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# Recruitment of rural teachers in developing countries: an economic analysis

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## Abstract

Monetary and non-monetary incentives for rural teacher recruitment are a prominent feature of developing-country education systems. Despite the widespread use of incentives, there is little theoretical or empirical evidence on their effectiveness. This paper interprets incentive policies within the framework of the economic theory of compensating differentials. The discussion clarifies the implicit assumptions of incentive policies and aids in organizing further empirical work on their effectiveness. Existing evidence on compensating differentials, mainly in the United States, shows that teachers tend to trade off monetary wages against non-monetary aspects of their jobs, such as geographic location and class size. © 1999 Elsevier Science Ltd. All rights reserved.

*Keywords:* Rural areas; Geographic isolation; Incentives; Developing nations; Recruitment

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## 1. Introduction

Research on the teaching profession in developing countries observes that rural areas present more onerous living and working conditions than urban areas (International Labour Office, 1991; Murnane, 1993; Lockheed & Verspoor, 1991). For instance, rural teachers are often subject to social and professional isolation, risks to personal safety, and challenging living conditions. If rural schools are to recruit personnel at least as qualified and able as those of urban areas, researchers conclude that monetary or non-monetary incentives are required.

Rural incentives are already a prominent feature of many education systems. Developing countries have adopted a vast array of recruitment strategies, including wage premiums, subsidized rural housing, special in-service training, and even the forcible reassignment of teachers to rural areas. Despite the considerable resources devoted to incentives, there is scant theoretical or empirical work which systematically explores the rationale for their implementation or the cost-effectiveness of current recruitment policies.

This paper delineates a framework for analyzing rural teacher recruitment, grounded in the economic theory of compensating wage differentials. The fundamental idea is that teachers value pecuniary and non-pecuniary aspects of their jobs, and willingly trade off one against the other in order to achieve higher levels of satisfaction. The purpose of the discussion is twofold. First, it emphasizes the

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assumptions that are only implicit in most academic and policy discussions of rural teaching incentives (indeed, these assumptions underlie most of neoclassical economics). Foremost is that teachers are rational individuals who make decisions about their work and residence so as to maximize their “utilities”. Second, the discussion provides a useful means of organizing further empirical research into the aspects of rural work which require incentives and whether teachers exhibit a greater willingness to work in areas that provide such incentives. Though my focus is on rural teachers, the framework can easily be applied to any teachers, urban or rural, who face difficult living or working conditions.

Before discussing the theory, the second part of this paper reviews evidence on the gap in school quality between rural and urban areas. Such evidence is often used to rationalize recruitment policies. Some examples of these policies are also summarized. Part 3 describes the theory of compensating differentials and its application to teacher labor markets. Part 4 operationalizes the vague concept of “ruralness”, discussing specific aspects of life and work in rural areas which may require compensation. Finally, part 5 explores the limited empirical evidence which exists — almost all of it in the United States — on teachers’ implicit valuation of some aspects of rural teaching, as well as establishing some caveats to its interpretation. The principal intent of the discussion is to motivate systematic empirical work on rural teacher recruitment in developing countries.

## 2. Rural education and teacher recruitment

By many yardsticks, rural schools and students are worse off than their urban counterparts throughout the developing world. Enrollments of school-age children are, in general, lower in rural areas (Lockheed & Verspoor, 1991). In Colombia, for example, the net primary enrollments are 86% for urban males and 78% for rural males (Molina, Alviar & Polania, 1993). Sometimes low enrollments are due to a simple lack of schools; in other cases, existing schools offer only a few grades. Rural schools consistently show higher repetition and

Table 1  
Formal education of primary schoolteachers, 1989

Country	Mean years of schooling	
	Urban	Rural
Brazil	14.2	13.0
Costa Rica	14.4	13.0
Honduras	12.6	11.5
Panama	14.2	13.0

Source: Psacharopoulos, Valenzuela & Arends (1993).

drop-out rates than urban ones, perhaps indicative of low student achievement. This is the case, for example, in Guatemala, Brazil, and Colombia (Lockheed & Verspoor, 1991; Departamento Administrativo Nacional de Estadística, 1993; Colbert, Chiappe & Arboleda, 1993). Urban students have scored better on standardized achievement tests in Peru, the Philippines, Thailand, and Colombia (Lockheed & Verspoor, 1991; Ministerio de Educación Nacional, 1993).

