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PRIVATE TUTORING AND PUBLIC CORRUPTION: A COST-EFFECTIVE EDUCATION SYSTEM FOR DEVELOPING COUNTRIES

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I. INTRODUCTION

IN developing countries, public expenditure on school education increased from 2.9 per cent of GNP in 1970 to 4.1 per cent in the late 1980s.[1] In most of these countries, more than 80 per cent of this public expenditure is used for paying salaries to the school teachers. Despite this, an ILO survey (1991) on "teachers' salaries" during the mid-1980s collected from fifteen developing countries shows that the teachers do not occupy the same position in the wage hierarchy in comparison with other professions requiring similar qualifications and responsibilities. The overall conclusion is that the teachers in developing countries are poorly paid despite their status in the society. Second, developing country governments have difficulty in monitoring teachers' activities at school. This is because developing countries often have harsh environments making communication and travel difficult. In addition, roads, railways, and telephones are often in poor condition or nonexistent. At the same time, it is also observed that the teachers are engaged in providing private tutoring to the students for a fee.

We hypothesize from the above facts that the existence of a wage differential and the fact that classroom teaching can only be imperfectly monitored, are likely to encourage school teachers to teach school lessons poorly in order to create a demand for income-generating private tutoring. There are many reasons for the demand for private tutoring. It can be either due to the weaknesses of the students or due to the negligence of the teachers. In some cases, although the teachers may

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[1] The sources of the data and stylized facts used in this paper are from ILO (1991), UNESCO (1987, 1991), UNDP (1991), and World Bank (1986).

be teaching properly at school, the students still may need tutoring if they are academically weak. In other cases, when the teachers do not teach properly at school, the students require tutoring from the teachers outside the school for a fee. This study focuses in analyzing the implications of the latter type of tutoring only. The motivation for this exercise is also derived from the following anecdotal evidence. A survey article on India, "India's Economy," published in the *Economist*, February 22–28, 1997, reported that "if you visit a village school in India on any given day, there is a good chance that nobody will be there. . . . Where teachers are absent, some may be doing quite different jobs while continuing to draw their government salary; but a good many are teaching in smaller groups, privately for a fee. . . . The problem is lack of accountability. . . . Teachers are paid by state governments. Government inspectors do not supervise them effectively: in many states they seem to settle for collecting bribes from teachers. . . . Illiterate villagers are used to seeing their school empty for much or all of the time; they know and expect no better" (pp. 20–23).

Usually, villagers (people) in developing countries do not consider private tutoring wrong or an act of corruption by teachers. On the contrary, teachers are highly respected. Perhaps this respect for teachers prevents people from noticing the resemblance between private tutoring and other forms of government corruption. Both tutoring and corruption require citizens to pay money to receive a "free" government service. Klitgaard (1991) explains that the government officials say that since graft and bribery are built into their pay structure, unless they take bribes, they will not have enough income to live on. Both tutoring and corruption carry an implied threat of adverse consequences if no payment is made. Both tutoring and other forms of corruption make life more difficult for those so poor that they cannot pay. Finally, both tutoring and other forms of corruption are common in developing countries. Payments are often made to ensure speedy completion of an official's work. Given this resemblance, we can derive insights into the provision of public education in developing countries from the literature on corruption.

In defining corruption, Klitgaard (1991) summarizes that: Corruption = monopoly + discretion − accountability. That is, illicit behavior flourishes when agents have monopoly power over clients, when agents can exercise their discretion, and when accountability of agents to principals is weak. Klitgaard's definition of corruption closely resembles the school teachers' tutoring practice in developing countries. They are the monopoly suppliers of their services to the students, they have the full discretion in what they supply, and they are hardly held accountable for their actions. This gives rise to a situation where the teachers try to extract students' consumer surplus by shirking at school and supplying tutoring outside the school for a fee. Given that private tutoring fits the definition of a form of corruption, one might think that the government should ban private tutoring. However, as this paper demonstrates, this no-tutoring policy would not be cost-effective, when

effective monitoring is expensive and difficult to implement. In some circumstances, allowing corruption may be the least-cost solution to a difficult problem. In the context of the collection of taxes in developing countries, studies[2] have shown that corruption can reduce the total cost of tax collection and help meet the revenue objective of the government. Flatters and MacLeod (1995) refer to this non-zero level of corruption as an "acceptable" level of corruption. The implication of these models is that corruption can be cost-reducing and welfare-improving under certain conditions.

This study is also related to the redistribution literature. Numerous authors[3] have argued for expenditure on public education on the grounds of redistribution of income from rich to poor. They argue that an appropriately chosen quality will separate consumers according to their income: low-income consumers will choose public education and high-income consumers will purchase a higher-quality private education. This literature, however, assumes away the presence of corruption in the delivery system. In the context of developing countries, Biswal (1999) extends the above redistribution literature by incorporating tutoring in the delivery system. The teachers shirk at school and provide tutoring to the students for a fee. The students have a choice to join either a general tax-financed public school with tutoring or a self-financed private school. The model endogenizes the proportion of students who will join the public school. It was also shown that under certain conditions tutoring is welfare-improving. If the government cares only about the welfare of the students who go to the public schools, then it will set a lower tax rate compared to a no-tutoring regime. In that case, the government will let the teachers provide tutoring to the students for a fee to supplement their low official salary. However, Biswal (1999) does not explore the market for tutoring in greater detail. The model also does not deal with the aspects of monitoring since the entire tax amount is assumed to be used for paying teachers their salaries. Therefore, the interaction between the fixation of salary and monitoring is absent in the model.

