Private Tutoring and Demand for Education in South Korea*

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March 2004

* The authors would like to thank Keith Bender, Eric Hanushek, John Heywood, and John Riew for their helpful comments and suggestions. We also thank Kwang Jun Lee for his research assistance in the data work.

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Abstract

South Korea's education sector has expanded dramatically as her economy grew over the last several decades. In 2000, the government spent more than 3.5% of GDP on primary and secondary schooling, comparable to the level in the other OECD countries. Despite the substantial government expenditure, households additionally spent about the same amount on private tutoring. We argue that the prevalence of private tutoring is a market response to the government's rigid and uniform education policy. In order to achieve rapid economic growth, the government pushed hard for universal primary schooling and the equalization of secondary schools. Unsatisfied demand for education by parents and students in a highly regulated educational environment has resulted in an enormous increase in private tutoring despite the government's strong policy measures to reduce it.

Key words: private tutoring, demand for education, South Korea.

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1. Introduction

Scholars and policy makers have grappled with the issue of the proper role of the government in the education sector in developing countries.[1] When many households are poor and cannot afford schooling even when the private return in education is higher, Schultz (1961) argues that investment in human capital through public schooling promotes economic growth. Empirical evidence on this subject seems to corroborate his thesis.[2] Moreover, many studies on the returns to education (e.g., Psacharopoulos 1994) report that the returns are higher in low-income countries and that they are higher in primary school level.[3] Consequently, the prevailing wisdom among education planners has been to provide universal public education (at least in the primary school level) as quickly as possible.

However, as the governments in those countries typically have limited fiscal resources, rapid expansion of public education often creates severe fiscal stress in the public school system. Consequently, the public school system in developing countries may result in low teacher salaries, poor school facilities, and low quality education in general. In this environment, households typically supplement their children's education with private tutoring.

Private tutoring is widely practiced all over the world, though it is more common in Asia, Africa, and Latin America.[4] In some low-income countries in which teachers are paid poorly

[1] See Lott (1987) or Trosel (1996) for a review of various arguments for the public provision of schooling.
[2] For example, by cross country regression on 35 East Asian countries, McMahon (1998) finds that more schooling, particularly the expansion of secondary schooling, is an important determinant of the growth rates for the last thirty years. Similarly, Birdsall et al. (1995) presents cross-country regressions showing that higher growth observed in East Asia can be attributed to the investment in education. They argue that the supply of high-quality education reduces income inequality, which in turn promotes growth.
[3] However, McEwan (1999) argues that the rates of return in developing countries may have been overestimated since the calculation typically ignores the educational costs paid by households directly.
[4] Bray (1999) reports that staggering percentages of students receive private tutoring around the world: nearly 70%

and the government's monitoring is not stringent, such as Indonesia, Lebanon, Nigeria, Cambodia, India and Tanzania, private tutoring is the main source of the teachers' extra income. Under this situation, teachers may deliberately shirk in order to create the demand for private tutoring. Students often take private tutoring from the very teacher after school hours, sometimes at the same school facility.[5] In other countries where teachers are paid relatively well and teachers are prohibited to provide private tutoring, such as South Korea and Japan, tutoring is mostly provided by university students and by professional private tutors. Consequently, there exists a well-developed market for private tutoring out of the formal school system.

Despite its importance, there have been not many studies on private tutoring. This paper is an attempt to fill the void by exploiting rich datasets on private tutoring from South Korea (Korea hereafter). We argue that the rampant private tutoring in Korea is a natural market response to the increase in educational demands that is not satisfied by the uniform public provision of schooling. In particular, the households with higher demand for education are more likely to seek private tutoring, as the gap between the demand and public supply is greater. Also, the competition for a more prestigious university exacerbates the situation. As private tutoring is a relatively expensive way to provide educational service, and it is only available to households who are willing and able to pay for it, the hasty state-led expansion of secondary education may result in an inequitable as well as inefficient school system.

The organization of the paper is as follows. In the next section, we describe the rapid expansion of primary and secondary education led by government policies and mushrooming

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of students had received tutoring by the time they finished high school in Japan in 1993; over 50% of students received tutoring in Rio de Janeiro public schools in 1997; 74% of Grade 8 in Egypt in 1991; 45% of primary school and 36% of middle school in Hong Kong; About 83% by the high school in Malaysia in 1990; more than half of high school students in Morocco; 70% of Grade 6 in Tanzania; 81% of secondary schools in Taiwan; and 61% of Grade 6 students in Zimbabwe.

[5] Biswal (1999) analyzes the incentive structure and optimal educational system in this situation.

private tutoring in Korea for the last several decades. In section 3, we develop a theoretical model in which private tutoring and public education are perfect substitutes. This model is used to derive empirically testable hypotheses. In section 4, using household survey data on private tutoring practice, we estimate the empirical model of the demand for private tutoring. Conclusions and policy implications are offered in the last section.

2. Expansion of schooling, equalization policy, and private tutoring

Korea has transformed herself from a backward agrarian economy to a fledgling advanced economy during the last four decades by successfully implementing government-led industrialization policies. During the same time, the government has put a major emphasis on the expansion of public education system (Adams and Gottlieb, 1993 and McGinn et al., 1980). In 1945, when Korea was liberated from Japanese colonial rule, only 65% of primary school aged children and less than 20% of secondary school aged children were enrolled in schools. Soon after the liberation, the Japanese teachers, who consisted of 40% of primary school teachers and 70% of secondary school teachers, returned to Japan soon after the liberation. Moreover, much of school facilities were destroyed during the Korean War (1950-1953).

Despite the inadequate educational resources, the Korean government wanted to establish universal primary school (Grades 1-6) education as soon as possible. The strong commitment for the expansion of primary education by Rhee's government (1948-1960) resulted in a remarkable expansion. Several teachers' colleges were established in order to produce primary school teachers quickly. The government started an aggressive construction campaign by building more than 5,000 classrooms per year starting in 1954. Consequently, primary school enrollment increased from 1.37 million in 1945 to 2.27 million in 1947 to 4.94 million in 1965.

The number of teachers increased from 20,000 in 1945 to 79,000 in 1965. By 1965, the goal of universal primary school education had been more or less achieved (see Table 1).[6]

Table 1. Enrollment Rates and Advancement Rates

When General Park took over the power by a bloodless coup d'état in 1961, he started successful economic growth plans with strong government initiatives. Increasing income and the expansion of elementary school graduates created a strong surge for the demand for secondary education. Up until then, each middle school and high school, regardless of pubic or private, was allowed to choose students through competitive entrance examinations. Competition for better schools became fierce as more students were graduating from elementary schools, and rankings among middle schools and high schools had been well established. The situation was commonly called as *ipsi-jiok* (literally, entrance examination hell). Education policy makers recognized several problems of such fierce competition.[7] The government's answer to these problems was the school equalization policy.

The equalization policy replaced the individually administered entrance examinations with a random allocation of students within separate school districts. Students were randomly

[6] However, in order to achieve the early universal primary school education, the government was forced to sacrifice the quality of schooling. The average student teacher ratio for elementary school was over 60 during this period, and class sizes often exceeded 80. Also, the government asked parents to share a significant portion of educational expenses such as textbooks, supplies, activity fees and so on.