Basic instructional inputs like textbooks, libraries, and other didactic materials are often deficient in rural schools. Rural schools may have substandard infrastructure, lacking even basic service provision like water or latrines. A key disadvantage, however, is the low quality of rural teachers, especially when compared with their urban counterparts (Dove, 1982). Table 1 shows that rural teachers in several Latin American countries have less formal schooling on average, a useful though imperfect measure of teacher quality. In a national sample of fifth-grade mathematics teachers in Colombian public schools, 51 and 49% of urban teachers had secondary and post-secondary education, respectively (Instituto SER de Investigación, 1994). Among rural teachers, the figures were 72 and 28%. Urban and rural teachers had an average of 17.5 and 11.9 years of teaching experience, respectively. In Honduras, rural teachers scored lower on tests of basic skills (Agencia de Cooperación Internacional del Japón, 1995). In general, evidence is consistent that rural schools attract teachers with lower levels of formal education, experience, and subject knowledge, compared to urban schools.

Countries have adopted a variety of approaches to problems of recruitment (see Table 2 for a description).<sup>1</sup> They have offered salary bonuses, subsidized or free housing, travel allowances for trips to urban areas, subsidies for the education of teachers' children, and special training which emphasizes pedagogy useful in the rural setting, such as multigrade teaching techniques. Subsequent sections explore in greater detail the theoretical rationale for these policies, and the empirical means of exploring their effectiveness.

### 3. The theory of compensating differentials

Most work on rural teacher recruitment is not explicitly theoretical, though it reflects an economic and rational choice approach. While the approach is necessarily incomplete, it provides a useful starting point to formalize arguments that have remained at the level of intuition. The theory of compensating differentials has a long tradition in labor economics, dating to the writings of Adam Smith. It is succinctly described by Chambers (1981; p. 332):

The basic notion . . . is that individuals care both about the quality of their work environment as well as the pecuniary rewards associated with particular employment alternatives, and that they will seek to attain the greatest possible personal satisfaction by selecting a job with the appropriate combination of pecuniary and non-pecuniary rewards. Similarly, employers are not indifferent as to the characteristics of the individuals to whom they offer particular jobs. The result of these simultaneous choices is the matching of individual employees with employers . . . [which] reveals implicitly the differential rates of pay associated with the attributes of individual employees and the working conditions offered by employers.

Table 2  
Approaches to the problem of rural teacher recruitment

Country	Policy
Argentina <sup>a</sup>	Up to 80% bonus on base salary
Bangladesh <sup>a</sup>	Special training for rural service
Chile <sup>b</sup>	Per-pupil subsidy for public and most private schools increased in rural and poor municipalities
Colombia <sup>c</sup>	Special training for rural service
Costa Rica <sup>d</sup>	Salary bonus and extra time towards retirement
Egypt <sup>a</sup>	Seniority requirements reduced by 2–4 years when applying to new positions; longer vacations; travel allowance for teacher and family; recruitment of local women
Guyana <sup>a</sup>	Accelerated promotion opportunities; travel allowances to purchase consumer goods
Honduras <sup>e</sup>	Three years of rural service counted as five years in calculation of seniority; 25% bonus on base salary
Iraq <sup>a</sup>	Free housing
Jamaica <sup>a</sup>	Rise two steps in pay scale
Libya	Payment of some travel and moving expenses
Mexico <sup>f,g</sup>	Reduced-rent housing; in some cases houses are built for teachers; compensation for damage caused by crime; opportunities for advanced training
Nicaragua <sup>a</sup>	Special training for rural service
Nepal <sup>h</sup>	Up to (and occasionally exceeding) 100% bonus on base salary
Pakistan <sup>g</sup>	Housing clusters for female teachers
Philippines <sup>a</sup>	Up to 25% bonus on base salary
Senegal <sup>a</sup>	Housing allowances
Sierra Leone <sup>a</sup>	Housing allowances
Syria <sup>a</sup>	Loans for purchase of house; compulsory rural service at beginning of career
Venezuela <sup>a</sup>	Twelve years of rural service entitles teacher to 20% pay raise; special training for rural service
Zimbabwe <sup>a</sup>	Loans for purchase of house

