WPS4530

POLICY RESEARCH WORKING PAPER 4530

How to Interpret the Growing Phenomenon of Private Tutoring:

Human Capital Deepening, Inequality Increasing, or Waste of Resources?

Hai-Anh Dang
F. Halsey Rogers

The World Bank
Development Research Group
Human Development and Public Services Team
February 2008

Policy Research Working Paper 4530

Abstract

Private tutoring is now a major component of the education sector in many developing countries, yet education policy too seldom acknowledges and makes use of it. Various criticisms have been raised against private tutoring, most notably that it exacerbates social inequalities and may even fail to improve student outcomes. This paper surveys the literature for evidence on private tutoring—the extent of the tutoring phenomenon, the factors that explain its growth, and its cost-effectiveness in improving student academic performance. It also presents a framework for assessing the efficiency and equity effects of tutoring. It concludes that tutoring can raise the effectiveness of the education system under certain reasonable assumptions, even taking into account equity concerns, and it offers guidance for attacking corruption and other problems that diminish the contributions of the tutoring sector.

This paper—a product of the Human Development and Public Services Team, Development Research Group—is part of a larger effort in the department to understand the sources of educational achievement in developing countries. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at hdang@worldbank.org and hrogers@worldbank.org.

How to Interpret the Growing Phenomenon of Private Tutoring: Human Capital Deepening, Inequality Increasing, or Waste of Resources?

Hai-Anh Dang and F. Halsey Rogers[1]

.

1. Introduction

Education is widely understood by developing-country policymakers to be a key determinant of individual productivity and economy-wide growth. Understandably, sector diagnoses and policy attention in the sector have focused largely on government schools and, to a far lesser extent, on the private-school sector. Discussions of the state of education and education policy only rarely mention what is emerging as a third important education sector: the private tutoring industry.

Yet in many countries, private tutoring has arisen as a substantial parallel educational sector that provides supplementary instruction to students who are enrolled in the public school system. Private tutoring is now a widespread educational phenomenon, and one that is on the rise. Substantial private tutoring industries can be found in countries as diverse economically and geographically as Romania, Egypt, Kenya, Morocco, Taiwan, Singapore, Japan, Cambodia, United States, and the United Kingdom. This survey cites evidence on the prevalence of tutoring in 22 countries, both developing and developed; in almost all these countries, between a quarter and 90 percent of students at certain levels of education are taking or have recently taken private tutoring. In some countries, such as the Republic of Korea (hereafter "Korea") and Turkey, spending by households on private tutoring now rivals public-sector education expenditures; in Korea, for example, it reaches an astonishing 2.9 percent of GDP.

Private tutoring has encountered mixed responses from policymakers. While it has been ignored in some countries, it is actively controlled and regulated in others. For example, private tutoring has been banned at various times in Cambodia, Mauritius, Myanmar, and Korea (Bray, 1999a). A number of criticisms have been raised against private tutoring, most notably that it exacerbates social inequalities, disrupts the (public) education system, and fails to increase either academic performance or human capital for students.

To formulate good policy toward private tutoring, education policymakers need evidence. What factors (micro and macro) drive the demand for private tutoring? Is private tutoring used only by rich households? How is private tutoring different from private education or public education? What impacts does private tutoring have on student academic performance? Is private tutoring a cost-effective form of education? And overall, does the evidence suggest that increased use of private tutoring is a welcome development, or one to be discouraged by governments? Policymakers may find it preferable to take a view on these questions before private tutoring becomes even more entrenched. Once it emerges as a major industry – and especially if upper-income parents see it providing competitive advantages to their children – it will likely be harder for governments to adjust policy in ways that threaten these vested interests.

This paper offers a review of what we know about the determinants and effects of private tutoring, and then analyzes the associated equity and efficiency issues, with a focus on developing countries. This paper begins by establishing the importance of private tutoring as an economic phenomenon in much of the world, developed and developing. It then provides a simple graphical framework of supply and demand for education with private tutoring, which provides theoretical guidance to the discussion of equity and efficiency issues later on. The next sections review (i) the determinants of private tutoring, from both a micro and a macro perspective, and (ii) the effects of tutoring on student achievement, with special attention to the statistical problems with identifying these effects, and to recent studies that have confronted those problems. Finally, we use those results and the theoretical framework to discuss the efficiency and equity implications of private tutoring, and to explore their implications for policy toward tutoring, as well as to identify the areas that may demand more research.

2. Private Tutoring—A Widespread Phenomenon

In this paper, private tutoring is defined as fee-based tutoring that provides supplementary instruction to children in academic subjects that they study in the mainstream education system.[2] The literature focuses primarily on tutoring lessons for children or adolescents paid for by their households, so private tutoring can clearly be considered to be a form of private education. However, the definition is broad enough to cover special tutoring programs financed by other sources including the government (e.g. remedial education programs). [3]

There are good reasons why a private supplementary tutoring sector might emerge to complement the public and private schooling systems. Private tutoring can offer lessons that are often more individualized than is possible in the public-school sector, using a more flexible delivery mechanism. But the private-tutoring industry is also differentiated from the private-school sector, in that its existence depends on the mainstream education system; it does not stand alone as an independent educational activity. This aspect of private tutoring helps explain why it has been referred to as "shadow education" (Bray, 1999a). Compared with the private-schools sector, private tutoring is also more informal and more flexible: it can include not only one-to-one tutoring but also group classes and can be provided not only by fulltime tutors and teachers, but also by college students, (retired) teachers, university professors, and, in the case of Japan, even homemakers (Russell, 1997). Since it supplements the public sector rather than replacing it, the combination of public schooling and private supplementary tutoring is also more affordable for many households than private education would be.

Japan has been a pioneer in the provision of this type of supplementary education. Private tutoring has long been a huge commercial industry in Japan, with annual revenues reaching an estimated US$14 billion by the mid-1990s. Nine private tutoring schools were already listed on the Japanese stock exchange at that time, and the tutoring sector had become a "crucial component of Japanese education" (Russell, 1997). Many students use school vacations, including the important New Year's holiday, for intensive tutoring programs. To stimulate "school" spirit, several private tutoring schools—or *juku*—have even had their students wear a kind of white headbands once worn in battle by *samurai* warriors (Rohlen, 1980). The proportion of college students who have spent additional years after high school graduation to cram for college entrance examinations, often at specialized private tutoring classes, averages about 30 percent. For those who end up enrolling at the most highly ranked schools, the share may exceed 60 percent (Ono, 2007).[4]

But recent research has made it clear that Japan is not unique in supporting a large and vibrant private tutoring industry. Tutoring is now widespread in many parts of the world, including the developing countries on which we focus in this paper. Table 1, which is largely based on Table II.1 in Dang (2007a), shows evidence on the extent of private tutoring in selected countries with a focus on developing countries. Although the studies cited there vary somewhat in methodologies and populations surveyed, certain patterns are clear.

First, while the incidence appears to be highest in East Asian countries, private tutoring is now an important phenomenon in many countries of different size, level of economic development, political institutions, or geographical locations. In some cases, spending on private tutoring approaches the level of spending on the formal public system. In Korea, households spent 2.9 percent of GDP on private tutoring in 1998, almost equaling the 3.4 percent of GDP spent on education by the public sector (Kim and Lee, 2004). A similar situation happens in Turkey, where the corresponding figures are 1.44 percent of GDP for private tutoring and 2 percent for public education expenditures (Tansel and Bircan, 2006).

Second, private tutoring is an important phenomenon not only for upper-secondary students preparing for university exams, but also for students at the primary and lower secondary levels, and sometimes (as in Japan) even among upper-secondary graduates.

Third, the private tutoring industry appears to be growing in many countries, both in absolute terms and relative to the formal education sector. Table 1 includes evidence of growth in terms of the percentage of students taking tutoring (in Kenya and Mauritius) and the number of private tutoring firms catering to them (in Turkey and Canada).[5] Evidence on tutoring expenditures, where it is available, also supports the notion that the sector is growing, as in Korea, where household spending as a share of GDP on private tutoring rose continuously from 0.7 percent of GDP in 1977 to 1.2 in 1990 and 2.9 in 1998. Finally, anecdotal reports also suggest an expansion in tutoring elsewhere; for

example, in both low-income countries such as Vietnam (Dang, 2007a) and high-income countries such as the US (Fuchs, 2002; Borja, 2005), some households have reportedly begun sending their children to private tutoring to give them an edge as early as preschool.

3. Education Supply and Demand with Private Tutoring: A Framework

This section presents a simple graphical framework, based on the standard microeconomic theory of supply and demand, for interpreting the private tutoring phenomenon. Figure 1 shows, for a typical household, the supply of and demand for education in the case where private tutoring is available. The supply of education is represented by the supply curves S_0 for private education, S_1 for public education, and S_2 for public education with private tutoring. S_1 is different from S_2 in that while the two curves share a common solid upward-sloping part ending at point A, the former includes the solid vertical line rising from point A, while the latter includes a dashed diagonal line starting from point A. (It is also possible to think about the dashed line as the supply curve for private tutoring alone).

The rationale for the vertical part of S_1, starting from point A, is that regardless of consumer demand, after a certain point, public schools may reach their capacity limit, preventing them from offering as much education—in terms of both quantity and quality—as parents or students want (perfectly inelastic supply).[6] By contrast, the dashed portion of the supply curve S_2 for public education with private tutoring is less steep than the vertical part of S_1, representing the ability of private tutoring to meet demand for education where the public education system cannot. At the same time, that portion of S_2 is also steeper than the lower sloping part of S_1, reflecting the assumption that, even in cases where the public school requires fees, private tutoring will usually cost the household more than public schooling does.[7]

Note that a household has to incur certain costs to send a child to school (for example, school-related fees or opportunity costs for the child going to school instead of working), even if school is provided free of tuition. The household demand for education is represented by either the demand curve D_1 (low demand) or D_2 (high demand). Thus, in our figure, compared to a representative household with the demand curve D_1, the demand curve D_2 represents another household that is assumed to have either higher income, stronger education preferences, higher expectations about future returns, or some combination of these variables. [8]

The amount of education the household consumes is represented by the amount on the horizontal axis corresponding to the point where the supply and demand curves meet. Thus, if the representative household's demand for education is represented by the demand curve D_2, the amount of public education the household consumes is Q_2. However, in the presence of private tutoring, the

same household can consume a larger amount of education at Q^*_2 since the supply curve of education in this case is not constrained by the vertical part rising at point A.

This setup, which we refer to as the "standard framework", underlies the discussion below on the determinants and welfare consequences of tutoring. The framework incorporates certain assumptions that will not always be valid, and so we return to those below. One assumption is that the market for private tutoring is competitive, and indeed that households are allowed to choose whether to purchase tutoring services. A second is that public schooling reaches a strict capacity constraint after a certain point, which is likely a better description of the short run than of the long run. In section 6, we will explore how relaxing these assumptions would change our analytical and policy conclusions.

4. Drivers of Private Tutoring

To understand the equity and productivity effects of the large and growing private-tutoring sector, and to design policy, it is essential to understand what factors, both micro and macro, lead to demand for tutoring. Factors at the micro level may include the different characteristics of individuals, households, schools, and communities. Macro-level factors may include the share of public education expenditure in a nation's GDP, the characteristics of its education system and labor market, and its cultural values. Together, these factors determine the level and slope of the tutoring demand curve for the society as a whole – specifically, the size of the gap between D_1 and D_2, in our simplified two-class model depicted in Figure 1. In this section, we present the evidence from the literature on these two sets of explanatory factors.

4.1. Micro factors

From standard economic theory, we would expect certain factors to increase household's demand for education (or shift households' demand curve for education outward in Figure 1): household income, their tastes for education, and their expectations about the returns to education for their children. These same factors therefore explain heterogeneity of demand across household types, as in the simplified two-type model in Figure 1. Compared to households on the demand curve D_1, which consume no private tutoring at the given supply curve for private tutoring S_2, households on the demand curve D_2 consume a positive amount ($Q^*_2 - Q_2$) of private tutoring.

