Asia Pacific Educ. Rev. (2010) 11:159–168
DOI 10.1007/s12564-009-9055-7

The determinants of private tutoring participation and attendant expenditures in Korea

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Received: 14 October 2008 / Revised: 28 August 2009 / Accepted: 28 September 2009 / Published online: 11 November 2009

Abstract With the growing worldwide prevalence of private tutoring, the causes and effects of private tutoring have been drawing increasing attention both academically and policy wise. This study intends to draw policy implications by investigating the determinants of private tutoring participation of school-aged children and expenditures per child for such private tutoring. The logistic regression (for participation), OLS, and F.E. panel models (for expenditures) were adopted for the analysis, using the Korean panel data. The empirical findings indicate that private tutoring for children—both in terms of participation and expenditures—has a positive correlation with the mother's educational attainment (preference effect), a negative correlation with the mother's employment status (time constraint effect), and a positive correlation with the household income (income effect).

Keywords Private tutoring participation · Private tutoring expenditures · School-aged children · Korea

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Introduction

Whether we like it or not, private supplementary tutoring ("private tutoring") has become a crucial element of the Korean education system. As of 2007, Koreans have spent some 20 trillion Korean won—approximately 21.6 billion US dollars, which is about 2.2% of the country's GDP—to pay for private tutoring for their children in grades 1 through 12. And some 77% of the nation's total student population receives private tutoring (Korea National Statistical Office 2008). Private tutoring is no longer an option for most Korean students, and their parents who have to foot the bills are struggling economically to pay for them. Private tutoring in Korea has emerged as not only an education issue, but also as a very significant socioeconomic issue as well.

Granted, the problems involving private tutoring are not unique to Korea. While private tutoring is more prevalent in some Asian countries like Korea and Japan, it is quickly gaining currency in China and many Eastern European countries that are making the transition to a market economy (Bray 1999). And although to a somewhat lesser degree, private tutoring has become something of a phenomenon in the US and many Western European countries as well (Dang and Rogers 2008).

The growing prevalence of private tutoring calls for adequate policy measures. For this, we need a comprehensive analysis of private tutoring as to what drives its expansion and what impact it has on its individual participants and the society as a whole. In light of this, many studies have begun to closely examine various aspects of private tutoring, including the size of the private tutoring industry (Baker et al. 2001; Bray 1999, 2003; Choi et al. 2003; Nam 2006), characteristics of those who participate in private tutoring (Choi et al. 2003; Dang 2007; Lee and Kim 2002; Nam 2006; Stevenson and Baker 1992; Yang 2003), its educational effects (Briggs 2001;

Dang 2007; Gurun and Millimet 2008; Ihm et al. 2004; Kang 2005; Sang et al. 2008; Stevenson and Baker 1992), as well as its socioeconomic ramifications (Bray 1999; Dang and Rogers 2008; Kim et al. 2001; Ono 2007).

This study analyzes the determining factors affecting the decision making as to whether or not to participate in private tutoring and how much to spend on private tutoring, for Korean students in grades 1 through 12. The analysis of determinants of private tutoring will yield important policy implications particularly on the equity issue, which is one of the most frequently invoked negative impacts of private tutoring. If the more well-to-do among the society invest more money into private tutoring, for example, and if such investment in private tutoring leads to better opportunities for higher education and financial security, private tutoring can limit social mobility. Certain policy measures are then required to deal with this equity issue. This study—which is a look at private tutoring in Korea—may also provide useful insights for many of the other countries where private tutoring is not uncommon.

As for the determinants of private tutoring, we focus on the education level and employment status of the student's mother (the "mother") and household income. The underlying assumption is that private tutoring decision is mostly determined by the attitudes of the parents toward private tutoring and the time and money they invest in it. In Korea, it is usually the mother who plays the leading role in children's education. Unlike previous studies that focus mostly on the levels of parents' education and household income, this study takes a close look at the effects of maternal employment on children's private tutoring, given the importance of the maternal contribution of time in children's private tutoring. For the dependent variable, we use private tutoring participation as a binary choice variable, actual spending on private tutoring and the percentage makeup of private tutoring expenditures in a household budget. The logistic regression analysis is used for the determinants of private tutoring participation, whereas the OLS and Fixed Effect (F.E.) panel models are employed for the analysis of average monthly expenditures on private tutoring and the percentage of total household budget spent on private tutoring. For empirical analysis, the Korean Labor and Income Panel Survey (KLIPS) data from the years 2000 to 2002 and 2004 and 2005 are used.