<sup>a</sup>International Labour Office (1991).

<sup>b</sup>Carnoy & McEwan (1998).

<sup>c</sup>McEwan (1998).

<sup>d</sup>Carnoy & Torres (1994).

<sup>e</sup>Secretaría de Educación Pública (1996).

<sup>f</sup>Dove (1986).

<sup>g</sup>Lockheed & Verspoor, 1991.

<sup>h</sup>Improving the Efficiency of Educational Systems Project Sector Study (1988).

<sup>1</sup>General discussions of rural incentives can be found in Murnane (1993), Dove (1982), Zymelman & DeStefano (1993), Lockheed & Verspoor (1991), and International Labour Office (1991).

I shall discuss compensating differentials within the specific context of rural teacher recruitment, first focusing on the decision of teachers to supply their services to rural or urban jobs, and then on the demand by schools for teachers.<sup>2</sup>

### 3.1. Supply of teachers

Consider a teacher deciding between two jobs, identical except that one is located in a rural area, the other urban. For the moment, assume that “ruralness” is a single good,  $R$ , for which teachers must be compensated (this unrealistic assumption is dropped in subsequent sections when I discuss particular aspects of rural teaching).  $R$  assumes values of either 1 or 0, the latter implying an urban job. The teachers’ preferences are represented by the following utility function, which she seeks to maximize:

$$U = u(W, R).$$

Utility is increasing in  $W$ , the wage, and decreasing in  $R$ , the amount of “ruralness”. The teacher will be indifferent between the two jobs if

$$u(W_R, 1) = u(W_U, 0).$$

In other words, there is some wage  $W_R$  which is sufficiently high to compensate a given teacher for the difficulty of rural service. The positive difference between the rural and urban wages ( $Z = W_R - W_U$ ) represents the teacher’s personal valuation of “ruralness”. Put another way,  $Z$  is the differential required by that teacher in order to compensate him or her for undesirable aspects of teaching in a rural area.

Now assume that  $R$  is continuous. The indifference curve of Fig. 1 maps out various combinations of  $W$  and  $R$  that the teacher is equally willing to accept. At  $R = 1$ , the teacher requires a compensating differential  $Z$ . Assume the teacher can choose between two jobs, one offering a wage of  $W_1$  and ruralness  $R = 1$ , the other offering  $W_2$  with  $R = 0$ . The vertical distance between  $W_1$  and  $W_2$ , defined as  $M$ , is the rural wage bonus offered to the teacher.

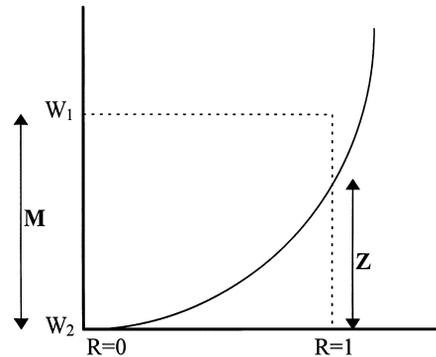


Fig. 1. Indifference between wages and “ruralness” Note: Adapted from Rosen (1986:646)

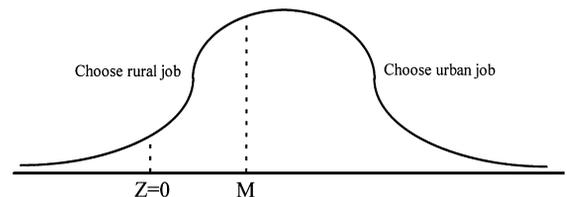


Fig. 2. Distribution of  $Z$  among teachers Note: Adapted from Rosen (1986:649)

The teacher will choose the rural job if  $M > Z$ , which is the case in Fig. 1. That is, teachers prefer the rural job if the prevailing wage more than compensates for the undesirable aspects of rural jobs. Likewise, if  $M < Z$  he will choose the urban job.

