254 | 0.4 | 0.4 |
| | Matched | 0.201 | 0.211 | 0.4 | 0.4 |
| *t_travelrain* | Unmatched | 1.479 | 1.541 | 0.8 | 0.8 |
| | Matched | 1.479 | 1.450 | 0.8 | 0.8 |
| *t_motivation* | Unmatched | 1.218 | 1.625 | 1.3 | 1.1 |
| | Matched | 1.218 | 1.171 | 1.3 | 1.4 |
| *t_delaysinpay* | Unmatched | 0.825 | 0.834 | 0.4 | 0.4 |
| | Matched | 0.825 | 0.817 | 0.4 | 0.4 |
| *d_rural* | Unmatched | 0.659 | 0.801 | 0.5 | 0.4 |
| | Matched | 0.659 | 0.670 | 0.5 | 0.5 |
| *d_motivation* | Unmatched | 0.781 | 0.833 | 0.4 | 0.4 |
| | Matched | 0.781 | 0.797 | 0.4 | 0.4 |
| *d_expyrs* | Unmatched | 2.899 | 2.915 | 0.9 | 0.9 |
| | Matched | 2.899 | 2.914 | 0.9 | 0.9 |
| *d_expyrs2* | Unmatched | 9.147 | 9.313 | 4.6 | 4.8 |
| | Matched | 9.147 | 9.274 | 4.6 | 4.8 |
| *d_highed* | Unmatched | 1.972 | 1.961 | 0.2 | 0.2 |
| | Matched | 1.972 | 1.970 | 0.2 | 0.2 |
| *d_ssize* | Unmatched | 9.707 | 8.295 | 5.3 | 4.0 |
| | Matched | 9.707 | 10.169 | 5.3 | 5.6 |
| *d_schoolbudget* | Unmatched | 0.477 | 0.555 | 0.5 | 0.5 |
| | Matched | 0.477 | 0.506 | 0.5 | 0.5 |
| *d_teacherabsent* | Unmatched | 0.438 | 0.463 | 0.8 | 0.8 |
| | Matched | 0.438 | 0.442 | 0.8 | 0.8 |

The final propensity score model for total score (*tscore4*) had 23 variables used as predictors. This included seven variables at the student level, six variables at the teacher level, and ten variables at the director level. The seven student-level variables utilized in the total score model (*tscore4*) were the same used for the numeracy (*numscore4*) and literacy (*litscore4*) score models with the addition of gender (st_gender). These other variables include age (*st_age*), the family's participation in fishing (*st_fishing*), the frequency a student eats breakfast (*st_breakfast*), student's parents have no education (s*t_phighest_noed*), student's parents have at least a primary or secondary education (*st_phighest_primsec*), student receives help on his or her homework at home (*st_hwhelp*), an interaction variable between homework help and parents who have at least a primary or secondary education (*st_sthwhelp_primsec*), and travel time from home to school one way (*st_traveltime*).

The six teacher-level variables used as predictors included if the teacher tutored students after school (*t_tutor*), years of teaching experience (*t_expyrs*), years of teaching experience squared (*t_expyrs2*), if the teacher attended in-service training since 2000 (*t_inservice*), if the teacher had a second job outside of work other than tutoring (*t_secondjob*), travel time from one to school during the rainy season one way (*t_travelrain*), and the teacher's motivation for joining the profession (*t_motivation*).

The ten director-level variables used as predictors for the final total score (*tscore4*) model included if the school was located in a rural environment (*d_rural*), the director's desire to stay at the school the following year (*d_motivation*), years of experience directing schools (*d_expyrs*), experience directing schools squared (*d_expyrs2*), highest level of education achieved by the director (*d_highed*), the age of the director (*d_age*), the gender of the director (*d_gender*), the size of the school as measured by the number of classes (*d_ssize*), the number of times parents attend meetings at the school other than at the opening ceremony (*d_parentpart*), and if the school received its entire school

operational budget from the previous academic year (*d_schoolbudget*). There were two additional variables in the literacy model. These were the director's motivation to stay at the school for the following year (*d_motivation*) and strategies for dealing with short-term teacher absenteeism (*d_teacherabsent*). These 23 variables used as predictors for the total score (*tscore4*) model are detailed in Table 28 below.