[7] Several problems were prominent. First, the heavy stress of preparing for the entrance exam hinders the healthy (physical as well as psychological) growth of eleven-year old children. Second, schooling in the elementary schools, particularly in the grade 6, was geared too much for the preparation of the exam. Therefore, teaching "normal" curriculum was difficult. Third, households spent substantial amount of money to prepare children for the exam. Fourth, the quality of middle school education differed very much from school to school, and students and their parents were obsessed with the most prestigious schools, commonly known as, *illyubyung* (the disease obsessed with the first class). Many students who failed to get in to the their desired schools repeated the sixth grade in order to prepare for the next year's entrance exam. Also, many parents desired to send their children to an elementary school that was more successful in sending its graduates to more prestigious middle schools. This created unbalanced demand for elementary school student allocations across school districts.

assigned to different public or private schools in the district by lottery as long as the student passed a nation-wide qualification examination. Under the new policy, private schools had to give up the rights to select new students and take all students assigned by the Ministry of Education. It also made levels of tuition, salaries of teachers, and the curricula of private schools equal to those of the public schools through a combination of regulations and financial assistance to private schools. Accordingly, private schools became almost identical to public schools in terms of the accessibility to students, contents of learning, and the quality of teachers.

The middle school (Grades 7-9) equalization policy was first implemented for Seoul (the capital of and the largest city in Korea) in 1969 and throughout the country by 1971. The high school (Grades 10-12) equalization policy was first adopted for Seoul and Pusan (the two largest cities in Korea) in 1974 and was gradually expanded to several major cities until 1980. However, during the 1980s the government slowed down the implementation because of growing opposition, and some small and medium sized cities and rural school districts were allowed to keep the old system.

The equalization policy eliminated competition among secondary schools, but definitely not among students as high school graduates wanted to enter the more prestigious universities.[8] Meanwhile, the government maintained a quota for the number of university admissions, and mandated strict student selection procedures for both public and private universities.[9] Even though one of the primary policy objectives of the equalization policy was to reduce private tutoring, it increased continuously. Eventually in 1980, the new government led by General

[8] In line with the equalization policy, the government prohibited universities from weighing the differences in high school quality in the student selection procedure. Since the relative position of a student in a school without any information on the quality of the school does not convey much about the true academic capability of the student, universities rely more heavily on entrance examinations in the student selection process.

[9] Due to political pressure, the government was forced to increase the number of university students in early 1990s. Also, the government started to relax the regulations for admission procedures since 1995.

Chun banned all forms of private tutoring except for a few exceptions.[10] However, such a ban was difficult to enforce, and the private tutoring did not stop.

Even after the apparent failure of the outright ban on private tutoring in 1980, the government maintained strict legal regulations on private tutoring. Until the banning was found unconstitutional in 1999, the government allowed only two types of private tutoring: *hakwon* (a private, for-profit, school-like learning institution) and private instruction by university students. The government has prohibited all the other forms of the private tutoring including the private instruction by schoolteachers outside the school, the private instruction by *hakwon* instructors outside *hakwon*, and the private instruction through the mail, phones, and TVs. Moreover, the Korean government has maintained strong controls over *hakwon*.[11] Even under this strict regulatory environment, the number of *hakwons* has increased tremendously from 381 in 1980 to 14,043 in 2000, and the number of students enrolled at *hakwons* has increased from 118,000 in 1980 to 1,388,000 in 2000.

Table 2 shows the public and private expenditure in primary and secondary education in Korea. The out-of-pocket payment by parents for the schooling of their children has been gradually reduced from 1.6 % of GDP in 1977 to 0.8 % of GDP in 1998. However, the escalating expenditure on private tutoring more than offsets the reduction of out-of-pocket

[10] There are three major forms of private tutoring catering for diverse market demand. First, individual tutoring for one or a group of students is provided typically at student's home. Second, instruction is provided by a private for-profit learning institution, called *hakwon*. It has classrooms and instructors, and the instruction is given in a classroom-like setting. Third, there are self-study sheets delivered and graded by mail or the internet. The individual tutoring is the most expensive type, and the study sheet is the cheapest.

[11] Those who want to establish a *hakwon* must acquire a permit from the government. Instructors at *hakwon* have to have certain required academic qualifications and lecture rooms that satisfy certain physical requirements. Also instruction fees should be kept below the guidelines set by the committee headed by the superintendents at the local education authority. The strong regulation on *hakwon* by the government is a sharp contrast to the laissez-faire approaches of Japan on *juku* (the Japanese counterpart to *hakwon*). The Japanese government has treated *jukus* like the other small businesses, and does not regulate them. Accordingly, compared to *jukus* that encompass a variety of forms of private instruction and meets the educational demands with flexibility, *hakwon* is a more narrowly defined form and is made to be more like schools. In effect, the Korean government has been trying to confine the private tutoring to *hakwon*, which is easily put under the tight control of the government.

payment for schooling.[12] Since the education reform in 1995, there has been a drastic increase in government spending on schools, reflected in the jump in government spending from 2.7% of GDP in 1994 to 3.4% in 1998.[13] However, escalating expenditure on private tutoring despite the big increase in government spending indicates that the mere increase in public spending on education might not be sufficient to reduce households' expenditure on private tutoring.

Table 2. Primary and Secondary Education Expenditure to GDP

In 1997, more than 70 percent of elementary school students and about half of middle and high school students are reported to take private tutoring. Many studies show that private tutoring in Korea is not limited to the wealthy population, but is widespread across groups with different incomes or consumption levels. KEDI (1999) shows that private tutoring expenses were about 9 percent of incomes of the households that have school-aged children for all income groups except for the top fifth income group with the spending of 7.4 percent of their incomes on private tutoring. Lee and Woo (1998) estimates that Korean households spent 12.4% of GDP per capita per elementary student on private tutoring in 1997.[14]

3. Theoretical Model

In this section, we present a theoretical model that provides not only a theoretical framework in which private tutoring can be discussed but also testable hypotheses that can be estimated in the next section. Consider a household i's maximization problem with respect to

[12] It is highly probable that the expenditure on private tutoring had been underreported in early 1980s because of the ban on most of the private tutoring.
[13] See Park (2000) for details on the education reform of 1995.
[14] UNESCO (2000) reports that Korea's public expenditure per pupil as a percentage of GNP per capita is 16% for

education (e) and a numeraire good (x). Education can be obtained either by formal schooling (publicly supported and publicly provided education), e_1 or by privately paid private tutoring, e_2.[15] We assume that formal schooling and private tutoring are perfectly substitutable.[16] As education is supplied privately as well as publicly, the structure of the model is similar to the model of public provision of private goods in which the household is allowed to supplement the public provision with additional purchase in the private market.[17] Since we are mainly interested in the household's demand for tutoring, our model will be a partial equilibrium model.

For analytical simplicity, we assume that each household has only one child.[18] The child's scholarly ability at the time is given by a_i. In order to capture the heterogeneous preferences over education across households, we parameterize the preference over education with parameter θ_i. The higher the value of θ_i, the greater its preference for education is.[19] We also recognize the consumption externality of education. The household cares not only about the amount of education that its child receives but the amount of education of all other children

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pre-primary and primary education combined and 12% for secondary education in 1995.