Empirical evidence supports our intuition about what factors tend to increase demand. Table 2 lists the most important micro determinants of tutoring for Egypt (Assaad and El-Badawy, 2004), Japan (Baker, 1992), Korea (Kim and Lee, 2004), Turkey (Tansel and Bircan, 2006), and Vietnam (Dang, 2007b). We highlight these studies because they all use nationally representative data, but the choice of countries has other benefits as well: the private tutoring sector is relatively prominent in all of them, and together they capture some of the geographical variation in the phenomenon.[9]

In these studies, the variables that most influence attendance at private tutoring include household income (household wealth for Egypt, household expenditure in the case of Turkey and Vietnam), parental education, and whether the household lives in an urban area. The latter two variables arguably correspond to household tastes for education. All these variables predict higher student attendance at private tutoring, meaning that students from richer, more educated households living in urban areas will be more likely to attend and spend more on tutoring classes. These results are not unexpected, but they are surprisingly consistent across the countries and fairly robust to the different models being used.[10]

Other factors that may matter across countries are the student's grade level and household size. In Egypt, students in diploma-granting years spend more on private tutoring (Assaad and El-Badawy, 2004); in Vietnam, the closer students are to the last grade in their current school level, the more they spend on private tutoring (Dang, 2007b). And in Korea, Turkey, and Vietnam, the number of children in households is found to be negatively correlated with private tutoring expenditures (Kim and Lee, 2004; Tansel and Bircan, 2006; Dang, 2007b). Presumably, the grade-level pattern reflects the use of private tutoring to prepare for the school-leaving examinations, while the household-size effect hints at the much-studied quantity-quality tradeoff between number of children and average child educational achievement.[11] However, these variables are not used in all the studies, and the household size variable is likely to be endogenous (see the next section for more discussion) which may bias estimated results. Thus it is not possible to investigate whether these two patterns hold for all these five countries, or to draw firm conclusions from them.

Beyond this core group of factors, other variables that affect spending on private tutoring vary from country to country. This diversity of findings may simply reflect differences in the models or in the variables available in the datasets of the different countries; alternatively, it could reflect country-level differences in tutoring patterns, perhaps as a result of differing institutions, cultures, or relative prices.

Another micro question naturally arises: do students take private tutoring for remedial or enrichment purposes? In other words, are most tutored students those who are performing at levels below or above their (conditionally) expected levels? Analyzing data from the Third International Mathematics and Science Study (TIMSS) in 1995 for 41 countries, Baker et al. (2001) show that in three-fourths of these countries, private tutoring is used significantly more often by low math achievers than by high achievers, controlling for family income, student, and community characteristics. That study calculates that the probability of attending private tutoring increases by 3.5 percent for each point decrease in TIMSS mathematics scores in countries such as Denmark, Germany and the United States.

The core explanatory factors common to all studies—income, parental education, urban location—echo those usually found to be important determinants of schooling attainment and performance in developing countries. The examination of 35 developing countries by Filmer and Pritchett (1999), for example, finds that "household wealth is strongly related to educational attainment of children nearly everywhere". The multicountry analysis in Hanushek and Luque (2003) finds that parental education and family asset ownership are as important in explaining children's test scores in developing countries, on average, as they are in developed countries. And in country-level studies, there are many examples of similar findings. To take just a few, Tansel (1997) finds that in Ghana and Cote d'Ivoire, parental education, household consumption, and urban location all predict greater educational attainment, and Tansel (1998) finds the same results for Turkey.

4.2. Macro factors

The literature on tutoring has cited several factors as likely drivers of the demand for private tutoring on a macro (economy-wide) level. First, the transition to a market economy has substantially increased the amounts of private tutoring (supplied and demanded) in countries where it did not exist earlier – China, Vietnam, some African countries, and many Eastern European countries in the former Soviet bloc (Bray, 1999a). Second, it has been argued that tight linkages between education and work are argued to result in intense competition for more education, and thus private tutoring (Stevenson and Baker, 1992). An extreme form of these linkages is what is called the "diploma disease" (Dore, 1976)—whereby modern bureaucratic organizations may use a person's degree as an initial screening tool for employment, regardless of whether the person receives the intrinsic education skills symbolized by the degree. This phenomenon has arguably fueled the demand for private tutoring in a number of countries.[12] Third, a deficient public education system may make parents resort to using private tutoring to compensate for poor quality (Kim and Lee, 2004). Low pay levels and weak monitoring of teachers in the public system can also cause teachers to force tutoring on students (Buchmann, 1999; Silova and Bray, 2006a), as formalized in a theoretical model by Biswal (1999).[13] Fourth, it has been argued that cultural values may explain why private tutoring is more prevalent in some countries, notably in East Asia (Bray, 1999a).

However, little formal empirical research has been done to test these hypotheses. The only cross-country study that has looked at the macro factors determining the use of private tutoring is Baker et al. (2001). Using data for 41 countries participating in the 3rd TIMSS international student assessment, that paper finds that higher public education expenditures (as a share of GNP) and gross enrollment rates predict lower use of private tutoring, but that a high-stakes testing system has no significant impact on private tutoring. The former result suggests that private tutoring is more popular in countries with weak and deficient public education systems. The analysis does not control for per-

capita income levels, however, and because income levels are highly correlated with both public education expenditures and gross enrolment rates, this omission may bias their estimation results.[14]

5. Impacts of Private Tutoring on Student Learning

To understand the policy implications of the growth of the private tutoring industry, we need to understand not only its determinants – who is investing in tutoring, and why? – but also its consequences for those who are being tutored. Does all of this expenditure on private tutoring yield substantial returns for the individual learner? For society as a whole?

In standard models, the presumption would be that private tutoring must yield substantial returns in terms of learning. From descriptions of tutoring, it is clear that for most students, tutoring is investment rather than consumption. Therefore, if households consist of well-informed, sovereign consumers focused on learning and ultimately on increased productivity in the workforce, we would expect significantly positive returns for the individual. But this is not the only possibility. First, consumers could be poorly informed about returns. Even econometricians find it challenging to tease out the returns to tutoring (as discussed below), and it may be very hard for households to know for sure whether their investment will pay off, particularly since any wage returns may be realized only after many years. Second, the consumers may not be sovereign: parents who pay for the tutoring may have objectives other than improving their children's learning and productivity, such as finding child care. And finally, most children could see tutoring as consumption rather than investment.

Here, we review the evidence on learning gains attributable to tutoring. First, however, we discuss an important econometric issue: the potential endogeneity of tutoring. Quite a few studies of tutoring have not addressed this issue seriously, which makes their results less illuminating. We present a variety of studies, but focus primarily on the results from the handful of studies that have dealt with endogeneity effectively.

5.1. Endogeneity of private tutoring

If we are interested in estimating the effects of private tutoring on performance, a naïve first approach would be to use micro-level data to estimate the following equation:

$$A = \alpha + \beta T + \gamma X + \varepsilon$$

where A is a student's academic performance, T is his or her attendance at or spending on private tutoring classes, X is a vector of other student, household, school and community characteristics (e.g., the student's age, gender, household socio-economic status, household residence place, school

quality), ε is the error term, and α, β, and γ are the parameters to be estimated. In this setup, the estimated parameter β would therefore be the estimated return to private tutoring.

But in practice, this approach, at least as it is usually implemented, is likely to yield unreliable estimates of the coefficient on private tutoring, since students who take private tutoring may differ in various unobserved but important dimensions from those who do not. One such dimension is the level of parental concern for their children's education. This variable is hard to measure and is therefore usually excluded from these analyses; yet we know that parents who are strongly oriented toward their children's education may directly help their children succeed in school (for example, by helping them with their homework) while at the same time spending money to send the children to private tutoring classes. Another example is a student's motivation for studies, which can rarely be measured in practice. Highly motivated students may be more willing to take private tutoring than their less motivated peers, but are likely also to perform better than predicted in school for reasons unrelated to tutoring.

Thus private tutoring is endogenous, in that these unobserved factors affect both investment in private tutoring, on the one hand, and the student's performance at school, on the other.[15] If not properly controlled for in regression analysis, all these unobserved characteristics will end up in the error term ε, and due to their correlation with the private tutoring variable, they will make estimation results inconsistent and unreliable. (In other words, estimation results suffer from selection bias if analyses do not properly address the fact that students attending private tutoring are different from those who do not). This identification problem is analogous to others in the education literature, such as the difficulty of estimating whether religious and other private schools yield better student outcomes than public schools do.[16]

Three econometric techniques have been used in the literature to deal with the endogeneity of private tutoring. The first and perhaps cleanest approach, where possible, is to run experiments that randomly assign students into comparable treatment and control groups, with only the members of the treatment group receiving private tutoring. With such a set-up, researchers can use a straight difference-in-difference comparison of the gains in educational outcomes for the two groups to estimate the returns to private tutoring.[17] Even with this set-up, interpreting the results is challenging, because students cannot be assigned to *purchase* private tutoring; instead, they are only assigned to receive free tutoring, which may be an important difference.[18]

A second approach, implemented *ex post* using observational data, relies on quasi-experimental identification of the effects of tutoring by using a difference-in-difference analysis as a program is rolled out across the country. Note that this approach too has had to rely on measuring the effects of tutoring provided by the program, rather than by privately purchased tutoring services.

The third approach is to rely on instrumental variables (IV) that correlate with private tutoring attendance (and/or expenditure), but do not correlate with the unobserved characteristics described above (such as parental concern or student motivation). This approach has the advantage of measuring the effects of private tutoring that emerges as a result of household decisions, rather than government programs; the disadvantage is that such IV estimates are likely to be more sensitive to econometric assumptions than the experimental and quasi-experimental estimates.

5.2. Impacts of private tutoring: Recent evidence

Table 3 categorizes recent studies on the impacts of private tutoring into those that control for the endogeneity of private tutoring, as described above, and those that do not. In addition to the standard type of tutoring paid for by the household, the table includes studies on remedial education programs—special tutoring programs for underperforming students—financed by sources other than households.

Among the studies that do not control for endogeneity, there is mixed evidence on the impacts of private tutoring on student academic performance. These studies indicate that private tutoring has positive impacts in Japan (Stevenson and Baker, 2001), Kenya (Buchmann, 2002), and Vietnam (Ha and Harpham, 2005), but it has negative impacts in Korea (Lee et al, 2004) and Singapore (Cheo and Quah, 2005). The results from these studies should be received with caution, however, because of the endogeneity resulting from self-selection into tutoring (as some of the studies themselves acknowledge). In addition, as noted in Table 3, two of these studies do not control for school characteristics, and one study includes another endogenous variable (student academic standing) that may further bias the estimation results.

By contrast, the studies that control in some credible way for the endogeneity of private tutoring generally find that private tutoring boosts student academic performance. Tutoring lessons are found to increase test scores in India (Banerjee et al., 2007), mean matriculation rates in Israel (Lavy and Schlosser, 2005), the quality of colleges in which students can enroll in Japan (Ono, 2007), both SAT and ACT test scores (except for ACT reading scores) and academic performance in the US (Briggs, 2001; Jacob and Lefgren, 2004),[19] and student academic performance in Vietnam (Dang, 2007b). The sole exception is in Indonesia (Suryadarma et al., 2006), where tutoring was not associated with higher performance by 4th-graders.[20] While it would be useful to see if the estimated negative correlations between private tutoring and achievement in Korea and Singapore change when endogeneity is properly addressed, no studies that we know of have addressed this issue.