Table 28. Final Propensity Score Model for Total Score (*tscore4*)

| Variable Abbreviation | Description | Type |
|---|---|---|
| *st_girl* | Gender | Binary |
| *st_age* | Age | Continuous |
| *st_fishing* | According to the student, the family is primarily engaged in fishing | Binary |
| *st_breakfast* | Frequency a student eats breakfast | Ordinal (0=never; 1= 1 to 2 days a week; 2=3 to 4 days a week; 3= 5 to 6 days a week; 4=everyday) |
| *st_phighested_noed* | Parent's highest education is no school | Binary |
| *st_phighested_primsec* | Parent's highest education is at least primary or secondary school | Binary |
| *st_hwhelp* | Frequency a student receives help on homework at home | Ordinal (0=never; 1= sometimes; 2=often) |
| *t_tutor* | Tutors students after school | Binary |
| *t_expyrs2* | Teaching experience | Ordinal (1= less than one year to 5 years; 2= 6 to 10 years; 3= 11 to 20 years; 4= more than 20 years) |
| *t_expyrs* | Teaching experience | Ordinal (1= less than one year to 5 years; 2= 6 to 10 years; 3= 11 to 20 years; 4= more than 20 years) |
| *t_inservice* | Attended in-service teacher training since 2000 | Binary |
| *t_secondjob* | Second job outside of work other than tutoring | Binary |
| *t_motivation* | Motivation for joining teaching | Continuous |
| *d_rural* | School is in a rural environment | Binary |
| *d_motivation* | Director wants to stay at the school next year | Binary |
| *d_expyrs2* | Experience in directing schools squared | Ordinal (1= less than one year to 5 years; 2= 6 to 10 years; 3= 11 to 20 years; 4= more than 20 years) |

Table 28 (continued)

| Variable Abbreviation | Description | Type |
|---|---|---|
| *d_expyrs* | Experience in directing schools | Ordinal (1= less than one year to 5 years; 2= 6 to 10 years; 3= 11 to 20 years; 4= more than 20 years) |
| *d_highed* | Highest level of education | Categorical (1=primary; 2= lower or upper secondary; 3= university) |
| *d_age* | Age | Continuous |
| *d_gender* | Still teach classes | Binary |
| *d_ssize* | Number of classes at the school | Continuous |
| *d_parentpart* | Number of times parents attend meetings at the school other than the opening ceremony | Continuous |
| *d_schoolbudget* | School received its entire "school operational budget" from the previous year | Binary |

Following the process previously described when creating the literacy (*litscore4*) and numeracy (*numscore4*) models, the 23 variables used as predictors for the total score (*tscore4*) model were balanced between the treatment and control groups in the unmatched and matched samples. The final balance for all 23 variables is shown in Table 29 below.

Table 29. Balance on Key Covariates, Total Score (*tscore4*)

| Variable | Sample | Mean | | Std. Dev. | |
|---|---|---|---|---|---|
| | | Treat | Control | Treat | Control |
| *st_girl* | Unmatched | 0.539 | 0.505 | 0.5 | 0.5 |
| | Matched | 0.539 | 0.508 | 0.5 | 0.5 |
| *st_age* | Unmatched | 12.278 | 12.775 | 1.5 | 1.5 |
| | Matched | 12.278 | 12.257 | 1.5 | 1.3 |
| *st_fishing* | Unmatched | 0.217 | 0.272 | 0.4 | 0.4 |
| | Matched | 0.217 | 0.207 | 0.4 | 0.4 |
| *st_breakfast* | Unmatched | 4.091 | 3.569 | 1.4 | 1.7 |
| | Matched | 4.091 | 3.999 | 1.4 | 1.5 |
| *st_phighested_noed* | Unmatched | 0.080 | 0.096 | 0.3 | 0.3 |
| | Matched | 0.080 | 0.073 | 0.3 | 0.3 |
| *st_phighested_primsec* | Unmatched | 0.401 | 0.378 | 0.5 | 0.5 |
| | Matched | 0.401 | 0.431 | 0.5 | 0.5 |