[15] As described in the previous section, formal schooling includes education provided by private schools as well as by public schools, as private schools in Korea are effectively identical to public schools. Hence, the only possible private education would be private tutoring.

[16] When the major purpose of private tutoring is to prepare students for major examinations such as college entrance examinations, private tutoring may emphasize test-taking skill while formal school system may focus on broader educational objectives. Hence, it can be argued that private tutoring and formal schooling are imperfect substitutes. Nonetheless, we take the perfect substitution assumption for analytical convenience.

[17] When the private good is indivisible so that the household cannot supplement its consumption with the private market purchase, Besley and Coate (1991) argue that universal provision of public good as an income redistribution mechanism is not efficient, as both the rich and the poor would prefer direct income transfer. However, several authors argued that public provision of private goods is a second best Pareto efficient outcome if there exists information constraints in which the government cannot use the optimal nonlinear income tax or if there is a time inconsistency problem (e.g., Nichols and Zeckhauser 1982; Boadway and Marchand 1995; and Blomquist and Christiansen 1995). In the model in which the public provision can be supplemented with private purchase and the level of public provision is determined by majority voting and financed by proportional income tax, Epple and Romano (1996) show that total expenditure on the good is higher in the dual supply case than either in the private supply only case or public supply only. Blomquist and Christiansen (1999) argue that if the government can exercise a non-linear income tax system, the efficient level of public provision can be obtained with majority voting or two party political system under certain conditions.

[18] Allowing more than one children for a household will create a question of how to allocate private tutoring expenditure among children in addition to the question of how much to spend on private tutoring.

[19] Specifically we assume that as θ increases, the marginal utility of education increases and the marginal utility of

receives, E_{-i}.[20] The tournament aspect of education is clearly manifested in the Korean labor market. Despite the fact that college premium in the Korean labor market shows a decreasing trend in most of 1980s and 1990s as a result of rapid expansion of college education (Kim and Lee, 2000), there are plentiful reasons for fierce competition to enter a few elite universities in Korea. Kim, et al. (2002) show that graduates of top six universities (out of more than 100 universities in Korea) consist of 59 percent in the list of Who's Who in four major newspapers and 85 percent of who passed exams for selecting high-rank public officials. Jang (2002) shows the pronounced wage premium of about 42 percent for the graduates of top five universities over those below ranked 30.[21] In addition, 57 percent of the members of National Assembly in 2000 are graduates from top three universities.

Since there are many households, we shall ignore the strategic interaction between the households regarding the choice level of education, i.e., we shall treat the other children's education (E_{-i}) exogeneous. The household wants to maximize its utility function u_i (x, e; a_i, θ_i, E_{-i}) subject to

(1) $e = e_1 + e_2$

(2) $e_1 = \bar{e}_1 + \alpha\,(\bar{a} - a_i)$

(3) $x + p\,e_2 = y - \eta\,\bar{e}_1$

(4) $x \geq 0,\ e_1 \geq 0,\ e_2 \geq 0.$

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other goods decreases.

[20] As the level of the education of other children increases, the household's own child's probability of being admitted to the desired university decreases. Therefore, we assume that the marginal utility of own education increases as the other children's education increases. However, as there is no obvious relationship between the marginal utility of the numeraire good (x) and the other children's education (E), we assume the cross partial derivative of the utility with respect to the two variables is zero.

[21] Jang also estimates that the quality premium depreciates very quickly after the top five schools. For the next top five universities, the premium decreases to less than 10%.

We assume in equation (1) that total educational services obtained by the household is the sum of formal schooling (e_1) and private tutoring (e_2). The second equation says that the education service received through schooling depends not only on the level of education provided by the school ($\bar{e}_1$) but also on the child's ability (a_i) and his peers. Specifically, there is a positive peer effect to the student proportional to the difference between his ability and the average ability ($\bar{a}$) of the children in the classroom whose ability is greater than his.[22] In the regions subject to the equalization policy, where school choices are not allowed, average ability of children in the classrooms can be regarded as exogeneous. The parameter α represents the degree of this peer effect. The level of schooling $\bar{e}_1$ is determined by the government, and it is provided free of charge.[23] However, in order to provide schooling, the government collects the lump-sum tax of the amount of $\eta\ \bar{e}_1$. The parameter η (> 1) represents the efficiency of the formal school system. The lower the value of η is, the more efficient the school system is. The price of x is normalized to one, and the price of private tutoring is p. Private tutoring is available with continuous amount e_2.

Since the price of schooling is zero, every household will choose to attend schools as long as the educational service the household receives (e_1) is positive. If not, the household will pull the student out of the formal school system. However, there are virtually no alternatives for such students within Korea. Some households, therefore, send their children to other countries

[22] We are assuming a type of "baseline model" of peer effects where peer effects have distributional consequences but no efficiency consequences. Under the model, in order to give one student a better peer, one must take that peer away from another student; the two effects exactly cancel and total societal achievement remains the same (Hoxby, 2000b).

[23] The household has to pay a nominal amount of tuition for secondary schools in Korea. Since formal schooling is much cheaper than private tutoring, the assumption of free schooling is mostly for analytical convenience. Moreover, the government recently announced that middle school education is free of charge starting in the 2002 school year.

for education.[24] However, since we are going to examine households who are in Korea, we shall assume that e_1 is positive. Thus, the household's utility maximization problem is reduced to choosing x and e_2 subject to the budget constraint (3). The Lagrangian function is written as:

$$(4) \qquad L = u(x, \bar{e}_1 - \alpha\, b + e_2) + \lambda\,(y - x - p\, e_2 - \eta\, \bar{e}_1),$$

where $b = (a_i - \bar{a})$.[25] We have dropped the subscript i for convenience.

Assuming that the marginal utility of income (or the Lagrangian multiplier λ, associated with the income constraint) and the consumption of x are both positive, the Kuhn-Tucker conditions for the problem are:[26]

$$(5) \qquad L_x = u_x - \lambda = 0$$

$$(6) \qquad e_2 L_e = e_2 (u_e - \lambda p) = 0,\ e_2 \geq 0,\ L_e \leq 0$$

$$(7) \qquad L_\lambda = y - x - p\, e_2 - \eta\, \bar{e}_1 = 0$$

The household may choose no private tutoring ($e_2 = 0$). In this case, $L_e < 0$. Therefore, the marginal rate of substitution between education and other goods (u_e/u_x) is less than the price ratio (p). On the other hand, the household may choose positive amount of private tutoring. In this case, $u_e/u_x = p$. The idea of the separation between the no-tutoring vs. positive-tutoring

[24] In August 2000, the government started to regulate the studying abroad by primary and middle school students. It is estimated that more than 13,000 primary and secondary school students were studying abroad in 1999, and the number is growing rapidly (Joong-Ang Daily, August 4, 2000). The U.S., Canada, and Australia are the most favorite destinations.

[25] Under the assumption of the uniform distribution of the ability $b = (a_i - a^*)/2$, where a^* is the highest level of ability. In general, b will be positively related to a_i. If the ability has a bell-shape distribution, the peer effect would be greater for a high ability student than an average ability student.