We discuss the three studies for India, Israel, and Vietnam in more detail, because these studies include cost data, making it is possible to consider both the impacts of tutoring lessons on academic performance and its cost-effectiveness. Furthermore, these studies reflect the variation in the usage

and financing of tutoring lessons: they include both low-income (India and Vietnam) and high-income (Israel) countries; they include estimation of tutoring effects on students of all academic abilities (Vietnam) and underperforming students (India and Israel); and finally, they include tutoring that is privately financed (Vietnam), publicly financed (Israel), and NGO-financed (India).

NGO-financed remedial tutoring in India

Pratham—a large Indian NGO—recently financed the implementation of a two-year tutoring program in schools in two major cities in India that cater to poor children. This remedial education program was targeted at the weakest children, those in grades 3 or 4 that had not mastered the basic skills. These students were taken out of their classroom and given two hours of additional instruction each day by young women from the community—private tutors, in effect, rather than formal teachers.

Banerjee et al. (2007) find that this tutoring program improved student test scores by large and statistically significant amounts. Children randomly assigned to the treatment group improved their test scores by 0.6 standard deviations in the second year, while control children remaining in the regular classroom did not benefit. Overall, the test scores of children whose schools benefit from this program improved by 0.14 standard deviations in the first year and by 0.28 standard deviations in the second year. However, these gains fell substantially one year after the program ended, suggesting that more research is needed on the long-term impacts of such programs.

The authors attribute the relative success of the program to regular teachers' lack of motivation to help lagging students and to the common background shared by the students and the young women tutors. The authors also show that this tutoring program is cost-effective. At around $10-15 per month, the tutors' salary is equivalent to only 6 to 10 percent of the salary of a starting teacher. As a result, Banerjee et al. (2007) calculate that scaling up the tutoring program would be much more cost-effective than hiring new teachers would be, at least in terms of achieving a given improvement in test scores. The program, which has already reached tens of thousand of children across India, is estimated to cost around $2.25 per student per year.[21]

Government-financed remedial tutoring in Israel

A special tutoring (remedial education) program for underperforming high school students has been implemented in Israel since 1999, expanding until it reached around one-third of all high schools across the country around 2002 (Lavy and Schlosser, 2005). The objective of the program is to increase the number of students that earn matriculation certificates by providing them with increased instructional time. In each school, the program identifies groups of up to five students in the tenth, eleventh, or twelfth grades who are performing poorly and judged most likely to fail their matriculation exams. The classroom teachers then give these students after-school tutoring lessons in these subjects.

To examine the effects of the program, Lavy and Schlosser (2005) use a quasi-experimental difference-in-difference methodology (supplemented by instrumental variables as an alternative identification strategy). Their approach relies on the fact that the program was rolled out over time, allowing them to compare learning gains in schools that received it early on with those in schools that received it later. Lavy and Schlosser find that this tutoring program had a positive impact on both the students and the schools benefiting from the program. The program increased the probability of earning a matriculation certificate for tutored students by 12 percentage points, implying an average improvement of 22 percent from the base rate. The targeted schools saw approximately an increase of 3.3 percentage points in the mean matriculation rates, equivalent to an improvement of 6 percent. The program did not appear to affect non-tutored students.

On the other side of the ledger, Lavy and Schlosser note that the average cost of the program is rather high, at $1,100 per tutored student, or around 40 percent of the annual expenditure per high school student in Israel. Nevertheless, Lavy and Schlosser (2005) estimate the program's internal rate of return at a rather high 20 percent. [22] While this makes the remedial education program less cost-effective for increasing matriculation than two other incentive-based programs in Israel examined by the authors, they note this rate of return still makes the remedial tutoring program cost-effective.

Private household-financed tutoring in Vietnam

Private tutoring is very popular in Vietnam, with around 34 percent of the households with children in school sending their children to private lessons. A large majority of these households (90 percent) allocate between 1 percent and 5 percent of the total household expenditure to private tutoring. The proportions of students taking private tutoring are 31%, 56%, and 77%, respectively, in primary school, lower secondary school, and upper secondary school (Dang, 2007b).

Dang (2007b) estimates the learning effects of tutoring and addresses the endogeneity of tutoring with an instrumental variables strategy, which used tutoring prices as the instrument. Using data from the Vietnam Living Standards Surveys for 1992-93 and 1997-98, Dang shows that private tutoring improves student academic performance. After controlling for other individual, household, school and community characteristics, Dang finds that increasing yearly spending on private tutoring from 0 to only 20,000 VND[23]—about US$1.50 in 1998, or about 0.4 percent of mean consumption for households with children in school—has strongly positive effects on performance. It decreases a primary-school student's probability of having a poor and average academic ranking, respectively, by around 0.01 and 0.04, while increasing the probability of having a good or excellent academic ranking by 0.05. At the same increase in expenditure, the corresponding figures for a lower secondary student are higher at around 0.01, 0.07, and 0.08 respectively.

Since students with an academic ranking of "poor" usually have to repeat grades in Vietnam, these estimates can be used to make a rough calculation of the cost-effectiveness of tutoring in promoting grade progression among lower secondary school students. A year of lower secondary schooling has a total cost (direct costs to the household and the government, plus assumed opportunity cost of forgone wages) of around 3 million VND per year. Ceteris paribus, under the assumption that the household's aim is for the child to complete a given level of education, a reduction of 1 percentage point in the probability of earning a poor academic ranking reduces expected costs from grade repetition by around 30,000 VND. But since the cost of the tutoring is 20,000 VND, this means that the benefits from lower repetition rates alone exceed the costs of the tutoring.[24] In fact, the benefits may be much higher than these monetary gains because these calculations do not account for any economic benefits of improving in the better academic ranking categories, or for any avoided psychological costs associated with having to repeat a grade.

Interpreting the evidence

Thus in the recent studies that have both dealt with endogeneity of tutoring and estimated cost effectiveness, private tutoring is found to have strongly positive returns. Some caution is needed in interpreting the evidence, of course. First, this line of analysis is made fundamentally difficult by the nature of the typical private-tutoring transactions: typically it is the household (rather than an NGO or government) that decides whether to purchase private tutoring, and it is hard to imagine that decision could be randomized across households as an aid to clean measurement of the returns to tutoring. At best, a government could randomize access to potential tutors—for example, by flooding certain randomly chosen communities with unemployed graduates—and then see whether households chose to consume more tutoring and how this consumption affected student performance. It is for this reason that the evidence on returns must rely on government- and NGO-financed tutoring programs, or on identifying exogenous variation in the use of tutoring.

Second, estimation results from these studies should be considered in context, and should neither be generalized to all students nor narrowed to specific sub-groups of tutored students. Most of the studies cited in Table 3 estimated only the average return for all students enrolled in tutoring; this approach implicitly assumes that all students share the same returns to private tutoring, regardless of their innate ability or socio-economic background. [Exceptions include the studies by Banerjee et al., 2007; Lavy and Schlosser, 2005; and Jacob and Lefgren, 2004.] If this homogeneity assumption is violated, estimated benefits of tutoring will not apply to sub-groups, and they may be biased as well.[25] It is not easy to take account of this heterogeneity in returns to private tutoring, however. Doing so requires detailed data on the student variables that may affect returns, as well as more sophisticated estimation techniques. Thus most of the cited studies can provide only general guidance to policy

makers to a certain level. For example, while the studies for India (Banerjee et al., 2007), Israel (Lavy and Schlosser, 2005), and the US (Jacob and Lefgren, 2004) show that remedial private tutoring improves student performance, this result may hold only for the grade groups evaluated. Clearly, more detailed policies would demand more in-depth analysis of specific groups in particular contexts.

Subject to these caveats, however, it appears that tutoring can generally have substantially positive returns as a supplement to formal public-school education. In addition, the programs on which we have direct evidence may provide good starting points for policy makers seeking to design and implement supplementary education programs.

6. What Stance Should Policymakers Take toward Tutoring? Efficiency and Equity Considerations

Given the evidence reviewed above, what conclusions can we reach about the efficiency and equity of private tutoring? We discuss our perspectives on these issues in this section using the economic framework from section 2. At first, we do this analysis while maintaining our assumptions that the market is perfect and the supply curve for public schooling is perfectly inelastic after a certain point. Later, we discuss how these conclusions change when those assumptions are relaxed.

6.1. Efficiency considerations in the standard case

The micro evidence on private tutoring suggests, once endogeneity caused by selection is properly accounted for, that private tutoring generally improves student academic performance for the average tutored student. More limited evidence suggests that these improvements can be cost-effective. A question for policymakers is whether from a broader social perspective, the availability of private tutoring increases overall welfare. Are the societal gains from private tutoring likely to be greater than its costs?

Unfortunately, there have apparently been no studies on the efficiency of private tutoring at the macro level. However, combining the micro evidence with the analytical framework from Section 2 helps answer this question. An analysis of Figure 1 suggests that availability of private tutoring increases efficiency and welfare (under certain assumptions that we revisit below). For a household whose demand for education is represented by the demand curve D_2, if private tutoring is available, the household consumes education in the amount Q^*_2. This is more than both the amount of public education (Q_2) that the household consumes in the absence of private tutoring and the amount of private education (Q_0) that the household can afford. [26] Households gain additional consumer surplus of an amount represented by the triangle BCE, while tutors—who are often public-school teachers working an outside tutoring job—gain producer surplus in the amount represented by the triangle ABE.

There is one other effect not shown directly on the graph. High-demand households that would formerly have chosen private schools may now choose to enroll their children in a combination of public schools and private tutoring. As demand for public schools increases, the costs to the government might be expected to rise, and producer surplus to private schools will fall. But because we are assuming that the public schools are on the vertical portion of their supply curve—that is, that they have reached capacity—the quantity of education provided by the government does not actually increase, and neither will government outlays. And standard micro analysis makes it clear that the total gains to households and tutors through the public school/private tutoring combination should exceed the losses in the private schools sector. Thus compared to the situation in which households face only a choice between public education and private education alone, our graphical framework suggests that offering the opportunity to supplement a public education with private tutoring increases welfare for households and the society as a whole – at least in the standard model. We return below to some caveats.

6.2. Equity considerations in the standard case

Suppose policy-makers are convinced that overall the existence of a robust private tutoring sector improves welfare, but worry that it may exacerbate inequality. Judging from Tables 2 and 3, there is indeed reason for concern. More privileged households—those with higher income and more education, living in urban areas—invest more in tutoring for their children than other households do, and private tutoring appears often to increase learning achievements for these children, at least on average. If we make the standard assumption that learning achievement translates into higher lifetime earnings, then we would expect that the availability of household-financed tutoring will increase social inequalities.

Nevertheless, there are several reasons that we should not be too quick to equate tutoring with increasing inequality, nor to assume that an equity-focused government should try to limit tutoring. First, when we specify the appropriate counterfactual—what would happen in the absence of a private tutoring sector?—tutoring may not increase educational inequality by as much as suggested above. Even productive tutoring may confer only a minor additional advantage on children from wealthier and more educated households. Those households already give their children educational advantages in many other ways—by providing the children with more books, more learning equipment, and even fulltime private schooling, for example, or by taking the time to teach their children themselves. A ban on private tutoring, even if it were enforceable, would likely just redirect the educational expenditures of better-off households into these other investments. Furthermore, compared with the situation in which only the public and private school sectors exist, access to supplementary private tutoring may

even benefit poorer households, if it helps their public-school children compete with wealthier children enrolled in private schools.

Second, note that tutoring may actually emerge as an unintended result of other government education policies—including some policies aimed at promoting equity. For example, imagine that the government substantially increases its per-student financing for public education in poor (low-demand) neighborhoods. In Figure 1, this would shift the supply curve S_2 in Figure 1 downward. If the shift is substantial enough, it will have the effect of inducing those low-demand households to consume more education, including more private tutoring. This possibility provides another reason not to assume that the existence of private tutoring signals equity problems.