Private tutoring: worldwide prevalence and related studies

Prevalence of private tutoring

Private tutoring is often referred to as "shadow education", because it is an educational activity carried out outside of the schools for the purpose of supplementing formal schooling (Stevenson and Baker 1992). Bray (1999, 2003) has emphasized that there is a need for policy making at the national level in many countries, because private tutoring is widespread but it does not get enough policy attention. According to a comparative study taken on 41 countries by Baker et al. (2001), on average, as much as one-third or more of the students in grade levels 7 through 9 have participated in private tutoring. There were large disparities among the countries, however, with countries like Japan and South Africa showing about three-fourth or more of their student population participating in private tutoring, whereas less than 20% of their counterparts did in such countries as England and Germany. For the most part, private tutoring is significantly more prevalent in the Asian, African, and South American countries than in the Western European, North American and Australasian countries (Bray 1999).

Among them, in nearly no other country is private tutoring carried out as extensively as in Korea. In order to put a stop to what seemed like an overexpansion of the private tutoring industry, the Korean government had, in 1980, experimented with prohibiting private tutoring by fiat. However, this measure proved limited and was gradually phased out beginning in the late 1980s. What followed was a dramatic expansion of the private tutoring market. Although the market stagnated temporarily in the late 1990s when the Asian financial crisis struck Korea, it regained its momentum since the new millennium, and today, it is still growing at an ever-increasing speed. As Figs. 1 and 2 illustrate, Korea's total expenditure on private tutoring (including expenditures for grade levels kindergarten through 12 as well as college students) has jumped from KRW 0.5 trillion in 1985 to KRW 23.6 trillion in 2006. Likewise, whereas expenditures on private tutoring made up only 0.54% of the national GDP in 1985, it made up as much as 2.79% of the GDP in 2006 (Nam 2007). The majority of the private tutoring expenditures are spent on private tutoring that is especially geared toward

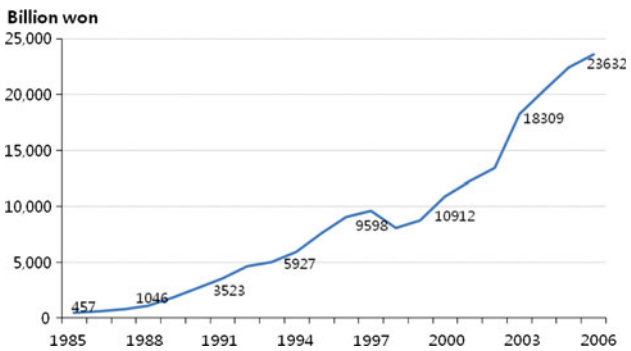

Fig. 1 The annual trend of private tutoring expenditures: From 1985 to 2006

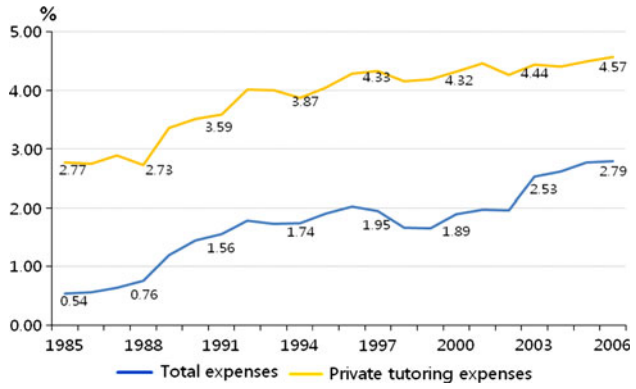

Fig. 2 Total expenditures on education and private tutoring expenditures vis-à-vis GDP: From 1985 to 2006

various school-entrance exams for grade levels 1 through 12. The side effects from the abuse of private tutoring have raised many social issues in Korea, prompting many to call for policy measures to help curb this overdependence on private tutoring (e.g., Kim et al. 2001; Koh and Lee 2002).

Causes and effects of private tutoring

The expansion of private tutoring is closely related to the nation's public education system and the schooling-work nexus in the labor market, among others (Baker et al. 2001; Dang and Rogers 2008). At the individual level, according to previous studies, the demand for private tutoring is determined largely by household income and parental education. Studies have demonstrated that the higher the household income and the parents' education level, the more likely that their children will participate in private tutoring and the more likely they are to spend more on private tutoring (Choi et al. 2003; Dang 2007; Lee and Kim 2002; Nam 2006; Stevenson and Baker 1992; Yang 2003). The impact of parental education on private tutoring reflects the parent's attitude toward their children's education (Dang and Rogers 2008). The cultural factor also affects the private tutoring decision. For example, unlike in other countries where private tutoring is used mostly as remedial supplement, private tutoring in Korea is used as an enrichment supplement by a significant percentage of those students already with high academic achievement (Baker et al. 2001).