[26] The second order condition is easily satisfied if each of the marginal utility for x and e are diminishing as the level

households can be illustrated by the Figure 1, where, indifference curves for the two households are drawn in the space of (x, e). As households are taxed by the amount of $\eta\bar{e}_1$, the disposable income is y- $\eta\bar{e}_1$. Since $\bar{e}_1$ is provided freely, every household will consume at least $\bar{e}_1$. However, some households will choose point A at which private tutoring is zero, whereas others will choose point B with some positive amount of private tutoring. For the former households whose preference for education is lower, the marginal rate of substitution between education and all other goods is lower than the price ratio between the private tutoring and all other goods. Alternatively, their marginal utility of education is lower than the price of private tutoring, but is certainly higher than the price of school-provided education, which is zero. For the latter households, interior solution obtains, i.e., the marginal rate of substitution is equal to the price ratio, or the marginal utility of education is equal to the price of tutoring.

Figure 1: Household's Choice over Education and Other Goods

The comparative static results indicate the following predictions of the model.[27] First, as the income rises, the demand for private tutoring rises. As long as education is a normal good, higher income households will have higher demand for education. As the public education

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of consumption for that good rises and if the cross marginal utility (u_{xe}) is positive. These assumptions seem very reasonable as education and the numeraire good would be substitutes.

[27] For the maximization problem has the unique interior solution ($e_2 > 0$), the determinant of the bordered Hessian matrix (H) of the constrained maximization problem must be positive, that is,

$$|H| = \begin{vmatrix} u_{xx} & u_{xe} & -1 \\ u_{ex} & u_{ee} & -p \\ -1 & -p & 0 \end{vmatrix} = 2pu_{xe} - u_{ee} - p^2 u_{xx} > 0.$$ Assuming this condition is satisfied, it is straightforward to perform the comparative static exercise for parameters (y, b, α, $\bar{e}_1$, p, η, θ_i, E_{-i}). It can be shown that:

supply is fixed at the level of $\bar{e}_1$, they will want to supplement their child's education with private tutoring. Second, the higher the child's ability, the greater the demand for private tutoring will be, since the higher ability child will have a greater negative externality due to the equalization policy. Third, as the price of the private tutoring rises, the demand decreases.[28] Fourth, as the level of education collectively provided by the government rises, the demand for private tutoring diminishes.[29] Fifth, if the public school system is less efficient in providing education, private tutoring will increase. Sixth, the higher the preference on education, the greater the demand for private tutoring will be. Finally, as the education level of other children rises, demand for private tutoring increases.

The model presented here suggests that the prevalent existence of private tutoring in Korea may be the result of the various following factors. First, as income rises due to the tremendous success of economic growth, the demand for education rises as well. However, the high demand for education for some households is not be satisfied by the formal schooling since the government uniformly controls formal schooling even in private schools.[30] Second, the equalization policy can be directly blamed for the high demand for private tutoring. This demand would be particularly acute for academically strong students who have good chances of being admitted to prestigious universities. Under the equalization policy, they do not benefit

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$$\frac{\partial e_2}{\partial y} = \frac{u_{xe} - pu_{xx}}{|H|} > 0,\ \frac{\partial e_2}{\partial b} = \frac{\alpha\eta(u_{xe} - pu_{xx})}{|H|} > 0,\ \frac{\partial e_2}{\partial \alpha} = \frac{b\eta(u_{xe} - pu_{xx})}{|H|} > 0,\ \frac{\partial e_2}{\partial \bar{e_1}} = \frac{-\eta(u_{xe} - pu_{xx})}{|H|} < 0,$$

$$\frac{\partial e_2}{\partial p} = \frac{-e_2(u_{xe} - pu_{xx}) - \lambda}{|H|} < 0,\ \frac{\partial e_2}{\partial \eta} = \frac{-\bar{e_1}(u_{xe} - pu_{xx})}{|H|} < 0,\ \frac{\partial e_2}{\partial \theta_i} = \frac{-u_{x\theta} + pu_{e\theta}}{|H|} > 0,\ \frac{\partial e_2}{\partial E_{-i}} = \frac{pu_{eE}}{|H|} > 0.$$

[28] However, it is not clear whether the total expenditure on tutoring decreases as well, since it will depend on the price elasticity of private tutoring. If the private tutoring is price inelastic (elastic), higher price will result in higher (lower) expenses.

[29] As this model is for an individual household and it is assumed that the individual tax contribution to the improvement of the overall level of public school is ignored, the result follows from the income effect. In other words, the higher taxes for education reduces the household's disposable income. Higher taxes on education are likely to increase the level of public schooling and to decrease the level of tutoring. However, the amount of the reduction in private tutoring depends on the efficiency of the school system.

from the peer group effect in the school they attend. If the school had admitted other academically strong students, the students would have gotten better education and would have been prepared better for the university entrance examinations. Third, the high demand for private tutoring may be due to the ineffectiveness of the public school education provision, since the public education system is completely insulated from the market forces and local parents' demand. Finally, the tournament aspect of entering into better universities brings about an even greater demand for private tutoring. In short, private tutoring in Korea is the market response to the unsatisfied demand for education under heavily regulated educational environment.

4. Data and Empirical Analysis

Based on the theoretical discussion in the previous section, we shall estimate the following censored regression model:

$$(8) \qquad y_i = X_i\beta + \varepsilon_i, \quad \text{if } X_i\beta + \varepsilon_i > 0$$

$$= 0, \qquad \text{if } X_i\beta + \varepsilon_i \leq 0,$$

where y_i is private tutoring expenditure for household i, X_i is a vector of independent variables that affect the level of private tutoring such as student characteristics, household characteristics and environmental variables, and ε_i is the error term.

The obvious choice is to estimate the equation (8) with Tobit estimator. However, as Deaton (1997) points out, household consumption survey data is likely to be heteroskedastic across income levels. Moreover, the Tobit estimator is inconsistent when the error term is either heteroskedastic or non-normal (Arabmazar and Schmidt, 1981, 1982). It is known that the censored least absolute deviation (CLAD) estimator by Powell (1984) is robust to

[30] If the private schools were allowed to operate more independently, private tutoring would diminish as more

heteroskedasticity and consistent and asymptotically normal for a wide class of error distributions. Therefore, we shall adopt the CLAD estimator.[31] However, for comparison, we also present results based on ordinary least square (OLS) and Tobit estimators.

This paper utilizes two data sets. The first set is the Survey on Private Tutoring (SOPT) conducted by Korea Institute for Consumer Protection in 1997. The SOPT surveyed households with at least one child who is attending elementary or secondary school or a repeater who is preparing for the next year's university entrance exam after graduating from high school. Besides the general household characteristics, it has detailed information on each child including the performance in school and the private tutoring expenditure for each child. In order to take advantage of the detailed information on individual children, we transformed the household data of SOPT into the individual child data. Unfortunately, it does not contain the information on the location of the household so that we cannot identify whether the student is in a school district in which equalization policy is adopted. The second data set we used is the 1998 Annual Urban Household Expenditure Survey (UHES) by the National Statistical Office of Korea. Although UHES contains the household location data, it does not contain many variables on individual students. The SOPT data has 6,804 observations and UHES has 19,389 observations.[32] Besides the common independent variables, we are particularly interested in finding out whether students with higher abilities spend more in private tutoring in the former data set and whether the equalization policy decreases private tutoring as policy makers have hoped in the latter dataset.