Thus to control educational inequality, governments may find it more effective to attack its roots directly, rather than discouraging the tutoring that is in part a symptom of inequality. Korea took this tack in 1974, when it sought to control the growth of private tutoring by adopting a secondary-school equalization program (Kim, 2005). That program switched to allocating secondary-school entrance by lottery rather than examination; it thereby reduced the quality advantages of higher-ranking schools and also in theory reduced the incentive for exam-preparation tutoring. While demand for tutoring has in fact remained high, Korea is not generally thought to have severe intergenerational transmission of inequality via education.

Third, as shown in Section 5, governments can actually use tutoring as a tool to improve equity. The household-financed tutoring in the market equilibrium in Figure 1 benefits children from high-demand households, which will tend to be wealthier, but governments and others can target special tutoring programs at underperforming students. Examples include the cases of Israel (Lavy and Schlosser, 2005) and the US (Jacob and Lefgren, 2004) described above. In effect, the government would be segmenting the market depicted in Figure 1 by driving the supply curve S_2 downward, but only for low-demand households. In this case, the equity implications are clearly positive, assuming that the subsidy is financed progressively.

6.3. What if the availability of tutoring blocks public-school improvements?

The first assumption that needs to be relaxed is that public education is capacity-constrained—meaning that at the upper end of its range, the supply of education is perfectly inelastic. In practice, this assumption is likely to hold, even approximately, only in the short term. Over the long run, governments can and do take steps to increase the quantity of effective education delivered, for example by expanding school capacity to allow longer schooling hours, or by improving teacher attendance and time on task. Such improvements extend the upward-sloping portion of the public supply curve in Figure 1 and shift the vertical section outward.

Distinguishing between the short and long runs therefore matters. Under our earlier assumptions of the short-run standardized framework model depicted in Figure 1, private tutoring occupied a neutral territory away from the usual public-*versus*-private education debates. Public and private schools are typically depicted as substitutes—which they generally are, at least at the level of the individual student.[27] But in the situation depicted in Figure 1, privately provided education in the form of tutoring is a *complement* to public schooling. Under these conditions, as discussed above, private tutoring enables parents to invest in an optimal amount of education for their children, increasing both consumer and producer surplus.

Thus in the short run, private tutoring and public education appear to be complements. But in the long run, private tutoring may *substitute* for public education. Here, the long run is defined as the time it takes to make substantial improvements in the quality of public schooling – which, based on real-life experience, can be quite some time. The availability of tutoring could diminish parents' interest in lobbying for these long-term improvements in the quality of public education. If urban elites find that tutoring gives their children an advantage in competitive examinations or the labor market, and if they fear that any future public-school improvements would go primarily to schools serving disadvantaged areas, then they may prefer to remain at the status quo. In Japan, it has been argued that educational reforms to expand public school activities have been blocked by the dependence on private tutoring to perform these tasks (LeTendre, 1994). In other words, the tutoring market may serve as an outlet releasing political pressure for reform and quality improvement.

In fact, in the long run, private tutoring may provide less of a spur to public quality than competition from private schools does. It has been argued that loss (or potential loss) of students to private schools puts pressure on public schools to improve quality (Rouse 1998, Hoxby 1994, Bishop and Wossman 2004), but private tutoring will likely have no such effect – because the public schools do not actually lose students as a result.

Note that the question here is not whether private tutoring enables or undermines the public sector's role as a provider of education. In practice, public schooling is and will continue to be a part of virtually every national primary- and secondary-education system, whatever the views of education experts on both sides of the public-private debate. The take-away point is simply that where tutoring is widespread, it will likely have important effects on the quality and efficiency of the public schools, and that policy will need to take account of those effects, both short- and long-term.

6.4. What if teacher corruption makes the tutoring market uncompetitive?

A second assumption underlying the standardized model is that the market for tutoring is competitive. But this may not be the case. Public-school teachers may have substantial market power as suppliers of private tutoring, especially in situations sometimes found in developing countries. In

remote rural areas, the public-school teacher may be the only potential supplier of after-school private tutoring. More worryingly, teachers who are corrupt and poorly monitored (see Glewwe and Kremer, 2006) sometimes force their public-school students to take their private tutoring lessons, by intentionally omitting part of the curriculum during regular classroom hours or making it an overt requirement (Buchmann, 1999; Foondun, 2002; Silova and Bray, 2006a).[28]

In this case, the teacher's monopoly power will reduce the consumer surplus of the high-demand consumers. In a sense, the dysfunctional monitoring system coupled with teachers' corruption would blur the borderline between public education and private tutoring. Graphically, this will both increase the slope of the (ostensibly public) supply curve S_2 and shift it to the left in Figure 1, causing the household to pay a higher price than before for the same amount of education. The more market power the teachers have, the more leftward they may try to shift the supply curve. As we would expect given the teacher's monopoly power, consumer surplus falls by more than the gain in producer surplus to the teacher. In such cases, we are not likely to see the substantial returns to tutoring cited in the empirical studies above.

Not only is this outcome worse than the no-corruption, competitive private tutoring equilibrium, but for households, it may also be worse than the situation in the case without private tutoring. In the worst case, tutoring fees are then simply a net transfer from households to teachers: the amount of education provided remains the same, but the teacher delivers part of it for a fee outside of school hours. In the rural areas where teacher governance is poor and this type of corruption is most likely to flourish, the transfer will usually be regressive, since teachers tend to have considerably higher incomes than the average rural resident.[29] Moreover, evidence on service delivery suggests that it is the poorest households—the low-demand households in our graphs—that suffer the most from failures in service delivery (World Bank 2003) and that have to pay the largest bribes, relative to their consumption level (Hunt and Laszlo 2005). As a result, the transfer will likely reduce equity and overall welfare.

This analysis of potential teacher corruption has two implications for policy: First, it suggests that in the absence of mechanisms to control teacher corruption, allowing private tutoring may in fact be counterproductive in some cases. More realistically, given the difficulties and undesirability of banning tutoring outright, it provides a rationale for measures to prevent public-school teachers from tutoring their own students privately. Ukraine's education ministry imposed such a ban in 2004, for example, in response to complaints from parents that teachers were providing "compulsory private tutoring" (Hrynevych et al., 2006).

6.5. What if the tutoring is not aimed only at increasing human capital?

Another question is how our diagnosis changes if the tutoring is not necessarily productive from a societal perspective. Throughout this analysis, we have assumed implicitly that an increase in education units consumed by the student not only increases his or her future productivity (and hence wages), but also increases societal productivity by an equivalent amount. In theory, this need not be the case. If tests measure student characteristics that have signaling value but no productive value, then there may be no societal benefit to the increase in education made possible by tutoring—even though there are private benefits to the tutored students. This would be the extreme version of the signaling model introduced by Spence (1973). In such a signaling equilibrium, policymakers would be right to worry about the social costs of the tutoring industry, because that industry would in essence be an arms merchant in a negative-sum educational arms race.

While this extreme theoretical case certainly does not apply anywhere, criticism of some aspects of otherwise high-performing education systems in Korea and Japan—both of which have very large private tutoring sectors—has cited the perceived uselessness of some of the material that tutoring students learn in preparation for university entrance examinations. Concerns about the "inordinate financial burden to parents" of tutoring in Korea (Kim 2001) have justified reform, for example, and they are consistent with an argument that the long-term financial returns do not justify these costs. As noted earlier, empirical evidence suggests a bunching of private-tutoring investment immediately before school-leaving or university entrance exams, which is consistent with a signaling story. To take another example, standardized tests for admission to law schools in the United States, which have given rise to a large test-preparation industry, have been criticized for being widely used despite their inability to predict the applicants' ultimate performance as lawyers (Haddon and Post, 2006).[30] The mere fact that the LSAT is an aptitude (not achievement) test, but that many test-takers prepare for it by learning test-taking skills from tutoring firms, suggest that the test results contain an element of signaling. If tutoring were contributing only to productive human capital, it would not likely raise scores on an aptitude test, at least during those typical short courses offered by tutoring firms.

Although it is analytically difficult to distinguish between the signaling and productive human capital stories, signaling incentives are likely to explain some tutoring in societies like Korea and Japan that make especially heavy use of tutoring (Rogers, 1996; Chae et al., 2004; and Lee, 2007). [31] But three points should be kept in mind. First, a (partial) signaling story changes the situation depicted in Figure 1 to a degree, but does not qualitatively change the conclusions. A signaling equilibrium steepens the slope of the private-tutoring supply curve, by reducing the effective units of education (human capital) received, but the outcome does not change fundamentally. Second, societies like Korea that apparently make greater use of signaling are among the highest performers on internationally normed and well-designed student assessments such as PISA and TIMSS, suggesting

that students are acquiring a large amount of real human capital even if they are also investing for the signaling value. Finally, the appropriate response in the signaling case is probably not to discourage tutoring—as through the ban that Korea imposed in 1980—but to address the problem at its source. For example, the government could revise university admissions policies so that they place less reliance on a single examination that makes for a tempting ability signal.

7. Policy Implications

The analysis in this paper has provided evidence that, both in theory and in practice, under certain caveats discussed in Section 5, tutoring can play a positive role in raising education outcomes as a complement to the formal school systems. Our earlier discussions also suggest that in the absence of corruption, private tutoring increases the welfare of households and society overall. However, private tutoring may place poorer households at some disadvantage compared to richer households, particularly when corruption distorts the tutoring market; corruption also reduces the efficiency of the tutoring equilibrium. Thus while the discussion above holds rich policy implication for private tutoring for both developed and developing countries along several dimensions, this final section explores what these findings imply for education policy in developing countries, with a focus on the control of corruption.

7.1. Government policy and the control of corruption: A taxonomy

Before turning to policy recommendations, it is useful to consider what policies toward private tutoring have been implemented by governments in the past. Bray (2003) categorizes governments into four types, depending on their stance and action toward private tutoring: banning (type I), ignoring (type II), recognizing and regulating (type IIII), or actively encouraging (type IV). Table 4 is constructed mainly from Bray (2003, 2006) and Silova and Bray (2006b), with examples of the countries and territories falling into these categories, as well as several typical measures implemented by these countries on private tutoring. It should be noted that type III governments differ in the degree to which they react to private tutoring, in that not all the measures listed are implemented by each country. Nevertheless, the listed measures provide a good overview of how governments have reacted to private tutoring.

The studies by Bray and Silova offer helpful further detail on these different groups of governments. First, they note that the type I governments all failed in their attempts to ban private tutoring, for different reasons. Bans in Cambodia and Myanmar have failed because those countries' institutions are too weak to implement the policy, while in Mauritius and Korea, the bans faced too much opposition from vested interests. The latter two countries responded by subsequently lifting the ban and regulating private tutoring instead.

Type II governments, on the other hand, ignore private tutoring. Like type I, type II governments can also roughly be divided into two groups, based on their reasons for ignoring private tutoring. The first group (Nigeria, Sri Lanka) is characterized by weaker institutions and little capacity to monitor private tutoring. The second group of countries (Canada, the United Kingdom) has stronger institutions and adequate capacity for monitor private tutoring, but does not choose to regulate the sector, either because they consider it to have small and insignificant effects or because they prefer to leave it to market forces.

Compared to type II governments, type III governments take a more active role in controlling private tutoring (Hong Kong, Mauritius, Vietnam). These governments recognize the importance of private tutoring and attempt to control it in various ways, both direct and indirect: prohibiting private tutoring in early grades; forbidding teachers from tutoring their own students; stipulating fees, class sizes, or syllabi for private tutoring classes; and reducing disparities in schools.

Type IV governments take the opposite stance from type I governments, in that they actively encourage private tutoring (Singapore, South Africa, Zanzibar). These governments believe that private tutoring contributes to human capital development and that private tutoring lessons are an effective means of tailoring education to the needs of students. These governments' policies thus range from offering general encouragement to providing subsidies for private tutoring, training courses for tutors and tax incentives.