The objective of this paper is, therefore, to analyze the market for tutoring in developing countries. In doing so, the paper shows how the students and the teachers interact in the tutoring market. This interaction helps us find, perhaps for the first time, the intra-redistribution among the students within the public school system. The model also incorporates in the analysis the role of a government which optimally determines the salary of the teachers and expenditure on monitoring their performance. The government's main objective is to provide all students with a minimum level of education or, the universalization of education. The plan of the other parts of the paper is as follows. Section II is devoted to explaining the economy, giving an overview of the general framework of the problem and dis-

[2] See Flatters and MacLeod (1995) and Flatters, MacLeod, and Siamwalla (1995).
[3] See Stigler (1970), Ireland (1990), Besley and Coate (1991), Glomm and Ravikumar (1992, 1998), etc.

cussing briefly the techniques used in the study. In Section III, we develop a theoretical model to characterize the market for tutoring, and then we discuss the related policy implications. Section IV is devoted to analyzing the implications from the equity point of view. Finally, Section V concludes with an analysis of the results and future research.

II. GENERAL DESCRIPTION OF THE ECONOMY

This study focuses on how education is delivered in public schools of developing countries. The economy consists of three sets of agents: the students, the teachers, and a government. The students are assumed to be identical with respect to their wealth. This homogeneity assumption will be relaxed later on to analyze the implications of equity issues. We assume that there is an exogenously given N number of students who attend public schools.[4] The students' utility, u, depends on their level of consumption and education. Education is supplied free of cost in the public schools. However, the students pay for education which they acquire from private tutoring. In that case, the amount of wealth they receive from their parents is spent on consumption and private tutoring.

The teachers are assumed to be homogeneous (same teaching skills). Their utility, V, depends on the level of their income. They receive wages, $\bar{w}$, from the government and earn extra income from tutoring. The teacher is assumed to be a monopoly supplier of tutoring. This can be justified, in part, by the fact that the students going to their class teachers for tutoring is a well-established practice or tradition in developing countries. Second, there exists a shortage of teachers in many developing countries.[5] Third, the class teacher is responsible for making and grading the examinations of its classes. Finally, the teachers are assumed not to supply different qualities of teaching. Thus, the students do not have many options due to the lack of supply of teachers, and they do not have much incentive to select due to the absence of quality difference in teaching. It is preferable for them to ask their own class teacher for tutoring which is not only due to the obvious reasons of knowing the right material and doing well in the class examinations but also due to the other reasons such as familiarity, ready accessibility, and the fear of possible discrimination in the class. Due to the above reasons, we justify our assumption of a monopoly tutoring market.[6]

[4] Although N is exogenous to this model, it is determined endogenously when the students decide whether to join a public school or to join a private school (see Biswal 1999). In this study, since we are analyzing the provision of education in public schools only, without loss of the qualitative nature of the results, we take the number of students in public schools as given.

[5] See ILO (1991, pp. 12–17).

[6] Another extension of this problem is to introduce the possibility of a competitive market for the provision of tutoring services. The potential for entry into the tutoring market is expected to curb the behavior of teachers.

In developing countries, many teachers offer tutoring to students in small groups (or clubs) for a fee. The teachers may tutor a batch of students before school starts, and tutor one or more batches of students after school closes. To model this, we follow Buchanan's seminal paper (1965) on the theory of club goods.[7] Alternatively, tutoring can be modeled as a private good[8] where the students decide the amount of tutoring, and the teacher decides its price. However, the club model is more interesting as it captures the stylized fact of "tutoring in groups" which is widely observed in developing countries. The present analysis not only derives most of the results from the private good model, but it also addresses the issue of optimal consumption of tutoring (T) and group size (n) by taking into account the time available to the teacher for tutoring. If the total time is normalized to unity and the number of hours spent at school is S (exogenously determined), then the remaining time available for tutoring is $(1 - S)$ (or $\bar{S}$). This assumes, for simplicity reasons, the absence of leisure in the teacher's utility function.[9]

The features of the club are as follows. The student as a member of the club gets $g(T, n)$ where g represents the club service or benefits from the club which depends on the number of hours devoted to tutoring, T, and the number of students in that club, n. The function $g(T, n)$ is specified as follows: $g_T > 0$, $g_n < 0$. The first property implies that as the number of hours devoted to tutoring increases, the students benefit more from the club. The second property indicates that their benefit declines if the number of students admitted to a club increases. This is the congestion effect.[10] In addition, $g(0, n) = g(T, 0) = g(0, 0) = 0$, but we state that $(T, n) > 0$. We pose an Inada condition, i.e., dT/dn approaches zero when T and n approach zero, but increases with n. As a result, there is a unique intersection point between the curve $g(T, n) =$ constant (> 0) which is convex to n-axis, and the time constraint, $T = n\bar{S}/N$. The teacher charges a uniform club fee, p, to the students for joining a club.[11]

The government, in this case, is represented by the Department of Education or the Board of Education whose objective is to guarantee a basic level of education to all students at minimum cost. In other words, "education for all" is the main objec-

[7] See also Berglas (1976), Boadway (1980), etc.

[8] See Biswal (1993).

[9] See footnote 15 for other details.

[10] We do not assume, for convenience, that there are any congestion effects in the official classes at school, although the congestion in the official class may as well affect the conditions for private tutoring. It is also reasonable to assume that the official classrooms are bigger in size and have more facilities and, therefore, do not impose any congestion effects similar to the teacher's private classrooms. It can be seen from equation (1.2) that education from school enters student's utility as a public good and education from tutoring enters student's utility as a club good.