The independent variables include student characteristics (academic achievement, gender, level of attending school), household characteristics (household income, education level of

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households with high education demand send their children to those schools.

[31] A public domain STATA routine, written by Dean Jolliffe, Bohdan Krushelnytskyy, and Anastassia Semykina was used in the estimation.

[32] Although UHES has more observations, observations with no income data were dropped. Our sample includes

parents, home ownership, computer ownership, number of children in the household, whether mother works outside of home, and father's occupation), and environmental characteristics (size of the city that the household resides, density of the neighborhood, and whether the school district is under the equalization policy).

Appendix Table A1 shows the definitions, means, and standard deviations of the variables in the two data sets. About 75 percent of households in both datasets have positive private tutoring expenditures. The average expenditure on private tutoring amounts to 4.7 percent of household income in the UHES, and 5.8 percent for the households with positive expenditure. In general, households with positive tutoring expenditure have higher socio-economic status than those with no expenditure though the difference is not dramatic.

The Table 3 includes all independent variables that are available in SOPT (Model 1). In these tables, Model A uses OLS, Model B uses Tobit, and Model C and D use CLAD. As the equalization policy mainly targets big cities, leaving small cities and rural areas allow to choose between the equalization and no equalization policy, we run regressions not only on the whole sample (Model A through C) but also on Seoul and five next largest cities (Metro Cities)[33] that are all under equalization policy (Model D).

Table 3. Per Child Expenditure on Private Tutoring in 1997

Results by different estimators show similar patterns. For many variables, however, coefficient estimates using Tobit estimator are greater in absolute value and more significant than those in OLS. Also, some coefficient estimates in CLAD models are substantially different

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only households that have children in kindergarten, primary schools, middle school, or high schools.

[33] Metro Cities are large cities (between 2 to 5 million in populations) that are authorized to have autonomous

from those from OLS or Tobit, which indicates that the bias due to censoring, the non-normality and heteroskedacity of the error term may be non-trivial. Overall, our findings in empirical models from 1A to 1D strongly support the major predictions of the theoretical model.

First, as predicted by the theoretical model, a household with higher income spends more on private tutoring after controlling for other variables regardless of different specifications. The estimated income elasticity is around 0.5 for the average household. Second, students with the highest academic performance (upper 10 percentile) spend significantly more on private tutoring compared to students with around the average academic performance (between 30 to 70 percentile) after controlling for other variables regardless of different specifications. Furthermore, the spending on private tutoring increases in proportion to the students' academic performance; highest spending for students with the highest academic performance, the next highest spending for the students with the next the academic performance ladder (10 to 30 percentile), and so forth. Moreover, we found larger coefficient estimates on upper 10 percentile students in Seoul and metropolitan cities (Model 1D) compared to results over all regions (Model 1C), though there is no difference for the students in the 10-30 percentile. The above findings are consistent with the predictions of our theoretic model that the demand for private tutoring would be higher for students with higher ability, which becomes more acute under the equalization policy. It should be noted that our data on the academic performance of students is based on the survey to their parents and is significantly skewed toward the higher performance (Table A1). The resulting paucity of observations on the students with lower academic performance might lead to the less significant coefficient estimates of dummy variables of lower academic performance students. However, the result that the student with higher academic performance might be due to the possibility that more private tutoring improves academic standing.

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governments, equivalent to provincial governments.

Third, households with higher preferences for education spend more on private tutoring. Coefficient estimates on most of the variables concerning preference for education turn out to be significant with an anticipated sign. Years of educational attainment of parents significantly increase private tutoring expenditure. Also, households that own houses, maybe due to the higher level of wealth, spend more on private tutoring. The household with larger number of children is likely to spend less on private tutoring per child. This is consistent with the development literature stressing that a smaller size of family increases per capita spending on human capital accumulation. Father's occupation does not turn out to be significant in all specifications. However, we find some evidence that when mother works out of home, the household spends less on private tutoring. This result may be due to the possibility that wife is likely to stay home when the household has high preference over education.

We also found the evidence consistent with the idea that the desire to out-compete others in the university entrance exam increases the spending on private tutoring. Those living in a high density residential development area are found to spend more on private tutoring probably because their intimacy with neighbors might provide higher competitive pressures to spend more on private tutoring for their children. We can also interpret coefficient estimates on dummy variables of the levels of schools that a child is attending (middle school, high school, and repeater, compared to elementary school) in a similar manner. As a child advances from elementary school to middle school and to high school and approaches university entrance exam, the demand for private tutoring could increase because the latest academic performance weighs more in university entrance exams. However, in the Korean education system, high school education is divided into two tracks: academic and vocational. If a middle school student advanced to a vocational school, the demand for private tutoring for the student is significantly

reduced because of the little chance to take an entrance exam for 4-year universities. Accordingly, we found large and significant coefficient estimates for dummy variables for middle school students and negative and significant coefficients for high school students.[34] On the other hand, repeaters are found to spend the highest amount on private tutoring because of the strong need to show better performance in entrance exam and also because of the lack of proper formal educational institutions, like community colleges in U.S.A., to accommodate those who failed the university entrance exam.

Interestingly, education of the mother is found to affect private tutoring expenditure more strongly than that of the father, though this effect seems to disappear in the large cities sub-sample (Models 1D). This appears to be consistent with the typical division of labor within family, still prevalent in Asian countries such as Korea, where the father works outside home for income and the mother takes care of the family including education for children. Also, households with a computer are found to spend more on private tutoring, suggesting that computer cannot be a good substitute for private tutoring.[35] It is also interesting but not surprising to find that the gender dummy indicates more private tutoring spending for female students. We suspect it is due to the fact that the female students are more encouraged to take lessons in music and arts, which tend to be more expensive.

We need further discussion on the reasons why spending on private tutoring is higher in larger cities compared to rural areas, after controlling for other factors. One possible answer in line with our theoretical model is that larger cities are under the stricter control of the state because the major target areas of the equalization policy is Seoul and the other metropolitan

[34] Unfortunately, we do not have data regarding whether the high school student is attending a vocational school or a college preparatory school.
[35] Again, this is consistent with an alternative view that the household with higher preference over education is more likely to buy a home computer.

cities, allowing about half of the medium and small cities and all the rural areas uncovered by equalization policy. Another explanation could be that the cultural aspect or the life style of the big city could be related to higher concerns of parents on the relative position of the their children in the competition to enter better universities. A higher cost of living in big cities could attribute to a larger expense as well.

In addition to the problems with unobservables, there may be a sample selection problem. Many families devoted to educate their children may move from rural area to urban area to increase the educational opportunities for their children. Therefore, rural areas could be left with families that have lower preference on education. Likewise, one might move to Seoul to find better private tutoring for their children, which provides potential explanation for the positive coefficient estimates on the dummy variables of Seoul and metropolitan areas.

Some of the variables included in the models reported in Table 3 may be endogeneously determined with the level of private tutoring. In particular, the student's school ranking may be influenced by the amount of private tutoring, that is, a student who spends more on private tutoring may have a higher academic achievement. Also, the decision to allow a child to repeat for the next year's college entrance examination would be simultaneously determined by the level of private tutoring expenditure for the student. The decision to work outside of home may be correlated with the household's preference over education and the level of private tutoring. The decision to purchase a computer and the number of children in the household maybe endogenously determined as well. In Table 4, we report the results of the regression excluding the variables that are possibly endogeneously determined. The coefficient estimates are very similar to those reported in Table 3.