Though all teachers face the same rural wage bonus ( $M$ ), they will almost certainly not share the same preferences for life and work in rural areas. This implies that each individual possesses a unique indifference curve which maps out the various combinations of wages and ruralness which are equally desirable to that individual. Assume that values of  $Z$  are distributed among prospective applicants for teaching jobs according to a bell-shaped curve (see Fig. 2). Note that a small group of teachers may have negative values of  $Z$ , indicating that some will require compensation for jobs in *urban* areas, contrary to conventional wisdom. This conjecture has driven some countries’ attempts to recruit natives of rural areas, who are thought to require less or even negative compensation for rural service. Though the distribution of Fig. 2 is

<sup>2</sup> The discussion of teacher supply and demand relies upon Rosen (1986) and Chambers (1981).

symmetrical, there is no guarantee that this is the case. In fact, there could be a thicker tail extending far rightward, indicating that many teachers would require exorbitant compensation in order to consider a rural teaching job. This is one way of interpreting previous researchers' assertions that incentives simply would not function.

The prevailing rural wage bonus ( $M$ ) is located along the horizontal axis. All teachers whose values of  $Z$  are greater than  $M$  will supply their labor to urban jobs, since the prevailing  $M$  is not sufficient to compensate them for rural service. Likewise, workers with  $Z < M$  will choose rural jobs. An increase in  $M$  should increase the supply of teachers to rural jobs.

### 3.2. Demand for teachers

School decision-makers are faced with the task of offering a combination of monetary and non-monetary incentives that appropriately compensates teachers for the assuming a rural teaching job. Assume that a rural school decision-maker faces a marginal cost per teacher of reducing the "ruralness" of a teaching job, through investing in non-monetary factors such as improved teacher housing, school infrastructure, in-service training, travel subsidies, and so forth. Define this as  $B$ . Like teachers in the previous section, the school compares  $B$  to  $M$ , the prevailing wage bonus established in the labor market. If  $B > M$ , the school simply chooses to pay  $M$  as a monetary inducement, and offer a completely "rural" job. Likewise, if  $B < M$  the school invests in a package of non-monetary incentives for the teacher and tries, to the extent possible, to reduce or ameliorate elements of "ruralness" attached to the job.

Different values of  $B$  are distributed across schools. Some schools will find it more costly to invest in non-monetary incentives for teachers and will therefore have higher values of  $B$ . For instance, school maintenance or service connection costs may be higher for especially isolated schools. Fig. 3 presents a bell-shaped distribution of  $B$ ; caveats of the previous section regarding the shape of distributions apply here as well. Schools to the right of  $M$  will offer completely "rural" jobs and pay

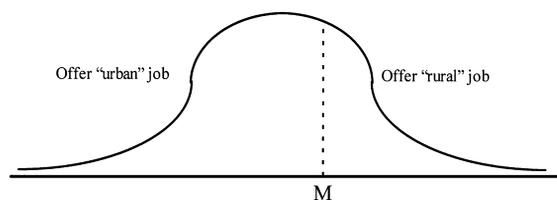


Fig. 3. Distribution of  $B$  among schools Note: Adapted from Rosen (1986:652)

a monetary incentive. Schools to the left will invest in non-monetary incentives in order to "urbanize" their jobs as far as possible. Of course, there may be a limit to the extent that rural schools can attract good teachers by simply improving non-monetary incentives (Chambers, 1981). This is particularly so if there are non-linearities in the job characteristics of interest. For example, teachers may greatly value a smaller class size in some initial range of values — say, 40 to 20 — and be willing to trade off a good portion of monetary wages. After that, however, they may value smaller class size less and less.