[11] The assumption of a uniform club fee is consistent with our observation. Club fees per unit of time basis can be easily adopted without changing the nature of our results. Second, when the students are heterogeneous, the teacher can use different club fees to distinguish and discriminate between the types of students. We will consider this issue later.

tive of the government. In order to achieve the above objective, the board hires teachers. The government spends $\bar{w}$ on teachers' wages and m on monitoring their performance. Expenditure on monitoring depends directly on the technology of monitoring[12] which is assumed to be exogenous to the model. The salaries of the teachers, $\bar{w}$, and the monitoring expenditure, m, which are optimally determined, are endogenous to the model.

The purpose of monitoring is to evaluate the performance of the teachers at school.[13] Actual monitoring takes place according to the following procedure. An inspection team from the board office visits the school at random intervals. The team may examine the students through an oral and/or written examination, or they may also look at their examination scores or a combination of both. It must be kept in mind that the status of the teachers in developing countries is such that the students do not reveal the true performance of the teachers at school to the monitors. Since the students make up their deficiencies from tutoring, they answer those questions to the best of their ability either during the time of the inspection or during the time of the final examination on the basis of their total knowledge acquired both from school and private tutoring. The impossibility of separating the effects of education from school and tutoring makes the role of the monitors difficult. Finally, the team makes its evaluation about the performance of the students and accordingly the performance of the teachers, and submits its report to the government, recommending sanctions when necessary against the teacher.

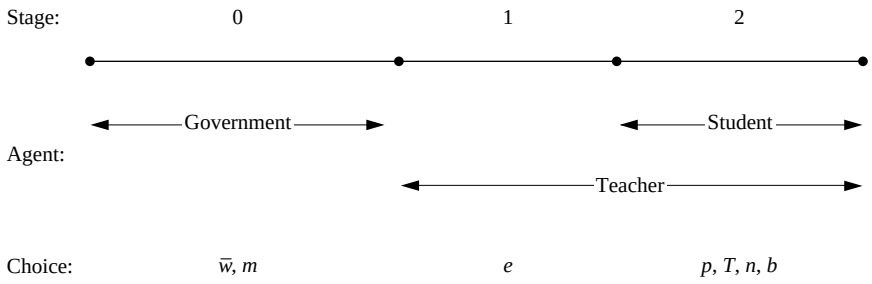
It is assumed that the probability of a teacher being caught shirking and being dismissed[14] depends mainly on the following two factors: (i) the total level of education of a student, E (e.g., examination scores) and (ii) the expenditure on monitoring, m, for an exogenously given level of technology of monitoring. We write this probability as $q(E, m)$ which satisfies the following properties. For $E < \bar{E}$, $q_E \leqq 0$ and $q_m \geqq 0$ where subscripts denote the partial derivatives. As long as the level of education is less than the required minimum level of education, $\bar{E}$, these properties

[12] The quality of monitoring depends on the level of technology of the economy, e.g., its infrastructure (road and transport, communication, telephone, computer, etc.), expertise and training of the monitors, etc. For instance, the board of education can carry out a better quality monitoring in the schools of urban areas compared to the schools in rural areas, and it would spend less on monitoring in urban schools to achieve a given level of deterrence.

[13] There are several ways to measure the quantity or quality of education. See Hanushek (1986) and Card and Krueger (1992) for evidence on the impact of school quality on the rate of return to education, test scores, graduation rates, etc.

[14] Sanctions can take various forms starting from warnings to punishments which may seriously affect remuneration, career advancement, and even employment. Presently, we assume that if a teacher is not meeting his target, he is dismissed. In actual practice, this may bring in other important issues like the time consistency of a government policy (see Boadway, Marceau, and Marchand 1993) and the teachers' response. Since the rigorousness of a sanction, as long as it is time-consistent, will not change the qualitative nature of the results, we assume here that the sanction takes the form of loss of a job.

Fig. 1. Stages of Game



imply that the probability factor is inversely related to the level of education, and directly related to the increase in the expenditure on monitoring respectively. The second-order and other conditions satisfy the properties that $q_{EE} < 0$, $q_{mm} < 0$, $q_{Em} < 0$, $q_{mE} < 0$, $q(E, 0) = 0$, and $q(\bar{E}, m) = 0$. The second-order conditions imply that the rate of change of the response of probability to E and m diminishes as E and m increase. Finally, $q(E, 0) = 0$ implies that, regardless of the level of education, the probability goes to zero if there is no spending on monitoring. And $q(\bar{E}, m) = 0$ implies that, regardless of the level of monitoring, the probability goes to zero if the required minimum level of education has been met.

Finally, we give an overview of the techniques used in the study. The model used in the study is a strategic noncooperative multistage game involving the government, teachers, and students. This game is played in three different stages. In stage 0, the government determines the level of monitoring and the wages it will pay to teachers. In stage 1, teachers after observing the government's monitoring and wages, make a decision about the effort level they will expend in the context of their official employment. In stage 2, the teachers make an offer of private tutoring conditional on the effort level expended at school, and the students decide whether to accept or reject the offer. Since the decision in each period is conditional on the previous period's decision, we solve this game using backward induction. Figure 1 summarizes the game.

III. ANALYSIS OF EQUILIBRIUM

A. *The Students*

The utility function of the students depends on their consumption and education which they buy with money given by their parents. Students may choose to reject the teacher's offer, consume only free state education and spend all their wealth on consumption. Alternatively, students may accept the teacher's offer, pay the club fee p to receive private tutoring, and spend the rest of their wealth on consumption.