While the list of countries needs to be expanded to allow generalization, Bray (2003, 2006) and Silova and Bray (2006b)'s observations provide a useful background for policy makers to formulate ideas. Given our earlier discussion about the distortions of equity and efficiency of forced private tutoring due to corruption, it may be useful to add another dimension to the above observations, which is a government's control of corruption. For each country and territory, Table 4 therefore lists in parentheses one measure of the control of corruption: Kaufmann et al.'s (2007) percentile rankings of countries and territories on a scale from 0 to 100, with higher percentile rankings representing better control of corruption.[32]

According to this measure, the first group in type I governments appears to have low control of corruption, while the second group has high control of corruption. (However, it should be remembered that both these two groups were not successful with their bans on private tutoring). Similarly, for type II governments, the first group has only low to moderate control over corruption, while the second group has high control of corruption. Type III governments range from low to high control of corruption, while type IV governments range from moderate to high control of corruption. These associations between type and governance quality will be useful in gauging the feasibility of different policies.

7.2. A (tentative) agenda for policy toward private tutoring

Based on these results and the casual (but intuitive) observations about the association between corruption and government policies above, some tentative policy recommendations can be proposed. First, since private tutoring is a widespread and growing phenomenon, we believe that it is time that governments devote more attention to this issue. The benign-neglect policy of type II governments in Table 4 runs the risk of letting tutoring-related corruption go unchecked, in the case of the countries with low control-of-corruption scores. Even the other countries in this group may be missing opportunities to use tutoring as an instrument of education policy, as a flexible sector that can help address imbalances between supply and demand for education. Government actions can range from monitoring (e.g., collecting data on private tutoring attendance, private tutoring businesses) to taking steps to ensure that private tutoring can operate free of corruption and unnecessary barriers to competition.

Similarly, more research needs to be done on private tutoring. We still do not have much empirical evidence on the macro-level determinants of private tutoring. In particular, more cross-country data needs to be collected to allow researchers to tease out the impacts of government policies and interventions (e.g. educational subsidies, public expenditure on education, high-stakes testing system) on creating the demand for private tutoring. On a micro level, more research should be done on the household decision to send children to school (e.g. household choice of private education versus public education versus public education with private tutoring; household choice between investing in the quantity and the "quality" of children), as well as the short-term and long-term impacts of private tutoring on students' well-being (e.g. student satisfaction levels, health status, labor-market outcomes).

Second, while it may be welfare-enhancing to ban private tutoring when all tutoring is provided by corrupt teachers, as in the analysis above, a total ban is very difficult to implement in practice. The experience we have from type I governments in Table 4 shows that this approach has not been effective.[33] Thus, it is perhaps better that resources be focused on monitoring and regulating—rather than eradicating—private tutoring. Regulatory approaches can focus on reducing opportunities for corruption by prohibiting public-school teachers from tutoring their own students.

Third, the private-tutoring markets in countries (territories) with low corruption are likely to be more competitive. In such circumstances, our analysis suggests that private tutoring is likely to be welfare-enhancing. Governments may even want to encourage the growth of the private tutoring industry, as Singapore, South Africa, and Zanzibar (Tanzania) have done, for example by training tutors. In such cases, policymakers should monitor the development of the industry and should address concerns about it using the appropriate instruments—which, as suggested earlier, may mean going to the root of the problem rather than holding the private tutoring sector responsible. Most

notably, in cases where tutoring appears to replicate social and geographical inequalities, government action will be most effective if it targets the source of the underlying inequalities. Ways to do this could include equalizing public-school finance across rich and poor districts.

Finally, governments may want to explore directly financing tutoring programs as a flexible means of educating disadvantaged children. While more evidence is needed on this point, the findings on targeted government- and NGO-financed tutoring programs suggest that this can be an effective means of improving educational outcomes for those children. Such programs, assuming they are well designed and implemented, have the added benefit of avoiding any equity-efficiency tradeoffs: by increasing the productivity of disadvantaged children, they clearly promote equity goals as well.

Bibliography

Ahmed, Manzoor, Samir R. Nath, Altaf Hossain, Md. Mahbubul Kabir, Md. Abul Kalam, Mirja M. Shahjamal, Rosie Nilufar Yasmin and Tata Zafar (2005). *Quality with Equity: The Primary Education Agenda. Dhaka: Campaign for Popular Education* (CAMPE), Bangladesh.

Assad, Ragui and Asmaa El-Badawy. (2004). "Private and Group Tutoring in Egypt: When Is the Gender Inequality". Paper presented at the Workshop on Gender, Work, and Family in the Middle East and North Africa.

Aurini, Janice and Scott Davies (2004). "The Transformation of Private tutoring: Education in a Franchise Form." *Canadian Journal of Sociology*, 29(3): 419-436.

Baker, David P., Motoko Akiba, Gerald K. LeTendre, and Alexander W. Wiseman. (2001). "Worldwide Shadow Education: Outside-School Learning, Institutional Quality of Schooling, and Cross-National Mathematics Achievement". *Educational Evaluation and Policy Analysis* 23(1): 1-17.

Banerjee, Abhijit V, Shawn Cole, Esther Duflo, and Leigh Linden. (2007). "Remedying Education: Evidence from Two Randomized Experiments in India". *Quarterly Journal of Economics*, 122(3): 1235-1264.

Barron, John M., Bradley T. Ewing and Glen R. Waddell. "The Effects of High School Athletic Participation on Education and Labor Market Outcomes". *Review of Economics and Statistics*, 82(3): 409-421.

Becker, Gary, and H. G. Lewis. (1973). "On the Interaction between the Quantity and Quality of Children." *Journal of Political Economy* 81: S279-288.

Becker, Betsy Jane. (1990). "Coaching for the Scholastic Aptitude Test: Further Synthesis and Appraisal". *Review of Educational Research*, 60(3): 373-417.

Bedi, Arjun S and Ashish Garg. 2000. "The Effectiveness of Private versus Public Schools: The Case of Indonesia." *Journal of Development Economics*, 61:2, pp. 463-94.

Beegle, Kathleen, Rajeev Dehejia, and Roberta Gatti. 2004. "Why Should We Care about Child Labor?: The Education, Labor Market, and Health Consequences of Child Labor." *National Bureau of Economic Research Working Paper* 10980.

Bishop, John H and Ludger Wossmann. 2004. "Institutional Effects in a Simple Model of Educational Production." *Education Economics*, 12:1, pp. 17-38.

Biswal, Bagala. P. (1999). "Private Tutoring and Public Corruption: A Cost-effective Education System for Developing Countries." *The Developing Economies* 37(2): 222-240.

Blake, Judith. (1989). *Family Size and Achievement*. CA: University of California Press.

Borja, Rhea R. (2005). "Growing Niche for Tutoring Chains: Prekindergartens' Academic Prep". *Education Week* , 25(8): 10-10.

Bray, Mark (1999a). "The Shadow Education System: Private Tutoring and Its Implications for Planners." *Fundamentals of Educational Planning No.61*. Paris: UNESCO International Institute for Educational Planning (IIEP).

---. (1999b). "The Private Costs of Public Schooling. Household and Community Financing of Primary Education in Cambodia". Paris: UNESCO International Institute for Educational Planning (IIEP).

---. (2003) "Adverse Effects of Private Supplementary Tutoring: Dimensions, Implications and Government Responses." International Institute for Educational Planning. Paris: UNESCO.

---. (2006). "Private Supplementary Tutoring: Comparative Perspectives on Patterns and Implications". *Compare*, 36(4): 515-530.

Bray, Mark and Percy Kwok (2003). "Demand for Private Supplementary Tutoring: Conceptual Considerations, and Socio-economic Patterns in Hong Kong". *Economics of Education Review*, 22: 611-620.

Briggs, Derek C. (2001). "The Effect of Admissions Test Preparation: Evidence from NELS: 88". *Chance*, 14(1): 10-18.

Budiene, Virginija and Algirdas Zabulionis. (2006). "Lithuania". In Silova, Iveta, Virginija Budiene and Mark Bray. (Eds). *Education in a Hidden Marketplace: Monitoring of Private Tutoring*. New York: Open Society Institute.

Buchmann, Claudia. (1999). "The State and Schooling in Kenya: Historical Development and Current Challenges." *Africa Today*, 46(1): 95-116.

---. (2002). "Getting Ahead in Kenya: Social Capital, Shadow Education, and Achievement". *Research in Sociology of Education*, 13:133-159.

Chaudhury, Nazmul, Jeffrey Hammer, Michael Kremer, Karthik Muralidharan, and F Halsey Rogers. (2006). "Missing in Action: Teacher and Health Worker Absence in Developing Countries." *Journal of Economic Perspectives*, 20(1): 91-116.

Chae, Sunhee, Jong-Haak Hong, and Tae Jeong Lee. 2004. "Anatomy of the Rank Structure of Korean Universities: Toward a design of integrated policies for education reform in Korea." Global Development Network Regional Research Evaluation Conference (October 5-7).

Cheo, Roland and Euston Quah. (2005). "Mothers, Maids and Tutors: An Empirical Evaluation of Their Effect on Children's Academic Grades in Singapore". *Education Economics*, 13(3): 269-285.

Chronicle of Higher Education. (2003). "Group in India Seeks to End For-Profit Classes," 49(36), p. A41.

Cutler, David M. 2002. "Equality, Efficiency, and Market Fundamentals: The Dynamics of International Medical-Care Reform." *Journal of Economic Literature*, 40:3, pp. 881-906.

Dang, Hai-Anh. (2007a). "The Determinants and Impact of Private Tutoring Classes in Vietnam". Unpublished Ph.D. dissertation. University of Minnesota.

---. (2007b). "The Determinants and Impact of Private Tutoring Classes in Vietnam". *Economics of Education Review*, 26(6): 684-699.

Davies, Scott (2004). "School Choice by Default? Understanding the Demand for Private Tutoring in Canada." *American Journal of Education*. 110: 233-255.

Dong, Alison, Batjargal Ayush, Bolormaa Testsgee, and Tumendelger Sengegodoris. (2006). "Mongolia". In Silova, Iveta, Virginija Budiene and Mark Bray. (Eds). *Education in a Hidden Marketplace: Monitoring of Private Tutoring*. New York: Open Society Institute.

Dore, Ronald. (1976). *The Diploma Disease: Education, Qualification and Development*. London: George Allen and Unwin.

Elbaum, Batya, Sharon Vaughn, Marie Tejero Hughes, and Sally Watson Moody. (2000). "How Effective Are One-to-One Programs in Reading for Elementary Students at Risks for Reading Failure? A Meta-Analysis of the Intervention Research". *Journal of Educational Psychology*, 92(4): 605-619.

Filmer, Deon and Lant Pritchett. 2001. "Estimating Wealth Effects Without Expenditure Data--Or Tears: An Application to Educational Enrollments in States of India." *Demography*, 38:1, pp. 115-32.

Foondun, Raffick. A. (2002). "The Issue of Private Tuition: An Analysis of the Practice in Mauritius and Selected South-East Asian Countries". *International Review of Education*, 48(6): 485-515.

Fuchs, Marek. (2002). "Tutoring Gives Pupils an Edge…for Preschool". *New York Times*, July 31 2002, p. 9.

George, Cherian (1992). "Time to Come out of the Shadows." *Straits Times*, 4 April, p.28.

Glewwe, Paul. (2002). "School and Skills in Developing Countries: Education Policies and Socioeconomic Outcomes." *Journal of Economic Literature*, 40(2): 436-482.

Glewwe, Paul and Michael Kremer. (2006). "School, Teachers, and Education Outcomes in Developing Countries." In Eric A. Hanushek and Finis Welch. (Eds). *Handbook of the Economics of Education*, North Holland.