There is equilibrium in the teacher labor market when there is equality of demand and supply for teachers on each type of job. In a competitive labor market, the value of  $M$  adjusts in order to equalize the partitions of Fig. 2 and Fig. 3 (Rosen, 1986). Of course, teacher labor markets in developing countries are rarely perfectly competitive, with wages adjusting in response to shifting demand and supply. Teacher wages and rural incentives are often rigidly governed by Ministries of Education. If wages and other incentives are insufficient, few teachers supply their services to rural teaching jobs, or the teachers that do apply for rural jobs will be less qualified. Though local school managers may attempt to compensate by investing in non-monetary incentives or wage bonuses above the standard pay scale, they are invariably constrained by centralized systems of school finance which provide few discretionary resources to local decision-makers.

## 4. The meaning of "ruralness"

This section delineates what rural teachers are being compensated for—what, in other words, may

be undesirable about living and working in a rural area. It reinforces the point that no two countries' incentive packages will be the same, if only because their rural areas and schools will differ widely in the characteristics outlined below, as well as teacher preferences for such characteristics. Characteristics of rural schools and areas are divided into two groups: alterable and inalterable factors.<sup>3</sup> Alterable factors are those elements commonly associated with rural schools which may be under the control of school policy-makers, such as the availability of training opportunities or class sizes. The key implication is that policy-makers could choose to alter these characteristics in an attempt to make rural teaching a more attractive option, rather than simply applying monetary incentives. Inalterable factors, on the other hand, are elements of rural areas which are immutable and beyond the reach of school officials, such as climate, crime, or physical isolation.

#### 4.1. *Alterable factors*

Rural schools typically isolate teachers from opportunities for interaction with their peers, professional development, and promotion through the system. Some countries have put innovative programs in place to combat such isolation. For instance, Mali has created a professional bulletin for rural teachers (Thomas & Shaw, 1992). Colombia has instituted "microcenters" for some teachers, where they can meet to exchange ideas and experiences (Colbert et al., 1993; Schiefelbein, 1992). A number of countries (see Table 2) have allowed rural service to increase teachers' seniority, thereby quickening the pace of promotion.

Housing of appropriate quality, particularly for single women, may be difficult to find in isolated areas. Many countries have resorted to providing subsidized or free housing to teachers, particularly for women (see Table 2). In some cases, housing is located on the school premises.

School and classroom characteristics could affect the quality of the teacher's work environment. The student-teacher ratio, though rarely linked to student achievement in developing countries (Fuller & Clarke, 1994), significantly affects how difficult a class is to manage. Though student-teacher ratios in some rural schools are exceptionally larger than urban schools, sometimes the situation is quite reversed, when low population densities imply low ratios (International Labour Office, 1991). Either would tend to affect the relative attractiveness of rural teaching opportunities. The absence of basic school inputs and infrastructure such as textbooks, a library, blackboards, electricity, sanitary service, and water makes the teacher's task extremely challenging. Such deficiencies are often exacerbated in rural schools. Finally, rural teachers must often teach in a multigrade environment — that is, classrooms where students are heterogeneous in age and ability. Researchers generally concur that multigrade teaching requires greater training and preparation outside the classroom than standard pedagogy (Bray, 1987; Benveniste & McEwan, 1996), and therefore may require incentives. A few countries have made intensive efforts to endow multigrade teachers with special training and materials, such as Colombia and its *Escuela Nueva* program (Colbert et al., 1993; McEwan, 1998).

#### 4.2. *Inalterable factors*

If rural teachers are natives of urban areas, they may be isolated from friends and families. In other cases, teachers may not share the language or culture of the community, and may be considered outsiders. Single teachers might have a more difficult time finding a spouse. The infrastructure which might reduce such isolation, such as telephones, public transportation, or roads, is often in poor repair if available. Many countries have sought to recruit teachers native to the communities in which they will teach—the rationale being that such teachers will find conditions more familiar and less onerous, though evidence on this point is scarce.