The students' utility function is

$$u(C, E), \tag{1}$$

where

$$C = Y - kp, \tag{1.1}$$
$$E = Se + k \cdot g(T, n), \tag{1.2}$$
$$k = \begin{cases} 1 & \text{if teacher's offer is accepted,} \\ 0 & \text{otherwise.} \end{cases} \tag{1.3}$$

C is the amount of consumption of a private (numeraire) good, E is the examination score or the education level which depends on education from school and from tutoring, Y is the initial wealth of a student, S is the amount of time a student spends in school, and e is the effort of the teacher at school. Equation (1.1) is the student's budget constraint. Equation (1.2) represents the education level of a student which depends on education from school and from tutoring (linearity is assumed for simplicity).

The utility function has the following properties. It is increasing in both arguments, concave, and $u_{11} < 0$, $u_{22} < 0$, and $u_{12} = u_{21} > 0$. It is also assumed that $\lim_{C \to \infty} u_C(C, E) = 0$ and $\lim_{C \to 0} u_C(C, E) = \infty$. These boundary conditions are required to ensure that consumption is neither infinite nor zero. Education is assumed to be a desired commodity such that $u(C, 0) < u(C, E)\ \forall\ E$. Both consumption goods and education are assumed to be normal goods.

The condition under which the student joins a club is as follows:

$$u[Y - p,\ Se + g(T,\ n)] \geqq \bar{u}(Y,\ Se). \tag{2}$$

Equation (2) implies that a student will not become a member of a club unless he derives at least as much utility from it as he derives from not joining it. Therefore, the teacher must offer a package to the students which increases the utility of the students. As the teacher is a monopolist, the reservation utility of the students acts as the only constraint on the decisions of the teacher. Therefore, equation (2) will hold with equality.

B. *The Teacher*

The teacher makes his decisions in two stages. In stage 1, he decides how much effort, e, to be supplied at school. In stage 2, he decides the optimal club package $\{p, T, n, b\}$ in order to attract the students for tutoring. We solve this problem by backward induction.

1. *Stage 2*

We assume that the teacher's utility in this stage depends only on his total in-

come which he earns from two sources: the salary from the government and the income from tutoring.[15] Effort, e, of the teacher at school is predetermined in this stage since it is a stage 1 decision. With N being the number of students and p being the club fee per student, we summarize the teacher's problem in the following utility function.

$$\max_{\{p,\,T,\,n,\,b\}} V(\bar{w} + Np), \tag{3}$$

subject to the constraints:

$$u[Y - p,\ Se + g(T,\ n)] - \bar{u}(Y,\ Se) \geqq 0, \tag{3.1}$$
$$1 - S - bT \geqq 0, \tag{3.2}$$
$$N - nb \geqq 0. \tag{3.3}$$

The teacher's utility function has the usual properties: $V' > 0$ and $V'' < 0$. Equation (3.1) is the reservation utility constraint of the students which will hold with equality. Equation (3.2) represents the time constraint. The total time available to a teacher for tutoring b number of clubs is $(1 - S)$ (or $\bar{S}$) hours. This time constraint will also hold with equality. This implies that the teacher devotes the entire after-school time to tutoring. Equation (3.3) shows that the total number of students in a class is as large as the total number of students obtaining tutoring services. We assume that this constraint will also hold with equality.[16]

Substituting equations (3.3) into (3.2) and then (3.2) into (3.1), we rewrite the teacher's problem as:

$$\max_{\{p,\,n\}} V\ (\bar{w} + Np) + \lambda\left\{u\left[Y - p,\ Se + g\left(\frac{n\bar{S}}{N},\ n\right)\right] - \bar{u}(Y,\ Se)\right\}, \tag{4}$$

where λ is the Lagrange multiplier of the constraint. It can be seen from equation (4) that the decision variable n only appears in $g(\cdot)$. Therefore, the optimum club size, n^*, is derived from the following marginal condition:

$$g_T \cdot T + g_n \cdot n = 0. \tag{5}$$

The optimal club rule stipulates that the marginal benefit to the student of an in-

[15] Alternatively it could be assumed that the teacher's utility depends on income as well as his leisure. Adding leisure to the teacher's utility function increases the price of tutoring due to income and leisure trade-off but it does not change the club rule in equation (5) and other qualitative aspects of our results (see Biswal 1993 for a detailed discussion). We, therefore, retain a simpler formulation.

[16] Since the students are homogeneous, the teacher's offer will attract all the students. In the heterogeneous case, given the objective of the government, it will be in the interest of the teacher to offer a package to each student in such a way that they accept the offer of tutoring. This would require a discriminating pricing policy which we consider in Section IV. If the objective of the government changes and the teacher is not obliged to offer the required level of education to all the students, the problem can be solved by taking equation (3.3) as a Kuhn-Tucker condition. However, in this case, we are interested in the solution which treats this equation with equality.

crease in tutoring time must be equal to the marginal benefit of a small reduction in tutoring class size. Equation (5) along with constraint equation (3.2) solves T and n which depend only on total after-school time and the total number of students. These do not depend on the effort of the teacher. The teacher then adjusts p to satisfy the constraint in equation (4):

$$p^* = p(e,\ Y). \tag{6}$$

Equation (6) implies that club fee depends on the effort, e, of the teacher at school. By totally differentiating the constraint in equation (4), we show that $p_e = S(u_2 - \bar{u}_2)/u_1 < 0$ since $u_2 < \bar{u}_2$.[17] That $p_e < 0$ implies that effort at school reduces the optimal fee. This is because the extra teaching effort at school reduces the need for tutoring. Thus, the teacher must reduce the price of tutoring to attract students. Similarly, we can also show that $p_Y = (u_1 - \bar{u}_1) / u_1 > 0$. This implies that as the income of the students increases, the teacher will charge a higher club fee. We will come to the usefulness of this property while discussing the equity issues. This completes the teacher's choice of the club package, $\{p, T, n, b\}$, which is offered to the students.