Glewwe, Paul and Seema Jayachandran (2006). "Incentives to Teach Badly? After-School Tutoring in Developing Countries". Mimeo, University of Minnesota.

Gordon, Edward E. and Elaine H. Gordon (1990). "*Centuries of Tutoring- A History of Alternative Education in America and Western Europe*." MD: University Press of America.

---. (2003). "*Literacy in America: Historic Journey and Contemporary Solutions*." CT: Praeger Publishers.

Gujarati, Damodar N. (2003). *Basic Econometrics*. New York: McGraw Hill.

Greene, William H. (2007). *Econometric Analysis, 6th Edition*. New Jersey: Prentice Hall.

Ha, Tran Thu and Trudy Harpham. (2005). "Primary Education in Vietnam: Extra Classes and Outcomes." *International Education Journal* 6(5): 626-634.

Haddon, Phoebe A. and Deborah W. Post. (2006). "Misuse and Abuse of the LSAT: Making the Case for Alternative Evaluative Efforts and a Redefinition of Merit." *Saint Johns Law Review*, 80:1, pp. 41.

Hanushek, Eric A. and Javier A. Luque. (2003). "Efficiency and Equity in Schools around the World." *Economics of Education Review,* 22(3): 481-502.

Heckman, James J., Lance J. Lochner and Petra E. Todd (2006). "Earnings Function, Rates of Return and Treatment Effects: The Mincer Equation and Beyond". In Eric A. Hanushek and Finis Welch. (Eds). *Handbook of the Economics of Education*, North Holland.

Heckman, James J., Sergio Urzua and Edward Vytlacil (2006). "Understanding Instrumental Variables in Models with Essential Heterogeneity". *Review of Economics and Statistics,* 88(3): 389-432.

Hoxby, Caroline Minter. 1994. "Do Private Schools Provide Competition For Public Schools?" 34: *National Bureau of Economic Research Working Paper* 4978.

Hrynevych, Lilya, Anna Toropova, Tymofiy Pylnyk, Leonid Sereda and Ulyana Gerasevich. (2006). "Ukraine". In Silova, Iveta, Virginija Budiene and Mark Bray. (Eds). *Education in a Hidden Marketplace: Monitoring of Private Tutoring*. New York: Open Society Institute.

Hunt, Jennifer and Sonia Laszlo. (2005). "Bribery: Who Pays, Who Refuses, What Are The Payoffs?" Unpublished paper, McGill University.

International Monetary Fund (IMF). (2006). *International Financial Statistics*. Washington, DC: International Monetary Fund.

Ireson, Judith and Katie Rushforth (2005). "*Mapping and Evaluating Shadow Education*." ESRC research project RES-000-23-0117. London: Institute of Education, University of London.

Jacob, Brian A. and Lars Lefgren. (2004). "Remedial Education And Student Achievement: A Regression-Discontinuity Analysis". *Review of Economics and Statistics*, 86(1): 226-244.

Kaufmann, Daniel, Aart Kray, and Massimo Mastruzzi. (2007). "Governance Matters VI: Governance Indicators for 1996-2006". Available on the Internet at http://info.worldbank.org/governance/wgi2007/sc_country.asp (accessed September 2007)

Kenny, Diana T. and Gavin Faunce. (2004). "Effects of Academic Coaching on Elementary and Secondary School Students". *Journal of Educational Research*, 98(2): 115-126.

Kim, Gwang-Jo. (2001). "Education Policies and Reform in South Korea," in *Secondary Education in Africa: Strategies for Renewal.* World Bank presentations at the December 2001 UNESCO/BREDA-World Bank Regional Workshop in Mauritius on the Renewal of African Secondary Education. World Bank: Washington DC.

Kim, Sunwoong and Ju-Ho Lee. (2004). "Private Tutoring and Demand for Education in South Korea." Mimeo. Department of Economics, University of Wisconsin, Milwaukee.

Kim, Taejong. (2005). "Shadow Education: School Quality and Demand for Tutoring in Korea." Kyoto University 21COE Discussion Paper No. 055.

Kulpoo, Dhurumbeer and Maya Soonarane. (2005). "The SACMEQ II Project in Mauritius: A Study of the Conditions of Schooling and the Quality of Education". Harare: SACMEQ.

Kwak, Byong-Sun (2004). 'Struggle Against Private Lessons in Korean Education Context'. Paper presented at the 28th annual conference of the Pacific Circle Consortium, Hong Kong Institute of Education, 21-23 April.

Lavy, Victor and Analia Schlosser. (2005). "Targeted Remedial Education for Underperforming Teenagers: Costs and Benefits". *Journal of Labor Economics*, 23(4): 839-874.

Lee, Jong-Tae, Kim, Yang-Boon and Yoon, Cho-Hee (2004). 'The Effects of Pre-Class Tutoring on Student Achievement: Challenges and Implications for Public Education in Korea'. *KEDI Journal of Educational Policy*, 1(1): 25-42.

Lee, Sanghoon Conan. (2007) "The Timing of Signaling: To Study in High School or in College?" *International Economic Review*, 48(3): 785-807.

LeTendre, Gerald. (1994). "Distribution Tables and Private Tests: The Failure of Middle School Reform in Japan". *International Journal of Educational Reform*, 3(2): 126-136.

Lipscomb, Stephen. (2007). "Secondary School Extracurricular Involvement and Academic Achievement: A Fixed-Effects Approach". *Economics of Education Review*, 26(4): 463-472.

Machingaidze, Thomas, Patrick Pfukani and Sibangani Shumba (1998). "The Quality of Education: Some Policy Suggestions Based on a Survey of Schools in Zimbabwe." *SACMEQ Policy Research: Report No. 3*. Paris: UNESCO/ IIEP.

Matiashvili, Anna and Nino Kutateladze. (2006). "Georgia". In Silova, Iveta, Virginija Budiene and Mark Bray. (Eds). *Education in a Hidden Marketplace: Monitoring of Private Tutoring.* New York: Open Society Institute.

Mingat, Alain and Jee-Peng Tan. (2003). "On the Mechanics of Progress in Primary Education." *Economics of Education Review*, 22:5, pp. 455-67.

Newhouse, David and Kathleen Beegle. (2005). "The effect of school type on academic achievement : Evidence from Indonesia." *World Bank Policy Research Working Paper* WPS 3604.

Nguyen, Nguyet Nga. (2004). Trends in the Education Sector from 1993-1998. In Glewwe, P., Agrawal, N., Dollar, D. (Eds) *Economic Growth, Poverty, and Household Welfare in Vietnam.* Washington, D.C: The World Bank.

Ono, Hiroshi. (2007). "Does Examination Hell Pay Off? A Cost-Benefit Analysis of 'Ronin' And College Education in Japan". *Economics of Education Review*, 26(3): 271-284.

Paviot, Laura, Nina Heinsohn and Julia Korkman. (2008). "Extra Tuition in Southern and Eastern Africa: Coverage, Growth, and Linkages with Pupil Achievement". *International Journal of Educational Development* 28: 149-160.

Powers, Donald E. and Donald A. Rock. (1999). "Effects of Coaching on SAT I: Reasoning Test Scores". *Journal of Educational Measurement*, 36(2): 93-118.

Psacharopoulous, George and George Papakonstantinou. (2005). "The Real University Cost in a "Free" Higher Education Country." *Economics of Education Review*, 24(1): 103-108.

Rogers, F. Halsey. 1996. "Four Pass, Five Fail: Multiple Ability Signals and Cross-Country Differences in Educational Effort." Ph.D. dissertation, University of California at Berkeley.

Rohlen, Thomas P. (1980). "The Juku Phenomenon: An Exploratory Essay". *Journal of Japanese Studies*, 6(2): 207-242.

Rouse, Cecilia Elena. (1998.) "Private School Vouchers and Student Achievement: An Evaluation of the Milwaukee Parental Choice Program". *Quarterly Journal of Economics* 113(2): 553-602.

Russell, Nancy Ukai. (1997). "Lessons from Japanese Cram Schools." In Cummings, W.K. and Altbach, P. (Eds). *The Challenge of Eastern-Asian Education: Lessons for America.* Albany: State University of New York Press.

Silova, Iveta and Mark Bray. (2006a). "The Hidden Marketplace: Private Tutoring in Former Socialist Countries". In Silova, Iveta, Virginija Budiene and Mark Bray. (Eds). *Education in a Hidden Marketplace: Monitoring of Private Tutoring.* New York: Open Society Institute.

---. (2006b). "Implications for Policy and Practice". In Silova, Iveta, Virginija Budiene and Mark Bray. (Eds). *Education in a Hidden Marketplace: Monitoring of Private Tutoring.* New York: Open Society Institute.

Silova, Iveta and Elmina Kazimzade (2006). "Azerbaijan". In Silova, Iveta, Virginija Budiene and Mark Bray. (Eds). *Education in a Hidden Marketplace: Monitoring of Private Tutoring.* New York: Open Society Institute.

Spence, M. 1973. "Job Market Signaling." *Quarterly Journal of Economics*, 87:3, pp. 355-74.

Stevenson, David Lee and David Baker. (1992). "Shadow Education and Allocation in Formal Schooling: Transition to University in Japan." *American Journal of Sociology* 97(6): 1639-1657.

Stylianou, Vasso, Andreas Savva, Maria Vraka and Andreas Serghiou. (2003). "Information and Communication Technology: First-Aid to the Private Tutoring Problem?" Nicosia: School of Sciences and Engineering, Intercollege. Available on http://cblis.utc.sk/cblis-cd-old/2003/2.PartA/Papers/ICT/Stylianou.pdf#search='Information%20and%20Communication%20Technology%3A%20FirstAid%20to%20the%20Private%20Tutoring%20Problem' (accessed July 2006).

Suliman, El Daw A. and Safaa E. El-Kogali. (2002). "Why Are the Children out of School? Factors Affecting Children's Education in Egypt." Paper presented at the Economic Research Forum 9th Annual Conference, Al-Sharjah, UAE.

Suryadarma, Daniel, Asep Suryahadi, Sudarno Sumarto, and F. Halsey Rogers. (2006). "Improving Student Performance in Public Primary Schools in Developing Countries: Evidence from Indonesia". *Education Economics*, 14(4): 401-429.

Tansel, Aysit. 1997. "Schooling Attainment, Parental Education, and Gender in Cote d'Ivoire and Ghana." *Economic Development and Cultural Change*, 45:4, pp. 825-56.

---. 1998. "Determinants of School Attainment of Boys and Girls in Turkey." Yale University, Economic Growth Center Discussion Paper No. 789.

Tansel, Aysit and Fatma Bircan. (2006). "Demand for Education in Turkey: A Tobit Analysis of Private Tutoring Expenditures." *Economics of Education Review,* 25(3): 303-313.

Wooldridge, Jeffrey M. (2002). *Econometric Analysis of Cross Section and Panel Data.* Cambridge, Massachusetts: MIT Press.

World Bank (2003). *World Development Report 2004: Making services work for poor people.* Washington, DC: Oxford University Press for the World Bank.

Wu, Li-juing. (2004). "Disaffection and Cramming—The Story from Taiwan". *International Journal on School Disaffection*, 2(1): 15-20.