Maternal employment is likely to affect private tutoring for children in that educational investment in children requires parents' time (as well as money), especially the mother's time in the Korean context, where child rearing remains mostly mother's job. According to a time-use survey of Korean households, men spend on average around 5 hours per week for child rearing and household chores, whereas women spend 21 h (working wives) to 41 h (full-time housewives) per week for child rearing and household chores (Sung 2006). Although the causality may run in the opposite direction when the mother takes up a job, so that the family could afford private tutoring for her children (Benjamin 1997), the impact of maternal employment on children's private tutoring seems to far exceed the impact, if any, of children's private tutoring on maternal employment.

The investment that families make in private tutoring is ultimately premised on their belief that private tutoring will enhance a student's academic achievement and the likelihood of later financial security in life. However, the studies show mixed views as to whether such belief is well founded. Stevenson and Baker's study (1992), using the Japanese data has shown that private tutoring increases the likelihood of university attendance, and Dang (2007), using the Vietnamese data, demonstrated that private tutoring also enhances academic achievement. Ono (2007) asserts that, in Japan, private tutoring affects the quality of college to which students are admitted, thereby affecting future earnings. On the other hand, Briggs (2001) and Gurun and Millimet (2008) report negligible effect of private tutoring on academic performance. Those studies that have used the Korean data have also shown conflicting results. While some studies ascertain some positive effect of private tutoring on academic achievement (Kang 2005; Kang and Ryoo 2008; Sang et al. 2008), others suggest no meaningful effect of private tutoring on students' academic performance (Ihm et al. 2004; Jo and Lee 2005).

Model and the hypotheses

The private tutoring determinants for students can be expressed as the following formula.

$$y_{ijt} = \alpha + W_{i,t}\beta' + M_{i,t}\gamma_1' + H_{i,t}\gamma_2' + C_{ijt}\gamma_3' + T_t\gamma_4' + \varepsilon_{ijt} \quad (1)$$

where the dependent variable y_{ijt} represents whether a given child ("j") of a mother ("i") has participated in private tutoring in a given year ("t") (the log value of the odds of participating in private tutoring), the log value of average monthly expenditures on private tutoring, and the percentage of average monthly expenditures spent on private tutoring. $W_{i,t}$ is the employment variable of the mother for the given year, which is measured by the employment dummy variable (employed = 1, unemployed = 0) or by the professional/non-professional dummy variables. $M_{i,t}$ stands for the mother's person-specific vector which includes education and age. $H_{i,t}$ and C_{ijt} represent the characteristics of the family and the characteristics of the children, respectively. $H_{i,t}$ includes the dummy variable for locality of residence and the earned/unearned household income in natural log. It should be noted that the earned

household income herein includes the employed mother's earnings, so the coefficient of maternal employment variable (β) excludes the income-related effect accruing from the mother's employment. C_{ijt} includes the students' grade level, gender, the number of siblings, and firstborn dummy variables. T_t is the dummy vector for the year which captures each year's general variable effects. ε_{ijt} is the error term.

Participation in private tutoring is analyzed through the use of the logistic regression shown below. In formula (2), y_{ijt} represents the log value of the odds of participating in private tutoring (the probability of participation relative to the probability of nonparticipation), and the probability of participation in private tutoring ("P") is defined as formula (3). The marginal effect independent variables in formula (2) have on the probability of participating in private tutoring is expressed in formula (4). θ_k is the parameter vector for each independent variable.

$$\ln\left(\frac{P}{1-P}\right) = y_{ijt} = \alpha + W_{i,t}\beta' + M_{i,t}\gamma_1' + H_{i,t}\gamma_2' + C_{ijt}\gamma_3' + T_t\gamma_4' + \varepsilon_{ijt} \tag{2}$$

$$P(\psi_{ijt} = 1|X_m) = \frac{1}{1+e^{-y_{ijt}}} = \frac{e^{y_{ijt}}}{1+e^{y_{ijt}}} \tag{3}$$

$$\frac{\partial P(\psi_{ijt} = 1|X_m)}{\partial X_{km}} = \frac{e^{y_{ijt}}}{1+e^{y_{ijt}}} \times \theta_k \tag{4}$$

The monthly spending on private tutoring was analyzed by using the OLS and F.E. panel models. The OLS analysis was conducted in formula (1) by using the log value of the average monthly expenditures on private tutoring and the ratio of private tutoring expenditures vis-à-vis average monthly household expenditures (%) as dependent variable y_{ijt}. The purpose of F.E. panel model is to eliminate the bias in estimation arising from the unobserved individual heterogeneity, and its estimation formula is as shown in Eq. 5. α_i represents individual-specific intercept while μ_{jt} represents the error term.