2. *Stage 1*

In this stage, the teacher makes his choice of effort, e, at school. He observes his salary from the government, $\bar{w}$, income from tutoring if not dismissed, Np, alternative income if dismissed, $\hat{w}$, and the monitoring, m. He chooses his effort, e, to maximize his expected utility:

$$\begin{aligned}\max_{\{e\}} V(\cdot) = \max_{\{e\}} [1 - q(Se + g^*,\ m)]V[\bar{w} + Np(e)] \\ + q(Se + g^*,\ m)V(\hat{w}),\end{aligned} \tag{7}$$

where

$$g^* = g\left(\frac{n^*\bar{S}}{N},\ n^*\right).$$

Equation (7) implies that the expected utility of the teacher is equal to his utility from his total income from teaching times, the probability $[1 - q(E, m)]$ that he is not sanctioned plus his utility from the alternative wage times, the probability that he is sanctioned.

The first-order condition is:

$$(1 - q)[V'(\cdot)Np_e] - q_E S[V(1) - V(2)] = 0. \tag{8}$$

[17] This assumes diminishing marginal utility and positive cross-partial derivatives; u_{12} and u_{21}. Using these properties, we show that $u_2 < \bar{u}_2$. This implies that marginal utility of education to a student who does not take tutoring is higher than that to a student who takes it.

$V(1)$ and $V(2)$ represent the teacher's utility when not sanctioned and sanctioned, respectively. Equation (8) implies that the teacher chooses effort so that the marginal gain in income from tutoring is equal to the marginal loss from being potentially sanctioned.

Now, we compare the relative magnitudes of the income from teaching and the alternative income, namely, income in the private sector. If there is no e, such that, given the salary and level of monitoring the teacher can do at least as well remaining a teacher (with supplementary income from tutoring) as in the private sector, the teacher will not maintain employment in the public sector. Using the assumption that q_E is negative, and assuming that the total income available through teaching in the public sector is lower than the income available from working in the private sector such that $V(1) < V(2)$, equation (8) cannot be satisfied as an equality. Both terms are negative. In fact, the teacher's best interests are served by supplying zero effort, thereby maximizing the chances of being dismissed.

To enable the teacher to supply a positive effort at school, it is necessary that the total income of the teacher in the public sector is higher than the alternative income so that $V(1) > V(2)$. The sufficient condition, however, depends on the relative magnitude of the time spent at school on teaching and tutoring, and the minimum education requirement of the government. If the teacher cannot make up the requirements of the government only by tutoring, then he must supply a positive effort at school. As it stands, it is possible that teachers will supply zero effort at school even if the monitoring expenditure is positive. This will depend on the level of minimum education and the amount of education the students receive from tutoring. We will consider this aspect in the next section.

Equation (8) implicitly defines e as:

$$e^* = e(\bar{w},\ m). \tag{9}$$

The properties of the effort function are: $e_{\bar{w}} > 0$ and $e_m > 0$.[18] The first property implies that as the salary of the teacher increases, effort at school increases. An increase in salary increases the cost of being dismissed and hence induces the teacher to reduce its probability by increasing effort. The second property implies that as monitoring increases, the effort of the teacher at school increases. This is

[18] Totally differentiating the first-order condition (8) with respect to e, $\bar{w}$, and m, and using the properties of the utility function, we show that:

$$\frac{de}{d\bar{w}} = \frac{(1-q)V''Np_e - q_E SV'}{-q_E SV'Np_e + (1-q)(V''p_e^2N^2 + V'Np_{ee}) - q_{EE}S^2[V(1) - V(2)] - q_E SV'Np_e}.$$

$$\frac{de}{dm} = \frac{-q_m V'Np_e - q_{Em}S[V(1) - V(2)]}{-q_E SV'Np_e + (1-q)(V''p_e^2N^2 + V'Np_{ee}) - q_{EE}S^2[V(1) - V(2)] - q_E SV'Np_e}.$$

In both equations, the signs of the numerators are positive and the signs of the denominators are negative. Thus, $e_{\bar{w}} > 0$ and $e_m > 0$.

due to the fact that since the increase in monitoring increases the cost of being dismissed, the teacher supplies a higher effort to reduce this probability.

We substitute $e(\bar{w}, m)$ into the teacher's expected utility function in equation (7) and write his indirect expected utility function as $v(\bar{w}, m)$. Using the envelope rule, we differentiate $v(\bar{w}, m)$ with respect to $\bar{w}$ and m and obtain that $v_{\bar{w}} = (1 - q)V' > 0$ and $v_m = -q_m[V(1) - V(2)] < 0$. These results are quite intuitive. A higher salary increases the indirect utility of the teachers, and monitoring decreases it. Also, we have $E(\bar{w}, m) = Se(\bar{w}, m) + g^*$.

C. *The Government*

The government or board of education is interested in providing a basic level of education to all the students in the economy. Since the objective of this study is not to maximize the education output or maximize the utility of the students in the public schools, the government, therefore, tries to ensure that minimum education is guaranteed to all students at a minimum cost to it. The minimum education is represented by an isoquant known as the iso-education curve. Although "education for all" or "universalization of education" is the objective of the government, its problem does not include the problems of the students in the private sector since they are assumed to get more than the minimum education.[19] The government's objective is to achieve that education isoquant with the lowest possible cost. In following the literature (Flatters and MacLeod 1995), we justify modeling the government's problem by minimizing the cost of providing a basic level of education.