Table 1: The scale of private tutoring in selected countries

Country	Year	Level/Grade/ Age	Percent of students tutored	Comment	Sources
Azerbaijan	2004	Secondary school	57%		Silova & Kazimzade (2006)
		University	92%	These first-year university students received private tutoring in their last year in secondary school.	
Bangladesh	2004	Primary school	43%	This study finds more boys receiving tutoring than girls.	Ahmed et al. (2005)
Cambodia	1997-1998	Primary school	31%	The proportion of students taking private tutoring was 60% among urban schools, and 9% among rural schools.	Bray (1999b)
Canada	1999	Students age 13 and 16	The proportion of students age 13 and age 16 taking private tutoring respectively ranges from 5% to 17% and 8% to 20% across districts		CME (2000)
	1997	School age children	N/A	Over the past 30 years, the number of formal tutoring business in major Canadian cities has grown between 200%-500%.	Aurini & Davies (2004)
Cyprus	2003	College	86%	These students received private tutoring in lyceum.	Stylianou et al. (2003)
Egypt	2000	Children age 6-15	71%	This study uses the Egypt Demographic and Health Survey	Suliman & El-Kogali (2002)

Greece	2000	University	80% attended group (cram) preparatory schools, 50% received individual private tutoring and 33% received both group and individual tutoring		Psacharopoulous & Papakonstantinou (2005)
Hong Kong	1996-1998	Secondary school	35% of Secondary 1-3 students; 47% of Secondary 4-5 students; 70% of Secondary 6-7 students		Bray & Kwok (2003)
Japan	1995	Grade 8	64% of 8th graders received weekly tutoring in mathematics and 41% in science	This study uses data from the 1995 International Mathematics and Science Study (TIMSS)	NCES (1996)
Kenya	2000	Grade 6	88%	- 58% of the students attending private tutoring paid for it. The proportion of pupils who received private tutoring had gone up from 69% in 1998 to 88% in 2000. - This study uses data from the Southern and Eastern Africa Consortium for Monitoring Education Quality (SACMEQ) II.	Onsomu et al. (2005)

Republic of Korea	2003	Primary school	83%	In aggregate, 73% of all Korean students had private tutoring. This study cites estimates from the Korean Educational Development Institute	Kwak (2004)
		Middle school	75%		
		High school	56%		
Lithuania	2004-2005	University	62%		Budiene & Zabulionis (2006)
Mauritius	2001	Grade 6	87%	- 91% of these students paid for private tutoring. The proportion of pupils who received private tutoring had gone up from 78% in 1995 to 87% in 2001. - This study uses data from the Southern and Eastern Africa Consortium for Monitoring Education Quality (SACMEQ) II.	Kulpoo & Soonarane (2005)
Romania	1994	Grade 12	32% in rural areas and 58% in urban areas received private supplementary tutoring	This study cites estimates from a study undertaken by the Romanian Institute for Sciences of Education, in 1994, on a national sample of 12^{th} graders.	UNESCO (2000)
Singapore	1992	Primary school	49%		George (1992)
		Secondary school	30%		
Sri Lanka	2003	Grade 5	78%		Glewwe & Jayachandran (2006)

Turkey	2001	High school	35%	The number of private tutoring centers in 2002 was 2,100 (up from only 174 in 1984), which is close to the number of 2,500 high schools in the whole country in the same year. This study uses estimates from the Private Tutoring Centers Association in Turkey in 2003.	Tansel & Bircan (2006)
Ukraine	2004	University	68%	These students received private tutoring in their last year in secondary school.	Hrynevych et al (2006)
United Kingdom	2003	Years 6 & 11	26%	In aggregate, 27% received private tutoring	Ireson & Rushforth (2005)
		Year 13	30%		
United States	1990-1992	High-school students		To prepare for the SAT or ACT, 14%-21% take special courses at high school, 8%-14% take group private tutoring (commercial coaching classes), and 6%-8% take one-to-one private tutoring.	Briggs (2001)
	2000			It is estimated that almost 7 million elementary school students are likely to take tutoring, and that tutoring has grown to be a professional-service industry of over $5-$8 billion.	Gordon & Gordon (2003)
Vietnam	1997-1998	Primary students	31%	Around 34% of the households with children in school send their children to private lessons and the majority of them (90%) allocate between 1% and 5% of the total household expenditure on private tutoring	Dang (2007b)
		Lower secondary students	56%		
		Upper secondary students	77%		
Zanzibar	2000	Grade 6	56%	- 38% of these students paid for private tutoring. The proportion of pupils who received private tutoring had gone up from 46% in 1995 to 56% in 2000. - This study uses data from the Southern and Eastern Africa Consortium for Monitoring Education Quality (SACMEQ) II.	Nassor et al. (2005)
Zimbabwe	1995	Grade 6	61%	The percentage varies from 36% to 74% across the regions.	Machingaidze, Pfukani & Shumba (1998)

Sources: This Table is largely based on Table II.1 in Dang (2007a).

Table 2: Most common factors that determine private tutoring

	Egypt	Japan	Republic of Korea	Turkey	Vietnam	
					Primary students	**Lower secondary students**
Dependent variables	Per child exp. on private tutoring	Participation in after-school private tutoring	Per child exp. on private tutoring	Log of household exp. on private tutoring	Log of per child exp. on private tutoring	Log of per child exp. on private tutoring
Independent variables						
Individual & household characteristics						
Household income	N.S./ +++	+++	+++	+++	+++	+++
Father's years of schooling	++	+++	+++	++	N.S.	+
Mother's years of schooling	N.S.	+++	+++	+++	+	N.S.
Community characteristics						
Urban	+++	+++	+++	+++	+	N.S.
Number of observations	6114	3053	6576	3898	2347	1179
Econometric model	Tobit	Logit	Tobit	Tobit	Tobit	Tobit

Note: 1. + significant at 10%; ++ significant at 5%; +++ significant at 1%. N.S. stands for not significant.

2. For Egypt, the significance level of household income is inferred from the significance levels for dummy variables indicating households in different wealth quintiles, which ranges from insignificant to highly significant.

3. For Republic of Korea, the significance level on the urban variable is inferred from the strong significance levels for the dummy variables indicating living in high density residential areas, living in Seoul, living in metropolitan city or a small and medium-sized city.

4. For Turkey, household income is log of total household expenditure. Father's years of schooling are for household heads.

5. For Vietnam, household income is log of household expenditure per capita.

Sources: Estimates are from Assaad and El-Badawy (2004) for Egypt (Table 4), Stevenson and Baker (1992) for Japan, Kim and Lee (2004) for Republic of Korea (Table 4), Tansel and Bircan (2006) for Turkey, and Dang (2007b) for Vietnam.

Table 3: The impacts of private tutoring in selected recent studies

a. Studies that do not control for the endogeneity of private tutoring					
Country	**Year**	**Level/Grade/ Age**	**Summary of Main Impacts**	**Comments**	**Sources**
Japan	1980-1982	High-school seniors	- For students in the first year out of high school, among forms of private tutoring, practice examination and correspondence course improve the probability of entering college by 16% and 25%. - For students in the second year out of high school, attending special tutoring school increases the probability of entering college by 80%. Having a private tutor significantly reduces this probability, but this most likely reflects the remedial character of this form of private tutoring in Japan.	One variable used in all regression models is student academic standing, which is likely to be endogenous because it is correlated with unobserved student innate ability or motivation.	Stevenson & Baker (1992)
Kenya	1995	Youth ages 13-18	Private tutoring reduces the chance of repeating grades and increases student academic performance	This study does not control for school characteristics.	Buchmann (2002)
Republic of Korea	2000-2001	Middle and high-school students	Pre-class tutoring (private tutoring that teaches a school's curriculum at least one month ahead of its schedule) has no short-term or long-term effects on student academic performance	From the description of the sampling procedure (p. 28), this study does not appear to account for student motivation into taking private tutoring or not.	Lee et al. (2004)
Singapore	Not reported	Eighth-grade students	Time spent with a private tutor has a negative impact on student academic performance		Cheo & Quah (2005)
Vietnam	2002	8-year-old children	Although private tutoring does not significantly increase the children's writing and multiplication test scores, it does double these children's reading test scores	This study does not control for school characteristics.	Ha & Harpham (2005)

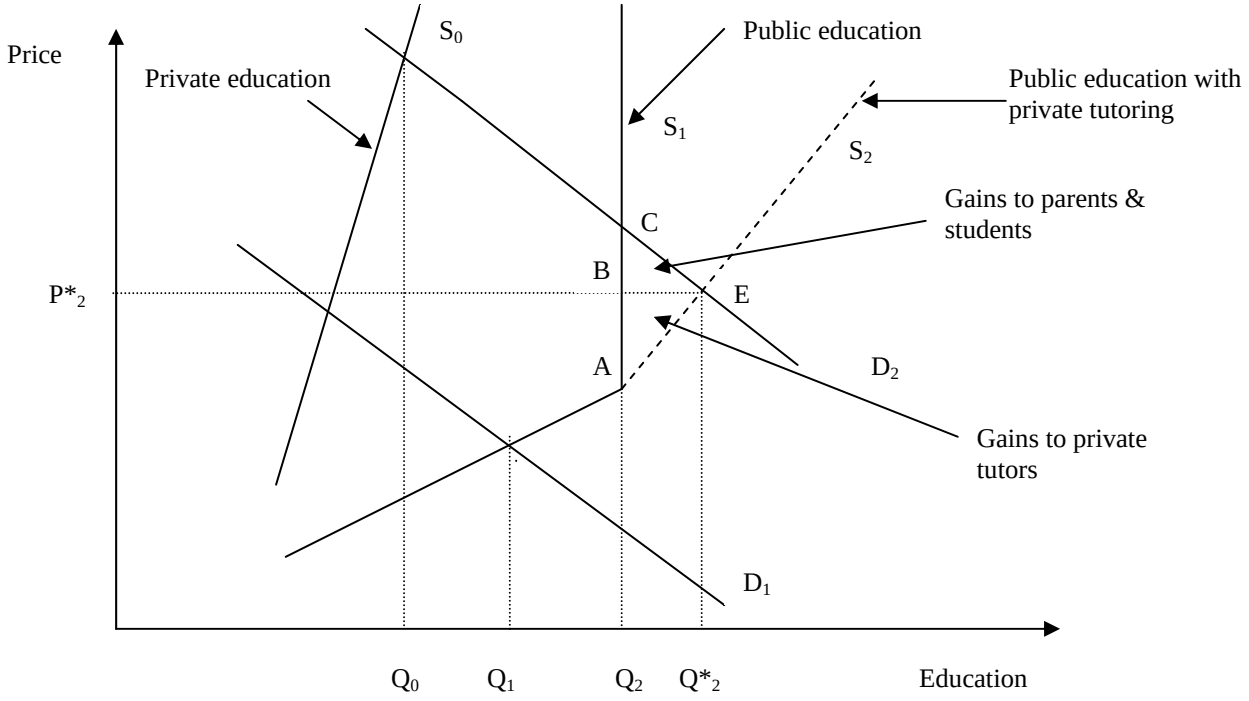
b. Studies that control for the endogeneity of private tutoring					
Country	**Year**	**Level/Grade/ Age**	**Summary of Main Impacts**	**Comments/ Instruments for private tutoring**	**Sources**
Germany	1998-1999	Students in grades five to eleven	Receiving private tutoring causes a larger improvement in academic performance and motivational variables.	This study uses a form of matching, in which students in tutoring identify a match, in an attempt to account for unobserved differences between tutoring participants and non-participants.	Mischo & Haag (2002)
India	2001-2004	Third- and fourth-grade students	- A remedial education program increases average test scores for all children in treated schools by 0.28 standard deviations. A computer-assisted learning program increases math scores by 0.47 standard deviations. - One year after the program, the initial gains reduced to 0.1 standard deviations.	This study uses a randomized experiment method.	Banerjee et al. (2007)
Indonesia	2002-2003	Fourth grade students	Private tutoring has no impacts on mathematics or dictation scores	A variable indicating school clustering in terms of private tutoring is used as the instrument for private tutoring	Suryadarma et al. (2006)
Israel	1999-2001	Underperforming high-school students	- A remedial education program increases the mean matriculation rate for schools and participating students by 3-4% and 11-12% respectively. - The program expenditure per participant is about 40% of the annual expenditure per high-school student in Israel.	This study uses both difference-in-difference and IV methods. Instrumental variables for the proportion of students participating in the program include the interaction terms of school size, year dummy variable and treatment status.	Lavy & Schlosser (2005)
Japan	1995	Male university and high-school graduates	Years spent after high-school graduation cramming in private tutoring centers (*ronin*) improve the quality of the college students go to, thus raising earning indirectly (through this improvement in college quality).	This study uses an IV method. However, the study does not control for other household or school or community characteristics (such parental education or household income).	Ono (2007)
US	1990-1992	High-school students	Coaching (commercial private tutoring courses) increases SAT math scores by 14-15 points, SAT verbal scores by 6-8 points, ACT math and English scores by 0-0.6 points, but decrease ACT reading scores by 0.6-0.7 points.	- This study does not report the variables used as instruments for private tutoring. - This study does not control for school characteristics.	Briggs (2001)
	1997-1999	Third- and sixth-grade students	Summer remedial programs increase math and reading achievement for third-graders by about 12% of the average annual learning gains. The corresponding figures are around 6% for sixth-graders.	This study uses a regression discontinuity method.	Jacob & Lefgren (2004)
Vietnam	1997-1998	Primary and lower secondary students	Private tutoring has positive effects on student academic performance.	This study uses the private tutoring fees charged by schools as instruments for students taking private tutoring.	Dang (2007b)