$$y_{ijt} = W_{i,t}\beta' + M_{i,t}\gamma_1' + H_{i,t}\gamma_2' + C_{ijt}\gamma_3' + T_t\gamma_4' + \alpha_i + \mu_{ijt} \tag{5}$$

The major hypotheses of this study are as follows. First, since the more highly educated mothers tend to have higher expectations for their children's educational attainment and academic achievement, such mothers are more likely to adopt a favorable view of private tutoring. Accordingly, it is hypothesized that, other things being equal, the mother's educational attainment level has a positive effect on the likelihood of her children's participation in private tutoring as well as on how much is spent on each of her children's private tutoring (the "preference effect").

Secondly, mothers with jobs tend to be less able to devote their time to their children's education when compared to those who are not employed. In Korea, it is usually the mothers who seek out information about private tutoring institutions and make the ultimate choice as to which private tutoring institutions their children will attend, as well as the job of taking their children to and from the private tutoring institutions. Other things being equal, the hypothesis is that the mother's employment is likely to have a negative effect on her children's participation in private tutoring (the "time constraint effect"). Whereas the mother's employment raises household income, thereby affecting the private tutoring decision, the maternal employment effect (as measured by β) in our model rules out such income-related effect (which is captured as part of the household income effect). Considering that professional working mothers on average face less time constraint while tending to have higher involvement in children's education than their nonworking counterparts, the time constraint effect is presumed to be larger for nonprofessional working mothers.[1]

Thirdly, as long as the parents accept that private tutoring helps raise their children's academic achievement, they will spend more on their children's private tutoring the more economically well to do they are. That is to say, private tutoring, in economist's terms, is "normal good" in that the higher the income, the higher consumption is expected. Therefore, household income is expected to exert a positive effect on the participation in private tutoring (the "income effect").

Data

The Korean Labor and Income Panel Survey (KLIPS) data were used for the empirical analysis of determinants for participation in and expenditures for private tutoring for students in grades 1 through 12. The KLIPS is a longitudinal survey of a sample of Korean households and their members who live in urban areas, so we need to be cautious about extending the empirical findings of this paper to rural areas.

The data from KLIPS's inauguration year of collecting data do not have identification numbers to match the mother to her children, while in the second year, no data

[1] In our sample, nonprofessional working mothers on average work 55 hours per week, while professional working mothers work 37 hours per week. This work hour difference is statistically significant (t-test). As for the maternal involvement in children's education, Jung & Lee (2008) have reported that professional working mothers are more likely to have conversation with their children about their children's future career than either the nonprofessional working mothers or the nonworking mothers.

were collected on private tutoring, and in the sixth year, no distinction was made between the child-care services and private tutoring. Accordingly, only the KLIPS data from the third to the fifth years and the seventh and eighth years (i.e., from 2000 to 2002 and 2004 and 2005) were used in this study.

In line with the aim of this study, the subject of the analysis was limited to only those married women with spouses and school-aged child(ren) of no more than grade level 12. Those instances with missing values for the variables used in the analysis were dropped from the study. In the final empirical analysis, 9,486 observed values were used for the analysis regarding participation in private tutoring of school-aged children, 7,363 observed values were used for the analysis of average monthly expenditures on private tutoring, and 7,350 observed values were used for the percentage makeup of private tutoring expenditures vis-à-vis average monthly household budget. The data from corresponding years were pooled, and for income and expenditure variables, the real values, which were calculated using the consumer price index (CPI) to obtain 2005 price equivalents, were used.

Table 1 shows the characteristics of the samples that were included in the analysis. As for the mother, their average age was about 40, about 60% of them were high school educated, while about 18% had at least junior college education. About 55% of the mothers had jobs, and about 16% of employed mothers were professionals. The average monthly real household earned income was about 2.7 million Korean won, and the unearned income was 0.28 million Korean won, earned income constituting about 90% of the total household income. The mother's income constituted about one-fifth of the total household income. As regards the characteristics relating to private tutoring, about 80% of school-aged children were participating in private tutoring, and about KRW 180,000 were spent on each child (based on 2005 valuation), which represented about 11% of average monthly expenditures per family.