The cost of providing education to the government in the economy has two components. It includes the salary of the teachers, $\bar{w}$, and the cost of monitoring, m. The precise policy problem we characterize is that in which the government chooses an optimal combination of the salary of the teachers and the cost of monitoring, which guarantees every student a minimum level of education. The government is constrained as well by the need to guarantee the teachers an expected utility at least equal to their reservation utility, in order to ensure that they will be prepared to work as teachers rather than in some alternative employment.

The government's problem can then be formulated in the following way:

$$c(\bar{w}, m) = \min_{\{\bar{w}, m\}} \bar{w} + m, \tag{10}$$

[19] See Biswal (1999). Biswal analyzes a general problem of all students in the economy; students in the public schools as well as private schools by maximizing a weighted social welfare function. The study shows that high-income students will join private schools and low-income students will join public schools. Thus, for the students in the private schools, minimum education was never an issue. In addition, since the stylized facts do not support to think whether or not the government is interested in providing "full" education to the students in the public schools or in maximizing the welfare of their teachers, a cost minimization approach is better justified over a welfare maximization one.

subject to the constraints:

$$E(\bar{w}, m) \geqq \bar{E}, \tag{10.1}$$
$$v(\bar{w}, m) \geqq v(\hat{w}). \tag{10.2}$$

Constraint (10.1) defines the iso-education constraint. It ensures that the education level of a student (i.e., students' examination score) is at least as high as the required minimum level of education. Constraint (10.2) defines the participation constraint of the teachers. It ensures that the indirect expected utility of a teacher should be no less than his reservation utility.

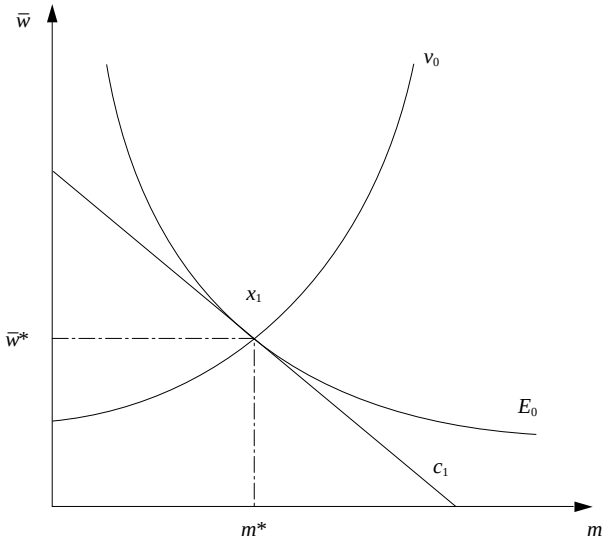
Let μ_1 and μ_2 be the Lagrange multipliers of constraints (10.1) and (10.2) respectively. μ_1 is interpreted as the shadow value of the minimum level of education in the economy and μ_2 as the shadow value of the reservation utility of a teacher. We can solve for four unknowns $\bar{w}$, m, μ_1, and μ_2 from the four first-order conditions (not shown here) derived with respect to $\bar{w}$, m, μ_1, and μ_2. We follow a diagrammatic approach to further analyze the government's problem. In the $(\bar{w}, m)$ space, the iso-education constraint (10.1) can be represented by a downward sloping curve, E_0, defined by the properties, $\left.\frac{d\bar{w}}{dm}\right|_E < 0$ and $\left.\frac{d^2\bar{w}}{dm^2}\right|_E > 0$. The participation constraint (10.2) can be represented by an upward sloping curve, v_0, defined by the properties, $\left.\frac{d\bar{w}}{dm}\right|_v > 0$ and $\left.\frac{d^2\bar{w}}{dm^2}\right|_v > 0$. The cost function of the government, c, is written in $\bar{w}$ and m space as: $\bar{w} = c - m$ with the properties, $\left.\frac{d\bar{w}}{dm}\right|_c = -1$ and $\left.\frac{d^2\bar{w}}{dm^2}\right|_c = 0$. This is a downward sloping straight line inclining forty-five degrees to the axes.

We analyze the problem in the following three possible cases:
Case I : $\mu_1 > 0$ and $\mu_2 > 0$ (i.e., both constraints bind),
Case II : $\mu_1 > 0$ and $\mu_2 = 0$ (i.e., only the iso-education constraint binds), and
Case III: $\mu_1 = 0$ and $\mu_2 = 0$ (i.e., neither of the constraints bind).

Case I

Figure 2 explains the case where both constraints are binding. We have an interior solution at point, x_1. We derive the optimum solutions, $\{\bar{w}^*, m^*\}$, by solving the two constraints. c_1 is the cost of providing education which guarantees the students their minimum education and the teachers their reservation utility. This case applies to the schools in rural areas. Since the marginal utility of education is positive to a student, there will always be a positive fee which will attract them to tutoring. However, the wealth level of the students is very low, and hence the amount a student is prepared to spend on tutoring is also very low. Due to the general poverty, the teacher does not have any opportunity to exploit a large consumer surplus. In this case, the teacher will be inclined to shirk and not meet the government's objective of providing a minimum level of education to the students.

Fig. 2. Case I



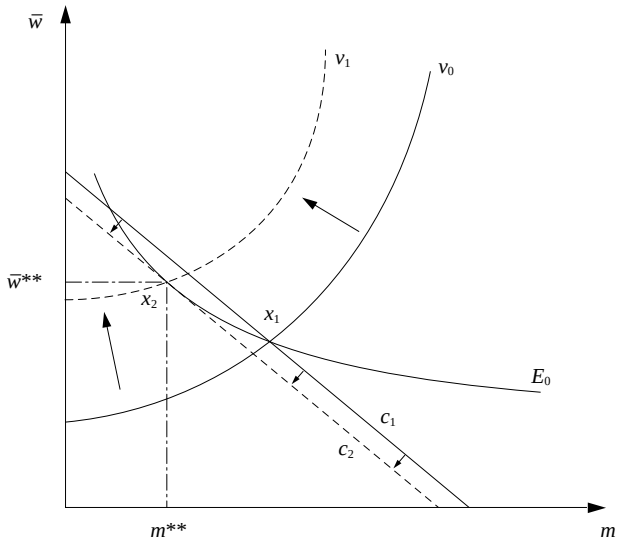
Therefore, the government requires a positive level of monitoring. At the same time, the government's salary should also be sufficient to ensure the reservation utility of the teachers so that they do not quit teaching.