Table 29 (continued)

| Variable | Sample | Mean | | Std. Dev. | |
|---|---|---|---|---|---|
| | | Treat | Control | Treat | Control |
| *st_hwhelp* | Unmatched | 0.853 | 0.605 | 0.7 | 0.7 |
| | Matched | 0.853 | 0.827 | 0.7 | 0.7 |
| *t_tutor* | Unmatched | 0.278 | 0.081 | 0.4 | 0.3 |
| | Matched | 0.278 | 0.288 | 0.4 | 0.5 |
| *t_expyrs2* | Unmatched | 8.271 | 8.410 | 5.5 | 5.7 |
| | Matched | 8.271 | 8.673 | 5.5 | 5.4 |
| *t_expyrs* | Unmatched | 2.662 | 2.686 | 1.1 | 1.1 |
| | Matched | 2.662 | 2.763 | 1.1 | 1.0 |
| *t_inservice* | Unmatched | 0.201 | 0.254 | 0.4 | 0.4 |
| | Matched | 0.201 | 0.149 | 0.4 | 0.4 |
| *t_secondjob* | Unmatched | 0.621 | 0.628 | 0.5 | 0.5 |
| | Matched | 0.621 | 0.619 | 0.5 | 0.5 |
| *t_motivation* | Unmatched | 1.218 | 1.625 | 1.3 | 1.1 |
| | Matched | 1.218 | 1.127 | 1.3 | 1.3 |
| *d_rural* | Unmatched | 0.659 | 0.801 | 0.5 | 0.4 |
| | Matched | 0.659 | 0.656 | 0.5 | 0.5 |
| *d_motivation* | Unmatched | 0.781 | 0.833 | 0.4 | 0.4 |
| | Matched | 0.781 | 0.814 | 0.4 | 0.4 |
| *d_expyrs2* | Unmatched | 9.147 | 9.313 | 4.6 | 4.8 |
| | Matched | 9.147 | 9.256 | 4.6 | 4.9 |
| *d_expyrs* | Unmatched | 2.899 | 2.915 | 0.9 | 0.9 |
| | Matched | 2.899 | 2.906 | 0.9 | 0.9 |
| *d_highed* | Unmatched | 1.972 | 1.961 | 0.2 | 0.2 |
| | Matched | 1.972 | 1.977 | 0.2 | 0.2 |
| *d_age* | Unmatched | 50.099 | 49.798 | 8.0 | 7.5 |
| | Matched | 50.099 | 49.519 | 8.0 | 7.6 |
| *d_gender* | Unmatched | 1.084 | 1.042 | 0.3 | 0.2 |
| | Matched | 1.084 | 1.080 | 0.3 | 0.3 |
| *d_ssize* | Unmatched | 9.707 | 8.295 | 5.3 | 4.0 |
| | Matched | 9.707 | 10.293 | 5.3 | 5.6 |
| *d_parentpart* | Unmatched | 3.284 | 2.096 | 13.8 | 6.4 |
| | Matched | 3.284 | 2.868 | 13.8 | 11.6 |
| *d_schoolbudget* | Unmatched | 0.477 | 0.555 | 0.5 | 0.5 |
| | Matched | 0.477 | 0.491 | 0.5 | 0.5 |

I utilized three different methodologies -- propensity score mean, propensity score weighted, and propensity score matched to estimate the effect of private tutoring on numeracy (*numscore4*), literacy (*litscore4*), and total score (*tscore4*). Propensity score mean method compares the mean outcomes across the matched groups. To calculate the treatment estimates with this method, I ran a regression analysis using the PSMATCH2

algorithm in STATA. In this coding, the treatment is identified, the variables included in my production function are listed, and then the outcome, in this case student test scores, are included last (Gelman & Hill, 2007).