Table 4. Per Child Expenditure on Private Tutoring in 1997

(Models without possible endogeneous variables)

Next, we turn to the estimation on per household expenditure on private tutoring using the UHES data. The focus of this empirical work is to see whether the equalization policy leads to lower spending on private tutoring as many education policy makers hoped. In the regions not covered by the equalization policy (school choice regions), high schools (private or public) can choose students, and students can also choose high schools.[36] However, the selection process must be based on region-wide entrance examinations. Accordingly, high schools in these regions have well-established rankings in terms of the minimum test scores of the incoming students. Therefore, students with similar academic capabilities sort themselves and end up with the same high school as a result of school choices based on the test.

It should be emphasized that high schools in these regions do not have full-fledged autonomy. Strict regulation over curriculum, textbooks, tuitions, teachers, principals, etc. applies to both public and private schools regardless of whether the school is covered by the equalization policy or not. Though there are differences among high schools in these regions, the differences are relatively small as the government tried to equalize virtually all school inputs. The most important difference between schools covered and uncovered by the equalization policy is the peer group effect due to sorting and competition among students.[37] Self-sorting of students according to test scores (and academic ability) might enable schools to cater to the demands of parents and students more easily. Also, higher competitive pressures among high schools,

[36] As was indicated earlier, middle schools (Grades 7-9) are fully equalized throughout the nation.
[37] Hoxby (2000a) examines the effects of the greater Tiebout choice on the productivity of public schools in U.S. In Korea, although regional educational authorities in Korea have very limited financial independence, public schools in regions uncovered by equalization policies enjoy the same extent of school choices as private schools.

particularly to attract better students, in the regions uncovered by the equalization policy might lead to higher productivity of schools. Although our theory predicts that higher productivity of school system reduces private tutoring, it is purely an empirical question whether the potential increase in the productivity of schooling due to the school choices in the regions uncovered by the equalization policy might reduce the demand for private tutoring.

One popular argument is that in school choice regions one would expect more competition among middle school students or even among elementary students to enter better high schools, which will fuel the competition for more spending on private tutoring. However, an increase in private tutoring in middle school or even elementary school to enter better high school may be outweighed by a decrease in private tutoring in high school due to the higher productivity of high schools and/or improved peer group effect.

Therefore, we ran OLS, Tobit, and CLAD regressions on the samples of households with at least one student in the UHES data. In order to test the argument that school choice in high schools may decrease private tutoring for high school students but increase for elementary and middle school students, we added interaction variables between school choice and number of children in various schools. Our findings are reported in Table 5. We found that the results are quite consistent with the major predictions of the theoretical model and the previous empirical findings.

Table 5. Per Household Expenditure on Private Tutoring in 1998

First, we found that households with higher incomes spend more on private tutoring after controlling for other variables regardless of different specifications. Moreover, the estimated coefficients are comparable to those reported in Tables 3 and 4, again suggesting that income

elasticity of private tutoring is around 0.5. Years of educational attainments of the head of households again exert a significant effect on the spending on private tutoring, and the estimated coefficients are comparable to those in the previous tables. Households with own houses spend more on private tutoring, and again the estimates are comparable. Whether the mother works outside of home is not statistically significant for all model specifications, which is consistent with CLAD estimates in the previous tables. As reported in the previous tables, the number of children attending different levels of schooling increases the amount of private tutoring. The private tutoring expenditure is substantially higher in Seoul compared to small and medium sized cities in all model specifications. However, the coefficient for Metro Cities are only significant in CLAD. It is quite remarkable that all these results are robust to different specifications with two completely different data sets.

Second, the results on the effect of school choice are not as strong as the other independent variables described above. However, considering the possibility that the effect of school choice in Korea could be limited because schools are not different from each other due to the lack of school autonomy, the results are consistent with the theoretical discussions above. Though most of the estimated coefficients involving school choice are not statistically significant, they have predicted signs.[38] That is, under the equalization policy there seems to be less private tutoring for elementary and middle school students and more for high school students. Overall, the equalization policy seems to increase private tutoring. Certainly, it does not decrease private tutoring expenditure as policy-makers hoped.

[38] Only exception is the interaction term between the school choice and the number of middle school students in the OLS and Tobit regressions.

5. Conclusions

The prevalent practice of private tutoring in Korea can be traced to the paradigm of state-led development policy that pursued rapid economic growth through industrialization and export promotion. Following the universal primary school education, the military government has equalized secondary education so that opportunities for secondary education greatly expanded. Concerns over the excessive wasteful competition among students to enter better schools during the period of rapid expansion of the school system made the public more receptive to the government's policy of equalization of secondary schools. However, the virtual socialization of private secondary schools accompanied with a heavy-handed regulation on university admission procedures has resulted in an ever-increasing demand for private tutoring. Currently, Koreans spend as much money on private tutoring as the government expenditure on primary and secondary education.

The theoretical model and empirical evidence provided in this paper strongly suggest that wide-spread private tutoring is a market response to the under provision of public education and the heavy regulation and strict controls of the government. It is predicted by our model and confirmed by our empirical findings that students with high academic ability, high family income, and whose parents are highly educated, spend more on private tutoring because their educational demands are not properly met by the formal school system that is provided by the government. Also, students in regions uncovered by equalization policy and therefore with school choices spend less on private tutoring, indicating that private tutoring is related to the strict government regulation on schools.

Under the current education system in which the consumption externality in secondary education is important because of the competition to enter a more prestigious university, private

tutoring practice is expected to flourish. However, it should be recognized that the large scale private tutoring might be inefficient as well as inequitable. Given that the financial market is not perfect, a high ability child with poor parents might end up with a low-ranked university, as they are not able to foot the bills for private tutoring.[39] That inequitable distribution of private tutoring would also lead to an inefficient allocation because the marginal rate of substitution between education and a numeraire good is not the same across individuals.[40]

Although many reform initiatives pushing for deregulation in the educational sector were proposed by the government-sponsored Education Reform Committee of 1995, the implementation of their proposals have been slow due to severe opposition by interest groups as well as the inertia associated with the legacy of the developmental state. The Korean experience clearly shows that the runaway escalation of expenditures on private tutoring is strongly related to strict regulation and controls over schools put in place during the rapid expansion of the Korean school system.

[39] Lee and Hong (2001) provide some empirical evidence suggesting that more private tutoring is associated with greater success of being admitted to elite universities.

[40] One of possible policy to address the problem is to provide financial assistance for private tutoring to low income groups. In 2000, one Education Minister actually tried to introduce the policy, which brought about strong opposition by teachers' unions and resulted in the resignation of the Minister.