Case II

The optimum solution to case II, $\{\bar{w}^{**}, m^{**}\}$, is determined by the condition $E_{\bar{w}}/E_m = 1$ derived from the first-order conditions. This equilibrium condition implies that the slope of the iso-education curve is equal to the slope of the cost function at the equilibrium point. This point is labeled x_2 in Figure 3. In contrast, we can see at x_1 (see figure 3) that the slope of the cost function is greater than the slope of the iso-education curve. This implies that, at x_1, the opportunity cost of providing education is higher than the shadow value of the minimum education. The government can reduce the cost by moving to x_2 from x_1 where $c_2 < c_1$.

The optimum solution to case II satisfies the education constraint and, as a result, the students are guaranteed their minimum education, E_0. However, the participation constraint is not binding. The teachers receive utility v_1 which is greater than their reservation utility, v_0. This case applies to the schools in other non-rural areas. The wealth level of the students is higher than in case I. The teachers are able to extract a higher consumer surplus from the students, and thereby achieve a higher level of utility than their reservation utility. This is consistent with the casual observation that teachers in non-rural areas of developing countries receive lower wages

Fig. 3. Case II



from the government than their private sector counterparts but appear to enjoy a similar or even a higher standard of living than these people.

Case III

This case analyzes the possibility where neither constraint is binding. It guarantees the students more than the minimum education and the teachers more than their reservation utility. Depending on the wealth level of the students, the government will allow education to be provided only through private channels. The students can afford to pay a higher fee in order to acquire a higher level of education. This case applies to the private schools or publicly run expensive boarding schools where the rich students enroll to receive their education at their own expense. This is consistent with the casual observation that "rich and famous" people send their children to the boarding schools which is beyond the reach of a common person. In this case, the users of the service bear the full cost of education.

IV. GENERAL DISCUSSION

It is worth mentioning at this stage that the solution to this problem depends on various potential policy parameters of the problem (e.g., Y, the wealth of the students; S, the length of the school day; N, the number of students in a class; $\hat{w}$, the outside option of the teachers; etc.). From the discussion of different cases, we can

see that wealth seems to be the most important. Therefore, we turn to the discussion of equity issues involved when the students are differentiated by their wealth level. In the standard literature (Besley and Coate 1991; Glomm and Ravikumar 1998; etc.) equity issues are discussed in terms of the transfers from the rich students to the poor students through the provision of a tax-financed free public education. In those models, although the rich students go to private schools, they also contribute to the running of the public schools by paying taxes. Through the provision of public education, the government realizes a transfer of resources from the rich to the poor. Biswal (1999) showed that, in the presence of private tutoring, the equity issue has been compromised. The government taxes at a lower rate to finance public education with tutoring compared to the case when there is no private tutoring. Since this tax revenue is used for paying wages to the public school teachers, they receive a lower official wage. However, their lower official wage is compensated through the supply of tutoring services to the students for a fee. This results in a lower burden on the rich students due to a lower tax rate and a higher burden on the poor students due to the fees charged to them for availing tutoring services.

This model further argues that when the students are differentiated by their income, there is an intra-redistribution of resources within the students who go to public schools. This is possible due to the role of a teacher which is absent in most of the redistribution literature cited above. In the heterogeneous case, the teacher acts as a price discriminating monopolist with the simple objective of maximizing his revenue from tutoring. In doing so, he charges a lower fee to the students in the lower-wealth group and a higher fee to the students in the higher-wealth group. If the teacher does not charge different fees for the same service, then the students with higher incomes will be left with surpluses. We show this in the following proposition.

Proposition: If for a given $g^*(T, n)$ and $p^* > 0$,

$$u^i[Y^i - p^*,\ Se + g^*(T,\ n)] = \bar{u}^i(Y^i,\ Se),$$

then

$$u^j[Y^j - p^*,\ Se + g^*(T,\ n)] > \bar{u}^j(Y^j,\ Se),$$

for $Y^j > Y^i$ and $j \neq i$.[20]

We showed in the above proposition that if a teacher charges the same fee for the same club services to two different types of students, then a student with a higher level of wealth in comparison with a student with a lower level of wealth will derive more utility from being a member of a club than when he is not. Therefore,

[20] The identity is that $u^i[Y^i - p^*,\ Se + g^*(T,\ n)] = \bar{u}^i(Y^i,\ Se)$. This equilibrium condition gives us the following: $u^i_1 = u^i_2/(p^*/g^*)$ or, $u^i_1 p^* = u^i_2 g^*$. Using the properties of the utility function, $u^j_1 p^* < u^j_2 g^*$. Thus, our result follows.

in order to get maximum revenue, the teacher should discriminate between the two types of students. This is also a standard result in the literature on price discriminating monopolist. We also know from the properties of the club fee, $p(\cdot)$, that $dp/dY > 0$. Using this property and the above proposition, we can show that the teacher will maximize its revenue by charging a higher fee to the students with higher wealth and a lower fee to the students with lower wealth. These results show that the richer students subsidize the education of the poorer students, and this intra-redistribution is possible due to the discriminating pricing policy of the teachers.