The propensity score method is more generous than the matched model described below but controls selection bias to a greater extent than using an OLS regression on an unmatched sample. To estimate the average treatment effect using this method, observations are assigned weights equal to the probability of receiving the treatment. The treatment group is assigned a value of "1" since they received the private tutoring services and the comparison group is given a value less than "1" (i.e., the propensity score for each observation is subtracted from 1). To calculate the average treatment effect using this method, I regressed the student outcome scores from the PETS (2004) exam on the treatment variable, in this case private tutoring, and the variables included in my model. STATA calculates propensity score weights as probability weights in the regression (Gelman & Hill, 2007; Omoeva 2014).

To estimate the treatment effect of private tutoring on student outcomes using propensity score matching, I ran a regression analysis using the PSMATCH2 algorithm in STATA. This algorithm utilized the "matching with replacement" method whereby comparison observations are matched as many times as they are identified as being a good match with treatment observations. Treatment observations are assigned a value of "1," and those comparison observations that are retained are given a weight equal to the number of times they are matched with a treatment observation. However, the algorithm, in the process of matching treatment and control observations, discards those observations that were unmatched. These discarded observations reduce the sample size and may impact the representative nature of the sample to the general population (Gelman & Hill, 2007; Omoeva 2014).

The results of these calculations are presented in Table 30. *I found a small effect of private tutoring on each of the three outcomes.* The standard errors for each model demonstrate a statistical significance at the traditional probability value of 0.05. While my analysis captured a positive relationship between participation in private tutoring and student outcomes, these results are presented cautiously given the previously described limitations (e.g., the inability to eliminate selection bias on non-observables and important variables being dropped from the analysis as a result of a sufficient amount of overlap) and the small effect size. The difference in the effect size across the three methods is negligible. However, the effect size is greater for literature than for numeracy or total scores. For all three methods, I found that fourth grade students who received private tutoring every day scored about a quarter of a standard deviation greater than those fourth grade students who never participated in private tutoring. The impact of private tutoring had a smaller effect for numeracy and total score on those students who participated every day. This effect ranged from a tenth of a standard deviation to almost a fifth of a standard deviation.

Table 30. Propensity Score Adjusted Models Effect Size Estimates from Private Tutoring (n=2,894)

| **Outcome** | **Mean** | | **Weighted** | | **Matched** | |
|---|---|---|---|---|---|---|
| | **Effect** | **Std. E.** | **Effect** | **Std. E.** | **Effect** | **Std. E.** |
| *numscore4* | *0.191* | *0.195* | *0.171* | *0.312* | *0.150* | *0.297* |
| *litscore4* | *0.269* | *0.311* | *0.269* | *0.316* | *0.223* | *0.274* |
| *tscore4* | *0.187* | *0.572* | *0.187* | *0.532* | *0.177* | *0.499* |

To explore the impact of private tutoring on equity, I first evaluated the variables that were associated with private tutoring participation. To conduct this analysis, I employed my original OLS base model and utilized private tutoring (*pt4*) as a binary outcome variable. As shown in Table 31 below, *there are nine explanatory variables that show a statistical relationship to student participation in private tutoring.* Participation in

private tutoring favors families with greater financial means (*st_breakfast*) and those families that can offer their children more help on their homework at home (*st_hwhelp*). Additionally, schools that have stronger levels of parent participation (*d_parentpart*) and teachers who offer private tutoring (*t_tutor*) also positively affect a student's ability to access private tutoring. Conversely, the ability to access private tutoring negatively impacts students who are older (*st_age*), live in rural communities (*d_rural*), have to travel greater distances to reach school (*st_traveltime*), or attend schools that did not receive its entire budget from the previous year (*d_schoolbudget*). Interestingly, teachers who entered into the profession of teaching for positive reasons (*t_motivation*) have a negative association with private tutoring. This may indicate that these teachers may not offer private tutoring opportunities while teachers who entered into the profession for negative reasons are more likely to offer private tutoring sessions.