Rural areas lack several amenities more common to urban areas, which could affect the desirability or cost of rural life. These include educational

<sup>3</sup> Chambers & Fowler (1995) make a similar distinction. Both Dove (1982) and Murnane (1993) include a general discussion of such factors.

opportunities for the children of teachers; employment opportunities for the teacher's spouse; and cultural attractions like restaurants and theaters. Sometimes rural teachers are subject to personal dangers, because they are government representatives or simply the most privileged local citizens. Note that Mexico offers rural teacher compensation for damages caused by bandits (Table 2). In Colombia, teachers often work in zones of armed conflict with negligible government presence, and their students may be related to armed participants on one side of the conflict or another (McGinn, 1996; Loera & McGinn, 1992).

Finally, teachers may acquire satisfaction or discomfort from the characteristics of the students they teach, such as socioeconomic status, often correlated with rural location. For a variety of reasons, students of lower socioeconomic status may be absent more often, require more effort to teach when they are present, or be subject to additional behavioral problems (Chambers & Fowler, 1995).

## 5. Empirical evidence on compensating differentials

The preceding sections described a framework for analyzing incentives, and specific rural characteristics which may require incentives. Still lacking is a means of empirically corroborating whether teachers implicitly value the characteristics described above, and how much compensation is required. This section describes the limited empirical evidence on compensating differentials in teacher labor markets, and gives some guidelines for its interpretation.

### 5.1. *Prior studies*

Empirical research in economics has tested the theory of compensating differentials in several labor markets, usually focusing on industrial workers and job safety. Research has explored if and to what extent workers appear to trade off wages against increased risks of injury or death on the job.<sup>4</sup> In essence, these studies estimate the pre-

vailing bonus in the labor market for assuming jobs with relatively higher risks. A few researchers have conducted similar studies of teacher labor markets, invariably in the United States. They estimate the degree to which teachers implicitly value aspects of their jobs and locations, using variables that are intended to proxy many of the characteristics described in the previous section. Researchers employ a similar empirical strategy, using multivariate regression to estimate wage equations of the following form:

$$\text{Wage} = f(\text{teacher characteristics, job characteristics, locational characteristics}).$$

Using ordinary least squares, the wages of teachers are regressed on a variety of characteristics thought to affect teacher productivity, such as education, experience, and academic ability. A series of additional independent variables is added which proxy the job or locational characteristics of interest. Signs and magnitudes of the latter variables' regression coefficients are examined in order to determine whether workers attach implicit values to those characteristics in the labor market. For example, a positive coefficient implies that teachers are paid higher wages where they confront greater amounts of a particular job characteristic, holding constant teacher and other job characteristics.

Antos & Rosen (1975) found that white teachers in the United States require additional compensation in order to assume teaching positions in school districts composed of mainly black students. Levinson (1988) found the same effect, though it disappeared when additional independent variables such as student poverty and test scores — correlated with race — were added to the regression. This seemed to indicate that teachers may simply prefer teaching wealthier, better-achieving students, but not necessarily white students. Antos and Rosen did include locational variables, though their results were mixed. They found white female teachers required a small premium to teach in rural areas, relative to the inner city, while black females appeared to require a premium not to teach in rural areas.

Kenny & Denslow (1980) estimated wage equations for US teachers that included independent

<sup>4</sup> Polachek & Siebert (1993) review this literature.

variables measuring class size, crime rates, the desirability of the climate, and the cost of living. They found several expected effects: that wages adjust downward in the presence of smaller classes, less crime, a more desirable climate, and a lower cost of living. Harbison & Hanushek (1992), while not intending to study compensating wage differentials, do estimate wage regressions for a sample of rural Brazilian teachers. They find that the student–teacher ratio is positively correlated with wages, all else equal, perhaps indicating that teachers prefer working in smaller classes. This must be interpreted carefully, since small class sizes are probably more prevalent in more isolated areas due to lower population densities and they do not control for other aspects of “ruralness” in their equation.