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Figure 1. Household's Choice over Education and Other Goods

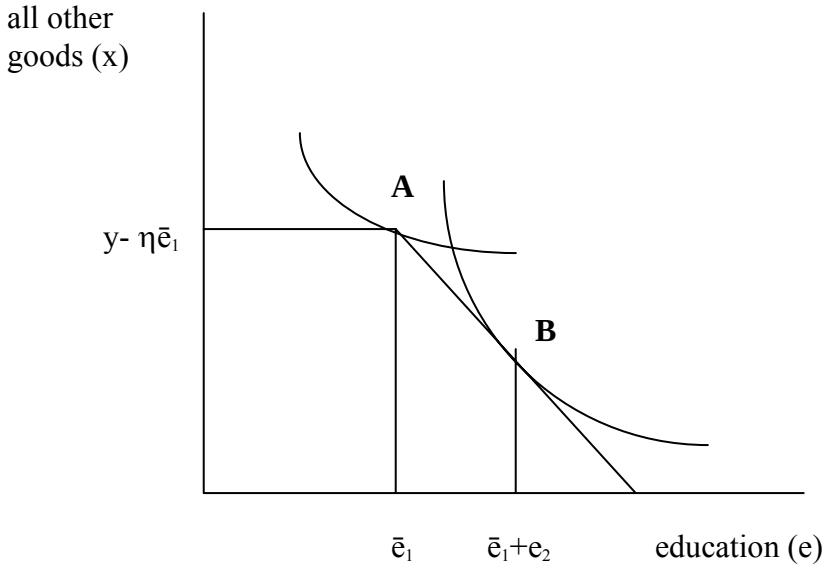

Table 1. Enrollment Rates (ER) and Advancement Rates (AR)

	Kinder garten	Elementary School		Middle School		High School		
	ER	ER	AR	ER	AR	ER	AR-Academic	AR-Vocational
1953	-	59.6	-	21.1	-	12.4	-	-
1955	-	77.4	44.8 [1]	30.9 [1]	64.6 [1]	17.8	-	-
1960	-	86.2	39.7 [2]	33.3 [2]	73.3 [2]	19.9	-	-
1965	-	91.6	45.4 [3]	39.4 [3]	75.1 [3]	27.0	-	-
1970	1.3	100.7	66.1	51.2	70.1	28.1	40.2	9.6
1975	1.7	105.0	77.2	71.9	74.7	41.0	41.5	8.8
1980	4.1	102.9	95.8	95.1	84.5	63.5	39.2	11.4
1985	18.9	99.9	99.2	100.1	90.7	79.5	53.8	13.3
1990	31.6	101.7	99.8	98.2	95.7	88.0	47.2	8.3
1995	39.9	100.1	99.9	101.6	98.5	91.8	72.8	19.2
1999	37.3	98.6	99.9	98.8	99.4	97.3	84.5	38.5

Source: Data before 1970 are from McGinn (1980), and other data are from MOE (1998).

Notes:

ER = percentage of students enrolled out of corresponding school-aged children

AR = percentage of the students who advance to the next level school

[1] 1956-57

[2] 1959-60

[3] 1954-65

Table 2. Primary and Secondary Education Expenditure in Percentage of GDP

	Total	Publicly Paid on Schooling	Privately Paid on Schooling	Privately Paid on Private Tutoring
1977	4.6 (100)	2.3 (50.5)	1.6 (34.4)	0.7 (15.1)
1982	4.8 (100)	2.7 (56.5)	1.7 (34.7)	0.4 (8.8)
1985	4.9 (100)	2.6 (53.2)	1.4 (28.5)	0.9 (18.3)
1990	4.7 (100)	2.5 (52.9)	1.0 (20.9)	1.2 (26.2)
1994	5.2 (100)	2.7 (52.1)	0.7 (14.4)	1.8 (33.6)
1998	7.1 (100)	3.4 (47.3)	0.8 (11.8)	2.9 (40.9)

Source: KEDI, Survey on Educational Expenditures, various years.

Note: The numbers in the parentheses are the ratios to the total expenditure.

Table 3. Per Child Expenditure on Private Tutoring in 1997

	Model 1A - OLS (All Regions)	Model 1B - Tobit (All Regions)	Model 1C - CLAD (All Regions)	Model 1D - CLAD (Seoul & Metro Cities)
Constant	-50836*** (-3.918)	-139891*** (-8.386)	-34793*** (-2.745)	-18123 (-1.268)
Household Income	0.02718*** (14.312)	0.03372*** (14.3232)	0.02055*** (8.526)	0.02291*** (36.213)
Upper 10%	12407*** (2.707)	20392*** (3.550)	16531*** (4.844)	22122*** (5.620)
10-30%	4968 (1.079)	11302* (1.943)	10836*** (3.805)	10196*** (2.772)
70-90%	-16933 (-1.578)	-40754*** (-2.786)	-12129 (-1.019)	-2875 (-0.217)
Lower 10%	-21983 (-1.077)	-51573* (-1.854)	-25687 (-1.344)	-29036 (-1.102)
Mother Education	5311*** (5.058)	8001*** (6.028)	3876*** (4.415)	2607*** (2.292)
Father Education	1942** (2.064)	3491*** (2.937)	2310*** (3.189)	2793** (2.456)
Mother Working	-9082** (-2.218)	-17105*** (-3.147)	-12603*** (-3.937)	-8735 (-1.598)
Father Professional	1732 (0.266)	-7038 (-0.873)	-2265 (-0.391)	3430 (0.462)
Own House	8117* (1.835)	11528** (2.066)	11457** (2.450)	11616*** (3.333)
High Density	22196*** (5.062)	28056*** (5.147)	18391*** (5.271)	18309*** (4.087)
Computer	13052*** (3.249)	19225*** (3.791)	6483** (2.112)	7226** (2.200)
No. Children	-15264*** (-5.121)	-26687*** (-6.869)	-20439*** (-8.620)	-16965*** (-5.800)
Middle School	3397*** (7.347)	22429*** (3.864)	30221*** (7.278)	47093*** (9.242)
High School	2422 (0.496)	-36555*** (-5.810)	-55475*** (-8.936)	-33338*** (-4.687)
Repeater	164633*** (10.271)	164683*** (8.456)	171264*** (7.616)	181705*** (7.914)
Gender	-9736** (-2.606)	-12733*** (-2.703)	-6889** (-2.190)	-9725*** (-2.992)
Seoul	48722*** (7.890)	78926*** (10.075)	47274*** (9.491)	21965*** (6.242)
Metro City	21460*** (3.686)	48514*** (6.502)	25092*** (5.610)	---
S&M City	9118* (1.931)	31355*** (4.244)	20060*** (4.859)	---
Sample Size	6555	6555	Initial size 6718 Final size 5779	Initial size 3317 Final size 3162
	Adj. R^2 = 0.1625	Psd. R^2 = .0109	Psd. R^2 = .1271	Psd. R^2 = .1224
Joint significance (p-value)	F(20, 6555) = 64.77 (0.0000)	$\chi^2(20)$ = 1498.70 (0.0000)	---	---

Notes: t-values are in parentheses below coefficient estimates

*Statistically significant at the 10% level; **at the 5%level; ***at the 1% level

Table 4. Per Child Expenditure on Private Tutoring in 1997
(Models without possible endogeneous variables)