Table 1 Definition of variables and summary statistics

Variables	Definition and measurement	Mean (S.D.)
Mother's attributes		
Age	Age in years	39.6 (4.46)
Below_HS	Dummy variable (Below high school = 1)	0.23 (0.42)
HS	Dummy variable (High school = 1)	0.60 (0.49)
COLL	Dummy variable (2-year college = 1)	0.08 (0.26)
UNIV	Dummy variable (4-year college or above = 1)	0.10 (0.30)
EMPL	Dummy variable (Employed = 1, Not employed = 0)	0.55 (0.50)
Professional	Dummy variable (Managerial/Professional = 1)	0.16 (0.37)
Household attributes		
Seoul	Dummy variable (Seoul resident = 1)	0.24 (0.42)
Major_cities	Dummy variable (Six other metropolitan cities = 1)	0.30 (0.46)
Earned_income	(Annual earned household income/12)/CPI (in 10,000 won, 2005 prices)	271.9 (196.9)
Unearned_income	(Annual unearned household income/12)/CPI (in 10,000 won, 2005 prices)	27.9 (194.8)
Child's attributes		
Primary	Dummy variable (Primary school = 1)	0.51 (0.50)
Junior_high	Dummy variable (Junior high school = 1)	0.24 (0.43)
Senior_high	Dummy variable (Senior high school = 1)	0.25 (0.43)
Son	Dummy variable (Son = 1, Daughter = 0)	0.54 (0.50)
Siblings	Number of siblings	1.18 (0.62)
First_child	Dummy variable (First child = 1)	0.50 (0.50)
Child's private tutoring		
PT_participation	Dummy variable (If child uses private tutoring institutions = 1, if not = 0)	0.79 (0.41)
PT_expenditure	Real per-child average monthly expenditures on private tutoring (in ten thousand Korean won, based on 2005 valuation)	17.7 (20.92)
PT_cost	Per-child (average monthly expenditures on private tutoring/average monthly budget) × 100 (%)	11.2 (7.98)
N		9,486

Notes: 1) Private tutoring institutions include cram schools, group/private tutoring, subscriptions to academic worksheets, after-school study programs, internet for pay classes

2) In calculations of the mean values and standard deviations of the occupational dummy variables, $N = 5{,}202$

Results

Table 2 shows the logistic regression analysis results relating to participation in private tutoring by school-aged children. The analysis results in column I include the employment dummy variable for the mother as the explanatory variable, and those in column II are the results derived by comparing the mothers with professional jobs and the mothers with nonprofessional jobs. Both column I and column II show that the higher the mother's education level, the more likely her school-aged children will participate in private tutoring. When the mother's education level is high, her husband's level of education is generally also high and thus tends to have high income. However, this effect is captured by the unearned household income in the regression equation. Thus, the observed effect of the

Table 2 The determinants of private tutoring participation: logistic regression estimates

Variable	Coefficients		Marginal effects	
	I	II	I	II
Mother's attributes				
Age	0.020	0.021	0.002	0.002
	(0.085)	(0.085)	(0.010)	(0.009)
Age_squared	0.000	−0.000	0.000	−0.000
	(0.001)	(0.001)	(0.000)	(0.000)
HS	0.685**	0.672**	0.081**	0.079**
	(0.068)	(0.068)	(0.009)	(0.009)
COLL	1.099**	1.022**	0.087**	0.082**
	(0.155)	(0.158)	(0.008)	(0.009)
UNIV	1.636**	1.562**	0.115**	0.112**
	(0.196)	(0.200)	(0.008)	(0.009)
EMPL	−0.149*		−0.017*	
	(0.061)		(0.007)	
Professional		0.138		0.015
		(0.145)		(0.015)
Non-professional		−0.177**		−0.020**
		(0.063)		(0.007)
Household attributes				
Seoul	0.345**	0.342**	0.036**	0.036**
	(0.078)	(0.078)	(0.008)	(0.008)
Major_cities	0.099	0.099	0.011	0.011
	(0.069)	(0.069)	(0.007)	(0.007)
Log(Earned_income)	0.954**	0.944**	0.106**	0.105**
	(0.064)	(0.064)	(0.007)	(0.007)
Log(Unearned_income)	0.091**	0.090**	0.010**	0.010**
	(0.021)	(0.021)	(0.002)	(0.002)
Child's attributes				
Junior_high	−0.717**	−0.714**	−0.092**	−0.091**
	(0.085)	(0.085)	(0.012)	(0.012)
Senior_high	−1.909**	−1.903**	−0.298**	−0.297**
	(0.094)	(0.094)	(0.018)	(0.018)
Son	0.055	0.062	0.006	0.007
	(0.060)	(0.060)	(0.007)	(0.007)
Siblings	−0.442**	−0.437**	−0.049**	−0.049**
	(0.050)	(0.050)	(0.006)	(0.006)
First_child	0.548**	0.547**	0.061**	0.061**
	(0.066)	(0.066)	(0.008)	(0.007)
N	9,486	9,486	9,486	9,486
Pseudo R^2	0.258	0.258		

Notes: 1) The year dummy variables are included in the regressions

2) Robust standard errors in parentheses

3) ** $p < 0.01$, * $p < 0.05$

mother's education reflects her preference for her children's education, after the income effect blocked out from mother's education level parameters.