The most comprehensive study is that of Chambers & Fowler (1995), notable for its exhaustive attempts to identify the relevant non-wage characteristics of teachers’ jobs and construct careful empirical proxies. They analyzed a nationwide sample of 40,484 US public school teachers. They find that for teachers who are more than 160 miles away from the closest city, salaries tend to be around 6% higher than those of the urban reference group, holding all else equal. They also find compensating differentials for climate (gauged by mean temperatures and snowfalls) and the number of violent crimes per capita, as well as a modest trade-off between higher wages and larger class sizes.

### 5.2. *Empirical challenges*

There are several challenges to the estimation and interpretation of the models described above. First, the measurement of “ruralness” and rural job characteristics is not straightforward and must be adjusted to particular contexts. The immediate instinct might be to measure rural characteristics with a simple dichotomous variable (rural vs. urban). I have already argued that doing so would obscure important aspects of ruralness that may be important to teachers. A variety of empirical proxies could be devised in different countries which reflect the relevant characteristics described in previous sections.

Second, none of previous studies of teacher labor markets have accounted for the possible biases induced by imperfectly measuring the productivity of individual teachers. Teachers may be productive in ways that are unobservable by the researcher. Nonetheless, such variables belong in the wage regression equation. If omitted productivity measures are correlated with rural characteristics and with wages, then the coefficients of rural variables will be biased.<sup>5</sup> For example, teachers may select rural positions who have a preference for shirking. Rural schools are, in general, subject to less supervision by central educational authorities (Keith, 1989), and they may lack on-site principals capable of observing teacher behavior. Moreover, parents may have little authority to monitor and sanction teacher behavior, especially in centralized systems.<sup>6</sup> If the unmeasured propensity to shirk is positively correlated with the ruralness of schools and negatively correlated with wages, then rural coefficients will likely be biased downward. The possible bias from omitting teacher productivity measures is illustrated in Fig. 4. Several researchers in economics have attempted to resolve these problems with additional econometric methods, including instrumental variables (Garen, 1988) and the use of longitudinal data on individuals (Brown, 1980; Duncan & Holmlund, 1983). Perhaps the best solution is obtaining better data on the background and abilities of teachers.

Third, compensating differentials which are observed among current teaching staff may not be an adequate guide to the incentives required to attract additional or better-qualified teachers to rural areas. Assume that the empirical analysis produces unbiased estimates of the compensating differentials required by current teachers to live and work in rural areas. But the first teachers to choose rural jobs are those with the smallest values of  $Z$  — in other words, those who require relatively smaller compensation to assume rural jobs (Rosen, 1986;

<sup>5</sup> For a complete discussion of compensating differentials and unobserved productivity, see Hwang, Reed & Hubbard (1992).

<sup>6</sup> The problem of teacher absence is one motivation behind programs such as EDUCO in El Salvador, which promotes community-management of schools (Jimenez & Sawada, 1998).

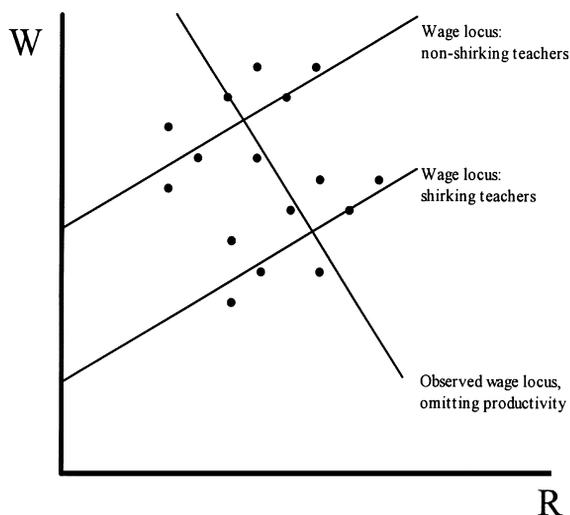


Fig. 4. Effects of omitted productivity variables on estimation of compensating differentials. Note: Adapted from Polachek and Siebert (1993:189)