Table 31. OLS Effect Size Estimates from Private Tutoring (n=2,894)

| Variable | Coeff. | Std. E. |
|---|---|---|
| *st_girl* | *0.024* | *0.024* |
| *st_age* | *-0.013*** | *0.006* |
| *st_bornhere* | *0.121* | *0.032* |
| *st_fishing* | *-0.037* | *0.022* |
| *st_breakfast* | *0.020*** | *0.007* |
| *st_traveltime* | *-0.059*** | *0.013* |
| *st_phighested_noed* | *-0.101* | *0.041* |
| *st_phighestest_primsec* | *-0.049* | *0.029* |
| *st_hwhelp* | *0.113*** | *0.019* |
| *t_female* | *0.174* | *0.041* |
| *t_bornhere* | *-0.020* | *0.047* |
| *t_travelrain* | *0.024* | *0.023* |
| *t_expyrs* | *-0.027* | *0.021* |
| *t_motivation* | *-0.068*** | *0.016* |
| *t_tutor* | *0.920*** | *0.073* |
| *t_inservice* | *-0.045* | *0.039* |
| *t_delaysinpay* | *-0.155* | *0.048* |
| *t_secondjob* | *0.159* | *0.046* |

Table 31 (continued)

| Variable | Coeff. | Std. E. |
|---|---|---|
| *d_male* | *0.235* | *0.083* |
| *d_age* | *-0.000* | *0.003* |
| *d_highed* | *-0.644* | *0.080* |
| *d_expyrs* | *-0.034* | *0.021* |
| *d_motivation* | *0.178* | *0.052* |
| *d_stillteach* | *-0.182* | *0.050* |
| *d_rural* | *-0.376* | *0.056* |
| *d_ssize* | *-0.000* | *0.006* |
| *d_parentpart* | *0.000*** | *0.001* |
| *d_schoolbudget* | *-0.202*** | *0.038* |
| *d_teacherabsent* | *-0.002* | *0.021* |
| _cons | 0.817** | *0.260* |

* p<0.05, **p<0.01

As a result of the positive relationship I found between private tutoring and student outcomes on the PETS 2004 exam and the statistically significant findings for the previous research question, *I conclude that private tutoring does, to some extent, impact student equity and a small Matthew Effect is found.* I provide this conclusion with a few caveats. First, the impact is positive, but the effect size is at most about a quarter of a standard deviation. This rather negligible difference between the treatment and control groups is not large enough to reduce a student's chances for grade promotion to fifth grade. As shown in Table 32, the overall breakdown of the variables that were positively and negatively associated with private tutoring displayed a consistent alignment by socio-economic status. Four of the variables positively impact families with higher socio-economic status. These include the frequency a student eats breakfast (s*t_breakfast*), the frequency a student receives help on his or her homework at home (*st_hwhelp*), parent participation at school (*d_parentpart*), and if the teacher offers tutoring services (*t_tutor*). Three of the variables negatively impact families with lower socio-economic status. These include student age (*st_age*), the location of the school in a rural environment (*d_rural*), and travel time one way from home to school (*st_traveltime*). There were two

variables that affect both affluent and less affluent families. These include if the school received its entire operational budget from the previous year (*d_schoolbudget*) and the teacher's motivation for entering into the teaching profession (*t_motivation*). There is no evidence provided in this research to suggest that either of these two variables is more or less likely to affect families based upon socio-economic status.