The mother's employment has turned out to lower probability of her child participating in private tutoring, specifically by about 2% points (column I, marginal effects) when compared to when the mother is not employed. This appears to reflect that when compared to the full-time homemaker mothers, the working mothers tend to experience more time constraints in seeking out information about private tutoring schools and taking their children to and from the private tutoring schools, the activities that are essential to help their children participate in private tutoring. It is worthy of note that the negative effect of maternal employment on children's private tutoring is statistically significant for nonprofessional working mothers, but not for professional working mothers (column II, marginal effects). This may be ascribed to the fact that the professional working mothers experience less severe time constraint than their nonprofessional counterparts, and that they tend to keenly prefer private tutoring for their children despite the time constraints from having to work. It is interesting to note that the way in which professional working mothers make private tutoring decisions appears to track that of the full-time homemaker mothers rather than the mothers who are engaged in nonprofessional jobs.

As expected, the analysis showed that earned income and unearned income of families increase the probability of participation in private tutoring for school-aged children. Specifically, those children in high-income families tend to show significantly higher probability of participation in private tutoring than those in lower income families. This represents the widening of the gap in educational opportunities stemming from income disparities. Students in grades 1 through 6 were more likely to participate in private tutoring than those in grades 7 and above. Also, those students with fewer siblings and those who were firstborn were more likely to participate in private tutoring. On the other hand, the students' gender had no relevance in the probability of private tutoring participation, just as the mother's age was not a factor. In terms of locality of residence, those families who reside in Seoul tended to show significantly higher level of participation in private tutoring than those families who reside in other regions.

Tables 3 and 4 present the empirical results of per-child average monthly private tutoring expenditures and the ratio of private tutoring expenditures vis-à-vis total monthly budget, in those families whose children participate in private tutoring. Table 3 shows the OLS results based on the pooling of data from each year, and Table 4 shows the F.E. panel analysis that blocks out the mother's unobserved time-invariant characteristics.

According to the OLS results, the higher the mother's education level and household income level (earned and unearned alike), the higher were the per-child private tutoring expenditures. Also, the per-child private tutoring expenditures were higher if the students had older mothers, had families that live in Seoul, had few or no siblings, and if the student was a firstborn. The per-child private tutoring expenditures were higher for those in grades 10 through 12 than for those in lower grades. There were no meaningful differences in the average monthly private tutoring expenditures based on gender of the student.

The school-aged children of employed mothers tend to not only participate less in private tutoring, but even when they do participate, they spend less money on it. Other things being equal, the employed mother's monthly average private tutoring expenditures amounted to 92% ($= e^{-0.081}$, column I) of that of the full-time homemaker mother. It is of note that the per-child average monthly expenditures on private tutoring for both professional and nonprofessional working mothers were less than those of the full-time homemaker mothers (column II). When the ratio of private tutoring expenditures vis-à-vis total household budget is used as the dependent variable, the observed effects of explanatory variables, excluding the income variable, are similar. Not only does the per-child average spending on private tutoring rise in correlation with the mother's education level, but also does the ratio of private tutoring expenditures vis-à-vis total household budget. The working mothers use less of their household budget on private tutoring than the full-time homemaker mothers, and this applies to professional and nonprofessional working mothers alike. While the per-child expenditures on private tutoring increase in correlation with the rise in the household's earned as well as unearned income, the ratio of private tutoring expenditures vis-à-vis total household budget shows a negative correlation with the household earned income and shows no meaningful correlation with unearned income.

When the foregoing OLS analysis results are compared with the F.E. panel analysis results in Table 4, the mother's education and employment variables lose their statistical significance in the F.E. panel analysis. This implies that the effect of the mother's educational attainment level or employment on the child's private tutoring expenditure may stem from the mother's unobservable individual characteristics.[2] On the other hand, household income

[2] This may be also due to the fact that there were few changes in the mother's schooling level or employment status during the panel period. Under the F.E. panel model, in principle, the coefficients cannot be estimated unless the value of the variables changes with time. Since there will be expectedly few cases of change in the mother's education level during the analysis period, it may be difficult to obtain a meaningful estimation coefficient.