Polachek & Siebert, 1993). There is a temptation to interpret the regression coefficients as the premium that non-rural teachers would require to move. However, such teachers (those currently in urban jobs) probably have higher values of  $Z$ . Thus, the estimated compensating differentials are only lower-bounds to premiums that might actually be required if additional teachers are to be recruited in rural schools.

Fourth, the interpretation of empirical results must take place within the context of a country's institutions. Assume once again that unbiased estimates are obtained, but that no evidence of compensating differentials is found. Is this necessarily evidence that teachers do not require compensation for rural teaching posts? In fact, it may simply indicate that an incentive program was grafted onto dysfunctional institutions, which were incapable of selecting the best teachers from available applicants. Incentives may prove effective at attracting a large body of qualified applicants. But in Honduras, for example, political interference and corruption often result in less-qualified teachers being drawn from the available pool of applicants. Hanson (1986) suggests that local politicians in Colombia hold considerable influence in filling rural teaching vacancies with favored applicants. In

cases such as these, higher pay resulting from incentives will not necessarily lead to a more qualified teaching staff.

## 6. Summary and implications

Incentives for rural teachers are a pervasive aspect of educational systems in developing countries. Nevertheless, there is little evidence which could guide the implementation and evaluation of such policies. A first step to such an analysis is being more explicit about the theoretical assumptions which are embedded in policies, principally that teachers are rational utility maximizers. I suggested that the economic theory of compensating differentials is a useful tool for thinking about incentives and for guiding empirical study. The few empirical studies which exist, mainly in the United States, give limited support to the idea that teachers trade off monetary wages against some non-monetary aspects of jobs and their location. For instance, teachers appear to value working in schools where the students are of a relatively higher socio-economic status and which are relatively closer to urban areas.

Much remains to be done, however. Where teacher incentives are concerned (and teacher labor markets in general), there is an enormous gap between policy and research in developing countries. Wage bonuses and non-monetary incentives are implemented with little regard to their effectiveness in attracting teachers. Moreover, it is unclear whether non-monetary incentives, such as on-site housing, might attain the same ends in a more cost-effective manner. Assume, for example, that a \$100 wage bonus and a reduced class size both contribute equally towards attracting a given teacher (that is, the teacher is willing to trade off \$100 of wages against the prospect of teaching a smaller class). But suppose that the monetary cost of reducing the class size is only \$85, which suggests that it is the more cost-effective means of recruiting teachers. Though only illustrative, it highlights the necessity of designing a package of incentives—monetary and non-monetary—which maximizes recruitment benefits at a minimal cost to the educational system. This can only be accomplished

through country-specific empirical work of the sort described in the previous section, because schooling contexts and teacher preferences will differ widely across countries.

Increasingly, there is the potential to collect the necessary data for such empirical work, or to take advantage of existing data sets collected for other purposes. Chile, for example, conducted a teacher census in 1996 which gathered a wide range of data on teacher qualifications and background. If it were to incorporate additional information on salaries, the data could easily be used to study compensating differentials. Brazil conducted a recent nationwide survey of teachers which does include wage data. Other countries such as Colombia have ongoing projects to collect data on student achievement and characteristics of their teachers and schools. The main intent is to conduct school effectiveness or production function studies, but the accompanying teacher questionnaires are a rich source of data on teacher characteristics and contexts.<sup>7</sup>

Data such as these hold great potential to shed light on the efficacy of current recruitment policies toward rural teachers in developing countries and provide additional guideposts to policy-makers. It is hoped that this paper will spur additional theoretical and empirical research in this relatively neglected area.

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<sup>7</sup> Fuller & Clarke (1994) summarize many of these studies.

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