Table 32. Matthew Effect Alignment with Statistically Significant Variables

| **Positively impacts families with higher socio-economic status** | **Negatively impacts families with lower socio-economic status** | **Affects both affluent and less affluent families** |
|---|---|---|
| *st_breakfast* | *st_age* | *d_schoolbudget* |
| *st_hwhelp* | *d_rural* | |
| *d_parentpart* | *st_traveltime* | *t_motivation* |
| *t_tutor* | | |

## 8.3 Chapter Conclusion

This research found that there is a small positive relationship between private tutoring and student outcomes in numeracy, literacy, and total scores. I found that the student-level variables were the strongest predictors of student achievement on the three outcome variables. Specifically, the two variables that measured family socio-economic status (i.e., if the student's family was primarily involved in fishing, *st_fishing*, and the frequency that a student ate breakfast, *st_breakfast*) were both statistically significant for all three outcomes. While fishing proved to be a negative predictor of student outcomes, the student's frequency of eating breakfast was a positive predictor but less influential predictor of student outcomes. Parental education (*st_phighested_noed*) was a strong predictor for student's numeracy and total score but not for the literacy score. A student whose parents had at least a primary or secondary education (*st_phighested_primsec*) was

a statistically significant predictor of numeracy outcomes but not literacy or total scores. This might be a reflection of the low literacy levels in the country for adults following the atrocities of the Khmer Rouge. Similar to parental education is homework help, or the frequency that a student receives help on his or her homework at home. Homework help (*st_hwhelp*) was a strong determinant for all three outcome variables and, in fact, was a stronger predictor than the parental education variables. This might be due to the potential inaccuracy of the student responses on parent's education compared to the ease that a student could answer if he or she received help on his or her homework. As previously discussed, a high percentage of students did not know their parent's education. However, children would easily be able to answer if someone provided homework help at home. This is one possible reason why homework help was a stronger predictor than parental education. Only one teacher-level variable was statistically significant -- if a teacher provided tutoring services (*t_tutor*). This variable was only a predictor for literacy scores, not numeracy or the total score.

In conclusion, this research found a small Matthew Effect of a quarter of a standard deviation at most. Four of the variables positively impact families with higher socio-economic status (*st_breakfast*, *st_hwhelp*, *d_parentpart*, *t_tutor*), and three of the variables negatively impact families with lower socio-economic status (*st_age*, *d_rural*, *st_traveltime*). The remaining two variables were agnostic (*d_schoolbudget*, *t_motivation*).

# Chapter IX

# CONCLUSIONS AND AGENDA FOR FUTURE RESEARCH

This chapter provides some final thoughts on policy recommendations, suggestion for strengthening PETS, and an agenda for future research. I will first begin with concluding thoughts and then detail, not necessarily in order of importance, the research I would like to conduct in the near future. Some of the ideas are directly related to this research, while others are more corollary in nature.

## 9.1 Conclusions

As this research has discussed, there are both supply and demand factors that motivate the perceived need for private tutoring. Supply side factors (e.g., teachers pressuring students to attend their private tutoring session because of low or delayed salaries or modifying their teaching to omit the material that will be covered on the exam) require interventions such as an increase in teacher pay, more timely payment of teacher salaries, and increased supervision to ensure that teachers are not withholding curricula for later use in private tutoring sessions. Demand side factors (e.g., parents understanding that in order for their students to pass an exam that they will need to attend private tutoring sessions where the critical test content is covered) require interventions such as public information on how families can help their students at home in lieu of pursuing private tutoring sessions. However, in the absence of these supply and demand side interventions, the practice of private tutoring has the potential to exacerbate inequity,