Table 3 The determinants of private tutoring expenses: OLS estimates

Variable	Expenditures (KRW)		Ratio (%)	
	I	II	I	II
Mother's attributes				
Age	0.040*	0.040*	−0.168	−0.166
	(0.018)	(0.018)	(0.239)	(0.239)
Age_squared	−0.000	−0.000	0.004	0.004
	(0.000)	(0.000)	(0.003)	(0.003)
HS	0.174**	0.176**	0.846**	0.879**
	(0.020)	(0.020)	(0.247)	(0.250)
COLL	0.346**	0.354**	1.603**	1.749**
	(0.030)	(0.030)	(0.317)	(0.335)
UNIV	0.407**	0.417**	1.758**	1.935**
	(0.031)	(0.033)	(0.409)	(0.423)
EMPL	−0.081**		−0.672**	
	(0.014)		(0.186)	
Professional		−0.106**		−1.129**
		(0.026)		(0.329)
Non-professional		−0.075**		−0.535**
		(0.015)		(0.192)
Household attributes				
Seoul	0.144**	0.143**	0.825**	0.818**
	(0.018)	(0.018)	(0.242)	(0.241)
Major_cities	−0.012	−0.012	−0.277	−0.279
	(0.016)	(0.016)	(0.202)	(0.202)
Log(Earned_income)	0.302**	0.303**	−1.007**	−0.984**
	(0.018)	(0.018)	(0.158)	(0.158)
Log(Unearned_income)	0.028**	0.028**	0.100	0.101
	(0.005)	(0.005)	(0.071)	(0.071)
Child's attributes				
Junior_high	0.289**	0.289**	2.101**	2.089**
	(0.018)	(0.018)	(0.224)	(0.223)
Senior_high	0.397**	0.396**	3.250**	3.242**
	(0.025)	(0.025)	(0.348)	(0.348)
Son	0.009	0.008	0.165	0.154
	(0.014)	(0.014)	(0.185)	(0.185)
Siblings	−0.097**	−0.097**	−1.266**	−1.268**
	(0.015)	(0.015)	(0.202)	(0.202)
First_child	0.127**	0.127**	1.887**	1.892**
	(0.015)	(0.015)	(0.194)	(0.194)
N	7,363	7,363	7,350	7,350
R^2	0.312	0.312		

Notes: 1) The year dummy variables are included in the regressions

2) Robust standard errors in parentheses

3) ** $p < 0.01$, * $p < 0.05$

remains as a major factor that determines monthly spending on private tutoring under the panel analysis as well. The expenditure on private tutoring in particular is determined by the household's earned income, with 1% increase in household's earned income entailing 0.1% increase in private tutoring expenditures (column I). The household's unearned income, on the other hand, has relatively small effect. The analysis results generally hold, with the exception of household income, when the ratio of private tutoring expenditures vis-à-vis total household budget is adopted as the dependent variable instead of the average expenses on private tutoring. The lower the ratio of expenditures on private tutoring vis-à-vis total household income, the higher the household's earned income. The

Table 4 The determinants of private tutoring expenses: F.E. panel estimates

Variable	Expenditures (KRW)		Ratio (%)	
	I	II	I	II
Mother's attributes				
Age	−0.182	−0.181	−3.778	−3.782
	(0.236)	(0.236)	(3.315)	(3.315)
Age_squared	0.002**	0.002**	0.016*	0.016*
	(0.001)	(0.001)	(0.007)	(0.007)
HS	−0.012	−0.011	0.632	0.627
	(0.110)	(0.110)	(1.547)	(1.547)
COLL	0.014	0.015	2.228	2.220
	(0.157)	(0.157)	(2.200)	(2.200)
UNIV	−0.015	−0.009	1.070	1.045
	(0.160)	(0.160)	(2.243)	(2.245)
EMPL	0.015		−0.241	
	(0.022)		(0.313)	
Professional		−0.023		−0.108
		(0.048)		(0.680)
Non-professional		0.021		−0.260
		(0.023)		(0.327)
Household attributes				
Seoul	−0.036	−0.041	−1.340	−1.321
	(0.089)	(0.089)	(1.248)	(1.250)
Major_cities	−0.056	−0.052	−0.258	−0.273
	(0.096)	(0.096)	(1.348)	(1.350)
Log(Earned_income)	0.102**	0.102**	−1.573**	−1.573**
	(0.018)	(0.018)	(0.254)	(0.254)
Log(Unearned_income)	0.016**	0.016**	0.106	0.106
	(0.005)	(0.005)	(0.068)	(0.068)
Child's attributes				
Junior_high	0.196**	0.197**	1.833**	1.832**
	(0.021)	(0.021)	(0.300)	(0.300)
Senior_high	0.179**	0.180**	2.255**	2.253**
	(0.034)	(0.034)	(0.474)	(0.474)
Son	−0.017	−0.018	−0.221	−0.221
	(0.017)	(0.017)	(0.233)	(0.233)
Siblings	−0.023	−0.023	0.465	0.465
	(0.050)	(0.050)	(0.708)	(0.708)
First_child	0.199**	0.199**	2.140**	2.141**
	(0.016)	(0.016)	(0.228)	(0.228)
N	7,363	7,363	7,350	7,350
R^2	0.238	0.238	0.060	0.060