V. CONCLUSION

This paper developed a basic model of private tutoring prevalent in public schools of developing countries. The main reasons for tutoring in developing countries are the low official wages of the teachers and the lack of an effective monitoring system. The objective of the government is to provide students at least with a minimum level of education. This study provides an explanation how the government can delegate its responsibilities to the teachers who would in turn compensate their low wages by offering tutoring to the students for a fee. The students receive some education from public schools for free and some education from tutoring for a fee. This justifies the role of tutoring as an instrument of providing education at a lower cost to the government.

This delegation of authority is not without implications. Biswal (1999) showed that the burden on the richer students who go to private schools is lessened due to a lower tax on them. In this study, we further showed that there exists an intra-redistribution of income from the richer to the poorer students within the public school system. These results suggest that the richer students in the public schools (who are the middle-income students in the society) bear the greatest burden of running the public school system. It is also important to understand the implications of this shifting burden. In many studies (e.g., Psacharopoulos 1985) social and private returns to education for developing countries have been calculated. It would be important to determine how the households' increased expenditure on private tutoring accompanied with reduced real public expenditure on education has affected these returns. At this stage, the lack of data on tutoring prevents us from doing any kind of empirical analysis. However, this will form the basis of our future research in the area.

This study also emphasized that monitoring is the key issue in achieving "education for all." It is almost five decades since the United Nations' Declaration of Human Rights (on December 10, 1948) was promulgated. Article 26 of the declaration guaranteed free and compulsory elementary education to every child. In many developing countries, primary school enrollment is far from satisfactory. In the New Delhi Summit held in 1994 among the nine of the world's largest develop-

ing countries, "guaranteeing education to all" was the key issue. In the summit, it was proposed that village-level committees be established to persuade the apathetic teachers to show up for work. Parental and community involvement should also be considered to complement the role of the village-level committees. As this study suggests, the implementation of policies of less-expensive and effective monitoring are the policies in the desired direction. As a further extension of this study, it is also important to explore an alternative system where the monitoring cost is financed from other sources of taxation and to compare this system with the private tutoring system in terms of the consequent levels of economic welfare. These issues will constitute our future research in the area.

REFERENCES

Berglas, Eitan. 1976. "On the Theory of Clubs." *American Economic Review* 66, no. 2: 116–21.

Besley, Timothy, and Stephen Coate. 1991. "Public Provision of Private Goods and the Redistribution of Income." *American Economic Review* 81, no. 4: 979–84.

Biswal, Bagala P. 1993. "Optimal Provision of Education in Developing Countries: A Theoretical Analysis." Ph.D. diss., Queen's University at Kingston.

———. 1999. "The Implications of Private Tutoring on the School Education in LDCs." *Journal of Policy Reform* 3, no. 2: 53–66.

Boadway, Robin. 1980. "A Note on the Market Provision of Club Goods." *Journal of Public Economics* 13, no. 1: 131–37.

Boadway, Robin; Nicolas Marceau; and Maurice Marchand. 1993. "Time-Consistent Criminal Sanctions." Department of Economics, Working Paper No. 9318. Québec: Université Laval.

Buchanan, James M. 1965. "An Economic Theory of Clubs." *Economica* 32, no. 125: 1–14.

Card, David, and Alan B. Krueger. 1992. "Does School Quality Matter? Returns to Education and Characteristics of Public Schools in the United States." *Journal of Political Economy* 100, no. 1: 1–40.

Flatters, Frank, and Bentley MacLeod. 1995. "Administrative Corruption and Taxation." *International Tax and Public Finance* 2, no. 3: 397–417.

Flatters, Frank; Bentley MacLeod; and Ammar Siamwalla. 1995. "Rationalizing Corruption in Developing Countries." Kingston: Queen's University at Kingston.

Glomm, Gerhard, and B. Ravikumar. 1992. "Public versus Private Provision of Education under Majority Voting." Thomas Jefferson Center, Discussion Paper No. 232. Charlottesville, V.I.: University of Virginia.

———. 1998. "Opting Out of Publicly Provided Services: A Majority Voting Result." *Social Choice and Welfare* 15, no. 2: 187–99.

Hanushek, Eric A. 1986. "The Economics of Schooling: Production and Efficiency in Public Schools." *Journal of Economic Literature* 24, no. 3: 1141–77.

International Labour Organisation (ILO). 1991. *Teachers in Developing Countries: A Survey of Employment Conditions*. Geneva: International Labour Office.

Ireland, Norman J. 1990. "The Mix of Social and Private Provision of Goods and Services." *Journal of Public Economics* 43, no. 2: 201–19.

Kiltgaard, Robert. 1991. *Controlling Corruption*. Berkeley, Calif.: University of California Press.

Psacharopoulos, George. 1985. "Returns to Education: A Further International Update and Implications." *Journal of Human Resources* 20, no. 4: 583–604.

Stigler, George J. 1970. "Director's Law of Public Income Redistribution." *Journal of Law and Economics* 13, no. 1: 1–10.

Stiglitz, Joseph E. 1974. "The Demand for Education in Public and Private School Systems." *Journal of Public Economics* 3, no. 4: 349–85.

United Nations Development Programme (UNDP). 1991. *Human Development Report, 1991*. New York: Oxford University Press.

United Nations Educational, Scientific and Cultural Organisation (UNESCO). 1987. *Statistical Yearbook, 1987*. Paris.

———. 1991. *World Education Report, 1991*. Paris.

World Bank. 1986. *Financing Education in Developing Countries: An Exploration of Policy Options*. Washington, D.C.: World Bank, Education and Training Department.