Table 4: Government Policies Toward Private Tutoring In Selected Countries/ Territories

Type	General Policy	Typical Measures	Country	Notes
1	Prohibit private tutoring	Total ban on private tutoring	Cambodia (7), Myanmar (1)	The bans were implemented at various times in these countries, but they were ineffective because of government's inability to enforce them.
			Mauritius (67), Republic of Korea (65)	
2	Ignore		Croatia (58), Georgia (45), Nigeria (6), Mongolia (37), Sri Lanka (49)	Most of these countries have weak institutions and do not have the capacity to regulate private tutoring
			Canada (94), United Kingdom (94)	These countries have strong institutions and have the capacity to regulate private tutoring. However, they consider the private tutoring market outside of their sphere of responsibility.
3	Recognize and regulate	- Generally prohibit private tutoring in early grades; prohibit teachers from tutoring their own students. - Regulations accompanied by inspections and sanctions on private tutoring fees, class sizes, syllabi. - Regulations on infrastructure of private tutoring centers. - Reduce stratification in the education system, reduce disparities in schools, raise public awareness about negative effects of private tutoring.	Hong Kong (93), Lithuania (60), Mauritius (67), Republic of Korea (65), Ukraine (28), Vietnam (29)	
4	Actively encourage	- Encouragement policies toward private tutoring. - Subsidies for private tutoring, dissemination of information to link potential tutors and clients, training courses for tutors, taxation incentives.	Singapore (98), South Africa (71), Zanzibar (Tanzania) (43)	These countries believe that private tutoring contributes to human capital development and caters to the needs of students.

Note: The typical measures are given for illustration purposes, and the countries listed in each category may not implement all these measures. The number in parentheses after each country is its percentile ranking in control of corruption, with higher rankings representing higher control of corruption. This Table is constructed mainly from Bray (2003, 2006), Silova and Bray (2006b). The cases for Croatia are added from Dedic et al. (2006), Georgia from Matiashvili and Kutateladze (2006), Mongolia from Dong et al. (2006), Lithuania from Budiene and Zabulionis (2006), Ukraine from Hrynevych et al. (2006), and Vietnam from Dang (2007a) respectively. The corruption rankings are taken from Kaufmann et al. (2007).

Figure 1: Demand and supply of education with private tutoring



[1] Both authors are with the Development Research Group, World Bank; email: hdang@worldbank.org (Hai-Anh Dang) and hrogers@worldbank.org (Halsey Rogers). The authors are grateful to Emmanuel Jimenez, Mark Bray, and three anonymous referees for their constructive comments, and to the Hewlett Foundation for its partial support of this research. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors. They do not necessarily represent the views of the International Bank for Reconstruction and Development/World Bank and its affiliated organizations, or those of the Executive Directors of the World Bank or the governments they represent.

[2] Our focus is on private tutoring for academic subjects; Lipscomb (2007) and Barron et al. (2000), among others, examine how non-academic extracurricular involvement affects academic achievement.

[3] Strictly speaking, while it may not be correct for these public-financed tutoring programs to fit under the denomination "private tutoring", results from these studies are highly relevant to the discussion about equity and efficiency with private tutoring. Furthermore, these tutoring programs have clear policy implications, since they represent what tutoring may look like if it is to be used on a large scale by the government.

[4] A similar and extreme case happens in Taiwan, where private tutoring is also popular. One Taiwanese student was even recorded as saying "The very start of my day is at the end of school when I go to the crammer [sic]school; the mainstream school where I spend most of my day is merely my leisure time" (Wu, 2004).

[5] It is also reported that the number of private tutoring colleges listed in the Telephone Book's Yellow Pages in Sydney—the largest city in Australia—increased from 60 in 1989 to 222 in 2002 (Kenny and Faunce, 2004). More evidence on the

growth of private tutoring for several countries in Southern and Eastern Africa can be found in Paviot, Heinsohn and Korkman (2008).

[6] Particularly in developing countries, the public education system is well-known for its rigidity, lack of teacher incentives and accountability, and inadequate infrastructure (see Glewwe and Kremer (2006) for a recent review). Even worse, teacher absenteeism is rather common in a number of countries (Chaudhury et al., 2006). Note that the supply curve need not turn completely inelastic at the upper end. We show this extreme case for ease of exposition, but all that is necessary is that at the margin, the public system be less able or willing to provide additional lessons (that is, have more inelastic supply) than the private tutoring sector is.

[7] Note that this is the public-education supply curve with subsidy – i.e., as viewed by the households – rather than the underlying marginal costs of supplying a public education. We assume that this cost of public schooling to the households is less than the cost of private schools, even though the underlying cost for the private school to produce education may be lower. We make no assumptions about the unit cost of private tutoring relative to the unit cost of private schools; the advantage of private tutors is instead in their flexibility and ability to supplement the public system, by providing as many additional hours (lessons) as the household demands.

[8] Other factors that shift the demand curve include the price of substitute goods or the number of buyers on the market. For our purpose, we focus on the above-mentioned factors only.

[9] Other papers that investigate the determinants of private tutoring using smaller survey data include Buchmann (2002), Davies (2004), and Psacharopoulous and Papakonstantinou (2005).

[10] The dependent variables and the other control variables generally differ across the models used in the cited studies for each country. For example, while the paper on Japan looks at the probability that students participate in after-school private tutoring classes, the remaining studies consider the determinants of expenditure on private tutoring either at the household level or child level. And while only the Egypt paper control for parental presence in the household, among other things, only the Turkey paper control for whether the mother is single.

[11] See Becker and Lewis (1973) or Blake (1989) for more details on this issue.

[12] See Rogers (1996) for a model of this effect, based on the experiences of Korea and Japan.

[13] It is reported that one rebel group in the northeastern state of Manipur in India has forbidden all teachers and professors from providing private tutoring classes, in an attempt to stop the rampant situation that teachers do not come to class because they are too busy tutoring to supplement their low salaries. Not surprisingly, even the Indian government-appointed official in charge of higher education in Manipur sympathizes with the rebels' efforts (Chronicle of Higher Education, 2003).

[14] The direction of bias depends on the correlation between income levels and the private tutoring variables. If this correlation is positive, the coefficients on the share of public expenditure in GNP and gross enrolment rates would be biased upward; if negative, the reverse would be true.

[15] Generally, variables are considered to be endogenous if they correlate with unobserved characteristics which determine the outcome. See, for example, Gujarati (2003, p. 701) or Greene (2007, p. 357) for an introduction.

[16] See, for example, Bedi and Garg (2000) and Newhouse and Beegle (2005) for public-private comparisons in the case of Indonesia.

[17] Another variant of the randomized-experiment method is regression discontinuity design, which takes advantage of what are in effect natural experiments in the region around a discrete (and exogenous) jump in the variable of interest. For a detailed and rigorous treatment of these econometric methods, see Wooldridge (2002).

[18] Providing the tutoring free seems likely to reduce its effectiveness in promoting learning, so if anything, this should bias downward the estimates of the returns to tutoring.

[19] In the case of the US, there is overwhelming evidence that private tutoring raises achievement. Other studies that find private tutoring has positive effects on the SAT include Becker (1990) and Powers and Rock (1999). A recent meta-analysis study of the effects of one-to-one tutoring programs in reading for elementary students with learning difficulties shows that these programs improve student reading skills (Elbaum et al., 2000).

[20] It is worth noting, however, that certain features of this Indonesian experience (in which one of us participated) may restrict its general applicability. First, the test administered to the students was quite simple, with the math test consisting of only twelve questions and the dictation test only one short passage. Second, limited data on student attributes and investments was available, so the tutoring variable used was a crude one – whether or not the student was currently taking tutoring.

[21] A second program studied by Banerjee et al. (2007) used computers, rather than human tutors, to deliver the tutorials. This program raises math scores for children under the program by 0.36 standard deviations in the first year and 0.54 standard deviations in the second year. However, it is much more expensive than the first program, at $15.18 per student per year

[22] These assumptions assume a constant lifetime increment in earnings due to the program of $127.5 per year, the positive payoffs begin 4 years after the costs are incurred and remain in effect for 43 years until the tutored students reach age 65, and the program affects only the tutored students' wages and there are no general equilibrium effects. See Lavy and Schlosser (2005) for more details.

[23] 20,000 VND is also equivalent to around 2% of the household spending on education by an average Vietnamese household with children in school (Dang, 2007).

[24] This calculation revises and updates those in Dang (2007) and is available upon request. Similar calculations for primary students also show that the gains from 20,000 VND worth of private tutoring reduce the expected cost of repeating a grade by around 25,000 VND.

[25] See Heckman, Lochner and Todd (2006) or Heckman, Urzua and Vytlacil (2006) for discussion of the heterogeneity in returns to education in instrumental variables models.

[26] Note that if the household's demand for education is on the D_1 (low demand for education) curve, the household would consume no private tutoring at the given supply curve.

[27] From the perspective of the school system as a whole, private schools may be viewed as a useful complement to the work of government schools.

[28] Alternatively, the teacher could give preferential treatment to particular children in return for a fee. On one hand, this may reduce teacher time and energy in the mainstream classes, but on the other hand this may encourage teachers to work additional hours. In this case, the problem of assessing the efficiency of allowing tutoring (assuming for a moment that policymakers have a choice) seems analogous to a problem from health economics that Cutler (2002) discusses.

[29] Mingat and Tan (2003) show that teacher salaries generally exceed, and are often several multiples of, income per capita in developing countries. Teachers tend to be paid a standardized salary wherever they are posted, or even receive a bonus for serving in rural areas; as a result, their income advantage over poorer rural residents will be even greater.

[30] We are grateful to an anonymous referee for suggesting this example.

[31] The analytical difficulty is to distinguish between tutoring to acquire a signal and tutoring to acquire human capital when tutoring leads to higher test scores (and perhaps even school grades, if the school's curriculum is aligned to entrance exams), and test scores have no or little productive values. Even if we have long-term longitudinal data on students that includes their labor market experience, higher test scores are likely to raise wages in either case, as long as the exam signal is used by employers.

[32] While the timing of this corruption measure does not always coincide exactly with the timing of the government actions described in Table 4, there has been little change over time in the corruption index for these countries, except for Tanzania (Kaufmann et al, 2007b).

[33] Furthermore, it is likely to have the unintended effect of preventing other, more beneficial private tutoring, because in reality corrupt teachers will not be the only tutors available.