Notes: 1) Robust standard errors in parentheses

2) ** $p < 0.01$, * $p < 0.05$

household's unearned income manifests no significant effect on the private tutoring expenses as a percentage of total household income.

Concluding remarks

This study analyzed the determinants for participation in private tutoring by Korea's school-aged students in grades 1 through 12 under the presumption that private tutoring is an important element in the country's education system. The logistic regression analysis was used for participation in private tutoring, and the OLS and F.E. panel analysis were used for the average monthly expenditures on private tutoring and the ratio of private tutoring expenditures vis-à-vis total household budget. For empirical analysis, KLIPS data from the years 2000 to 2002 and 2004 and 2005 were used.

The major hypotheses were drawn regarding three factors that may influence children's participation in private tutoring: the mother's education, the mother's employment status, and the household income. It was hypothesized that the children's participation in private tutoring has a positive correlation with the mother's educational attainment level (preference effect) and has a negative correlation with the mother's employment (time constraint effect), while having a positive correlation with household income (income effect). It was further hypothesized that the effect of maternal employment on children's private tutoring may differ for the mothers engaged in a professional job and those having a nonprofessional one, reflecting the differing time constraint and priorities in time allocation as to children's education.

The empirical findings tend to support these hypotheses. First, other things being equal, the mother's educational attainment level tends to raise her children's participation in private tutoring and attendant expenditures (monthly spending and its ratio to total household budget). This implies that the higher the mother's education, the more likely she will have keen preferences for her children's private tutoring. Secondly, in the case of working mothers, the probability of participation in private tutoring, the average expenditures on private tutoring and the ratio of tutoring expenses vis-à-vis total household budget are all lower than those of full-time homemaker mothers. These results comport with our hypothesis regarding the time constraints of working mothers. The effect of maternal employment is especially salient among nonprofessional working women, which bespeaks to their long work hours and the relatively little priority they place on their children's private tutoring. Third, children in households with high earned and unearned income are more likely to participate in private tutoring, and such households are more likely to spend more on private tutoring. This causality holds under the panel analysis as well, signifying the degree of impact household income has on private tutoring.

The empirical results of this study confirm that the parents' educational attainment level and differences in income level lead to disparities in private tutoring participation and expenses. Although maternal employment

overall tends to reduce the investment in children's private tutoring, professional working mothers (presumably having high socioeconomic status) are not discouraged from having their children participate in private tutoring.

The policy implications would differ depending on the contribution of private tutoring to students' academic performance and economic return in later work life. If private tutoring raises students' educational performance and hence economic returns in their future work lives, the disparities in educational opportunities would mean that one's given socioeconomic status quo will be passed on from one generation to the next due to this education factor. Then, the question of to what extent should educational opportunities be made equal, be it by providing private tutoring assistance to the disadvantaged (Dang and Rogers 2008) or by improving the public education system (Baker et al. 2001; Bray 1999), becomes a major policy issue. Given the tremendous expenditures, the Koreans currently devote to private tutoring, the first priority should be placed on improving the public education system so as to abate the demand for private tutoring. Meanwhile, the governmental effort should be geared toward giving access to private tutoring for those children from low-educated, low-income families (e.g., through subsidies or tax credit). If, on the other hand, private tutoring has little effect on students' academic performance and proves itself a waste of societal resources, the policy issue would then revolve around the question of how to suppress private tutoring. Since it is practically very difficult to ban private tutoring on the supply side—as proved in the Korean experience as reported in Kim et al. (2001)—the focus should be placed on how to reduce the demand for private tutoring (e.g., the improvement of the public education system).

The private tutoring has on students' academic achievement and subsequent economic activity thus remains an important topic for future studies, as the existing literatures provide mixed evidence. By examining how the differences in opportunities for private tutoring (stemming from the students' family background) may affect some of the very important markers in a child's life—such as academic achievement, academic degrees pursued, the transition from school to work, and lifetime earnings—such studies to come will shed light on many important issues for the education policies.

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