	Model 2A - OLS (All Regions)	Model 2B - Tobit (All Regions)	Model 2C - CLAD (All Regions)	Model 2D - CLAD (Seoul & Metro Cities)
Constant	-96743*** (-9.636)	-223280*** (-17.030)	-96650 (-10.80)	-53054*** (-8.253)
Household Income	0.02888*** (15.445)	0.03541*** (15.268)	0.02016*** (10.437)	0.02352*** (11.601)
Mother Education	5251*** (4.979)	8391*** (6.279)	4406*** (5.454)	2746*** (2.906)
Father Education	2832*** (3.005)	4957*** (4.156)	3330*** (5.222)	2940*** (3.107)
Father Professional	3359 (0.512)	-5266 (-0.646)	-3688 (-.645)	1354 (0.452)
Own House	11150** (2.522)	14684** (2.630)	10925*** (3.576)	14652*** (2.703)
High Density	25998*** (5.899)	33348*** (6.072)	19365*** (4.555)	20173*** (5.072)
Middle School	30098*** (6.564)	18467*** (3.207)	30000*** (6.611)	45124*** (3.574)
High School	2357 (0.499)	-34564*** (-5.658)	-51947*** (-9.881)	-31588* (-1.715)
Gender	-5394 (-1.457)	-6645 (-1.419)	-4818* (-1.922)	-6303** (-2.285)
Seoul	59148*** (9.756)	95029*** (12.311)	58923*** (13.09)	26007*** (5.682)
Metro City	27695 (4.797)	58156*** (7.834)	34444*** (8.11)	---
S&M City	14951 (2.626)	41137*** (5.599)	28027*** (6.953)	---
Sample size	6576	6576	Initial size 6718 Final size 5849	Initial size 3317 Final size 3182
	Adj. R^2 = 0.1414	Psd. R^2 = .0095	Psd. R^2 = .1087	Psd. R^2 = .0986
Joint significance (p-value)	F(12,6563)=91.25 (0.0000)	χ^2(12)=1313.12 (0.0000)	---	---

Notes: t-values are in parentheses below coefficient estimates
*Statistically significant at the 10% level; **at the 5%level; ***at the 1% level

Table 5. Household Expenditure on Private Tutoring in 1998

	Model 3A - OLS	Model 3B - Tobit	Model 3C - CLAD
Constant	-127992*** (-27.64)	-210662*** (-35.15)	-170567*** (-18.43)
No Equalization	-4530 (-1.26)	-8763* (-1.91)	-4239 (-0.74)
Household Income	0.0227*** (34.85)	0.0264*** (32.52)	.02271*** (13.44)
Head Education	8172*** (29.39)	10962*** (30.60)	9021*** (16.55)
Own House	14545*** (9.04)	19628*** (9.65)	116910*** (5.17)
Mother Working	-786 (-0.47)	112 (0.05)	-1624 (-0.81)
No. Kindergarten	18796*** (9.85)	24377*** (10.13)	20990*** (9.07)
No. Elementary School	47168*** (30.03)	59502*** (29.95)	56658*** (9.61)
No. Middle School	50002*** (22.76)	57038*** (20.55)	42167*** (12.14)
No. High School	46348*** (17.12)	57290*** (16.71)	35111*** (5.89)
Seoul	27044*** (9.36)	26308*** (7.22)	14780*** (3.15)
Metro City	1285 (0.52)	2411 (0.77)	10009*** (2.74)
No Equalization * No. Elementary School	4915** (1.99)	6321** (2.03)	4101 (0.69)
No Equalization * No. Middle School	-6208* (-1.85)	-3643 (-0.86)	3513 (0.80)
No Equalization * No. High School	-8327* (1.77)	-4617 (-0.77)	-1135 (0.13)
Sample size	19389	19389	Initial size 19389 Final size 17730
	Adj. R^2 = 0.2257	Psd. R^2 = .0118	Psd. R^2 = .1175
Joint significance (p-value)	F(14,19374)=403.55 (0.0000)	χ^2(14)=4755.06 (0.0000)	

Notes: t-values are in parentheses below coefficient estimates
*Statistically significant at the 10% level; **at the 5%level; ***at the 1% level

Appendix Table A 1. Means and Standard Deviations of Variables

Variables	Definition	Mean (Standard Deviation)		
		All Observations	Positive Tutoring Expenditure Only	No Tutoring Expenditure Only
< SOPT Data: 1997 >				
Per Child Expenditure on Private Tutoring	Monthly spending on private tutoring per child in won	108,177 (200,731)	143,954 (220,160)	0
Household Income	Monthly income of the household in won	2,843,705 (8,617,947)	2,832,930 (7,808,844)	2,876,324 (1,070,000)
Upper 10%	1 if student is above top 10 % of the class; 0 otherwise	0.30	0.33	0.21
10-30%	1 if student is between 10 to 30 % of the class; 0 otherwise	0.27	0.28	0.24
70-90%	1 if student is between 70 to 90 % of the class; 0 otherwise	0.03	0.02	0.07
Lower 10%	1 if student below bottom 10 % of the class; 0 otherwise	0.01	0.01	0.02
Mother Education	Years of mother's education	11.39 (2.81)	11.89 (2.62)	9.86 (2.80)
Father Education	Years of father's education	12.52 (3.11)	13.04 (2.94)	10.94 (3.08)
Mother Working	1 if mother has a job; 0 otherwise	0.30	0.27	0.41
Father Professional	1 if father has a professional job; 0 otherwise	0.10	0.11	0.07
Own House	1 if the household owns one or more houses; 0 otherwise	0.73	0.73	0.73
High Density	1 if high density residential development area; 0 otherwise	0.35	0.40	0.21
Computer	1 if the household owns computers; 0 otherwise	0.49	0.52	0.42
No. Children	Number of children in the household	2.07 (0.65)	2.03 (0.59)	2.19 (0.78)
Middle School	1 if middle school student; 0 otherwise	0.26	0.25	0.28
High School	1 if high school student; 0 otherwise	0.25	0.19	0.44
Repeater	1 if repeater; 0 otherwise	0.01	0.02	0.004
Gender	1 if male; 0 otherwise	0.52	0.52	0.51
Seoul	1 if Seoul; 0 otherwise	0.22	0.25	0.14
Metro City	1 if metropolitan city; 0 otherwise	0.27	0.29	0.21
S&M City	1 if small and medium sized city; 0 otherwise	0.28	0.29	0.25
(number of observations)		6,804	5,113 (75%)	1,691 (25%)
<UHES Data: 1998>				
Per Household Expenditure on Private Tutoring	Monthly spending on private tutoring per household in won	104,247 (119,852)	136,784 (119,990)	0
No Equalization	1 if not covered by equalization policy; 0 otherwise	0.29	0.29	0.30
Household Income	Monthly income of the household in won	2,232,886 (1,289,364)	2,348,539 (1,309,111)	1,862,330 (1,148,125)
Head Education	Years of education of the head of the household	12.64 (3.05)	12.96(2.92)	11.63 (3.24)
Mother Working	1 if mother has a job; 0 otherwise	0.33	0.34	0.31
Own House	1 if the household owns one or more houses; 0 otherwise	0.58	0.60	0.50
No. Kindergarten	Number of kindergarten students in the household	0.37(0.55)	0.37 (0.54)	0.38 (0.57)
No. Elementary	Number of elementary school students in the household	0.63(0.74)	0.68(0.74)	0.44(0.69)
No. Middle	Number of middle school students in the household	0.44(.54)	0.43(.55)	0.47(.54)
No. High	Number of high school students in the household	0.18(0.39)	0.18 (0.38)	0.18(0.38)
(number of observations)		19,389	14,777 (76%)	4,612 (26%)