especially for already marginalized populations. This research has shown that private tutoring may exacerbate inequity through a Matthew Effect. The next question, then, is: *What can be done to mitigate the impact when there is no clear panacea?* UNESCO (2009) urges policymakers to learn from the past mistakes and to consider long-term solutions before quick fixes. The Global Monitoring Report, which focused on issues of governance, states that "one of the central lessons to emerge from this report is that there is no quick fix for enhanced equity" (UNESCO, 2009, p. 235). This statement is not to dissuade researchers, policymakers, and practitioners from shying away from the topic and allowing the moral and economic consequences to fester. Instead, solutions that speak to either supply or demand side factors and provide long-term systemic solutions are required. Such is the case with private tutoring in Cambodia. There are several policy options that may help mitigate the role of private tutoring in educational outcomes in primary and secondary students. I will situate these recommendations within the primary stakeholders that are affected. These include the government, teachers, and students and their families. First, I will provide a few words about recommendations for future PETS surveys.

The World Bank PETS survey has been used extensively as a tool for measuring financial leakage in a system and its impact on educational outcomes. The survey has been adjusted and evolved into a robust data collection tool. However, there are gaps in the surveys that could be shored up to further strengthen it. For example, the survey did not ask parents if their student attended private tutoring, the motivations for doing so, the subject matter being instructed, the selection of instructors, or how much each session costs. The work on private tutoring could be expanded greatly by also including these questions as well as how parents decided which of their students to send and how they decided when private tutoring should end. Finally, the opinion of the parents regarding the consequences for their student not attending private tutoring could speak to the

negative repercussions from attempting to bypass these sessions. It is surprising to me that private tutoring questions were omitted from the parent surveys but included in the student, teacher, and administrator surveys. The PETS survey could be further enhanced by including questions to the teachers on their motivations for providing private tutoring, and student motivation for attending, and consequences for not attending, private tutoring sessions would be very insightful. Finally, questions on private tutoring and the impact on the students, teachers, and the overall school could be included on the school support committee tool. Greater care could be taken by the PETS designers to ensure that the tools are horizontally aligned, meaning that relevant questions are included to all potential stakeholders.

As previously mentioned, the parent survey did not include questions on their educational attainment. Given the history of Cambodia and the horrific atrocities inflicted upon the most educated individuals, it is understandable why the survey did not ask parents about their educational background. In lieu of asking students, in this case fourth graders, about their parent's educational background, this information could be ascertained by working with the local schools and the village leaders. The PETS designers could consider including questions on the average educational attainment of the village. These questions could help paint a more detailed picture of the village being included in the research and dramatically reduce the amount of omitted data.

Regarding policy recommendations, I consider the motivations of the stakeholders involved in private tutoring sessions in Cambodia. I will begin with the government. The Kingdom of Cambodia has long relied on foreign aid and an army of NGOs to augment and supplement educational expenditures, thereby, as previously discussed, putting most any plan or program at risk of being untenable and unsustainable. Private tutoring, as a cost-sharing mechanism for teachers' salaries, is similarly reliant upon outside funding (i.e., from families) to artificially support teacher compensation. As previous research has

shown (Brehm & Silova, 2014), this makes public education a hybrid public-private system. As privatization expands, one might expect other countries to adopt this type of hybrid system and reduce the budget set aside for teachers' salaries. Given that this category is the largest line item expense in a government's educational budget, this seems like a plausible solution to hard-hitting financial constraints. This would be a mistake. As this research has found, supplementing teachers' income by sharing the cost with families exacerbates inequity and makes the rich academically richer and the poor academically poorer. However, there are also critical long-term financial consequences to a country's economic growth that loom as a consequence of this choice. Until a government is convinced that the long-term ramifications outweigh the short-term financial savings, this trend could expand unmitigated. Although they are not directly involved in private tutoring, the actions of the government may exacerbate its existence. For example, delayed paychecks to teachers place an additional burden on teachers and their families. This extra burden may impact the actions of the teachers to provide private tutoring sessions for a fee as a means of providing for their families. Further, the pay given to Cambodian teachers is an unlivable wage. This low pay also contributes to the motivation of teachers to perpetuate private tutoring as a means of subsistence. Finally, the government is responsible for ensuring that the entire curriculum is taught in the classroom and not held for pay at the end of the day. It seems unreasonable that the government would have the capacity, or perhaps the motivation, to monitor each classroom in each school each day. However, to mitigate the existence of private tutoring and potentially allow for higher academic achievement by all students, the Cambodian government may benefit by implementing a more localized school management system. In this system, the village would manage and monitor the school by working in collaboration with the school administration, senior teachers, and the school's support committee. Taking a cue from teacher performance trends, local actors, such as school

administration, teachers unions, or senior teachers, could monitor the amount of curriculum taught during school hours. For example, teachers could be financially rewarded for evidence of the curriculum lessons being instructed during the school day and assessments of student understanding of this content. Schools could be given bonuses for the percentage of teachers who instruct the full curriculum and students' demonstrated understanding of this content. The monies would not come from the government but instead be pooled by the village that is already allocating monies for these actions but doing so individually instead of collaboratively. From the government's perspective, the state may be motivated to consider such a recommendation if it benefited them in some manner, for example, by decreasing government spending on other line items, such as monitoring.

Those parents who sought to accelerate their student's learning would be encouraged and instructed on how to contribute to their student's additional learning at home, and students would be motivated not to spend time outside of school on extra sessions unless remediation was required. However, none of this is possible without a community partnership perspective by those involved.

## 9.2 Agenda for Future Research

There are several notable areas for future research. First, as previously discussed above, I would like to conduct additional research on the impact of hybrid public-private education systems on the economic outcomes of individuals and a society. In Cambodia, the middle class is just beginning to emerge. The evolution and devolution of the middle class are of great interest to me, and the role education systems play in this changing dynamic is the next topic I would like to research. This research provides a solid launching point for this future investigation.

Second, as previously discussed, the absence of a pre-test and post-test serves as a limitation to this research. To more fully evaluate the impact of private tutoring on test scores, a well-crafted test (i.e., one that is valid and reliable) would need to be administered to a treatment and control group. Only in a true randomized setting can we more accurately assess the impact of private tutoring.

Third, more large-scale research is necessary to assess the costs, academic subject, and origination of the private tutoring sessions. This research was unable to include these aspects given the absence of these data in the PETS 2004 questionnaires. However, capturing these data in nationwide surveys is compelling given the ability to generalize across a larger set of the population.

Finally, I would like to conduct more research directly with the teachers in Cambodia to explore their thoughts and ideas on the topic of private tutoring and the other related challenges they face in their profession. I think it would be interesting to explore their conceptions of self-regulation and the barriers they may face in creating a more unified self-managing teaching cadre. Providing a greater voice for teachers, not just in Cambodia, but in other countries as well, remains a high priority for my future research.

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Appendix A

MAP OF CAMBODIA WITH PROVINCES


**Source:** www.vidiani.com.

Appendix B

WORLD BANK PETS DATA CLEANING PROCESS

Once collected, the structural stability of the raw data files were tested in a rigorous three step process to produce the file dataset. These included verification of structural stability, identification of invalid entries, and editing and imputation. Each of these steps will be briefly detailed below.

a. Verification of structural stability

Step 1. All variables were present and labeled
Step 2. Ensure response value labels are correct
Step 3. Ensure each entry has a unique identifier
Step 4. Recode missing values
Step 5. Create a codebook and dictionary file for the dataset.

b. Identification of invalid entries

Step 6. Identify skip patterns
Step 7. Identify other internal coherence issues
Step 8. Identify illegal responses
Step 9. Identify incoherent responses
Step 10. Identify outliers

c. Editing and imputation

Step 11. Identify errors to be reviewed
Step 12. Reviewing errors and imputing responses

Source: Data Cleaning Guide for PETS/QSDS Surveys: A Comprehensive Data Cleaning Guideline Applicable to Future PETS/QSDS Surveys.