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Why Are Teachers “Overpaid” in Developing Countries?

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Introduction

Teacher salaries account for 74% of the governmental recurrent expenses on education in 55 developing countries (Bruns, Mingat and Rakotomalala 2003). Yet in many education production function studies, teacher salaries have the lowest marginal product per dollar spent among observable school inputs (Pritchett and Filmer 1999). Meanwhile, teacher salaries are high relative to GDP per capita. These suggest that teachers are overpaid in developing countries. Pritchett and Filmer (1999) conclude that school spending systems in developing countries are distorted towards teachers' welfare, i.e. teachers receive rents due to political factors. Such rents should have attracted potential teachers to enter the teacher labor market. Yet, why class size is still so large in developing countries? Why many laborers with teacher training cannot be formally employed in schools? This paper offers an explanation based on several special features of the education production process. It argues that relatively high teacher salaries could be due to economic factors, e.g. the skill-matching mechanism in the teacher labor market, but not necessarily due to political factors in the school systems.

Table 1: Student Achievement and Teacher Quality: O-Ring Production

Country	Mathematics		Reading	Region	% trained teachers	
	TIMSS (Grade 8)	PISA (15yr)	PISA (15yr)		Primary	Secondary
Japan	579	557	522	East Asia		
South Korea	587	547	525		96	71
Argentina	--	388	418	Latin America		
Chile	392	384	410		87	77
Mexico	--	387	422			
South Africa	275	--	--	Sub-Saharan Africa	69	78

Sources: IAEA (2000, 2003)

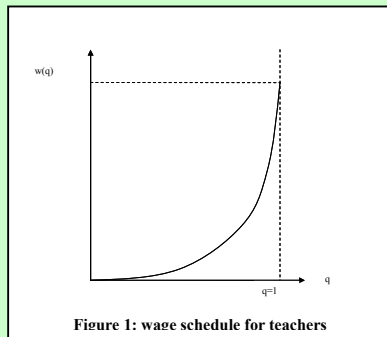


Figure 1: wage schedule for teachers

Model

✧ **Technology:** the O-Ring education production function; inputs are (imperfect) complements: early inputs (e.g., quality of primary teachers) are important to current achievement (e.g., test scores of secondary students; Table 1).

$$A_{j,k}(t) = (q_{1k} \cdot q_{(t-1),k} \cdot \dots \cdot q_{tk}) \cdot B(z_{j,k}, Q_k) \quad (1)$$

$A_{j,k}(t)$: the achievement (test scores) of student j in school k measured at semester t . $B(z_{j,k}, Q_k)$: maximum possible achievement of student j , given his or her characteristics ($z_{j,k}$) and non-teacher school quality (Q_k). $0 < q_{t,k} < 1$: Teacher quality in semester t ; the percentage of $B(z_{j,k}, Q_k)$ achieved, other things being equal.

✧ **Optimization:** Schools choose q to minimize short-run costs:

$$\begin{aligned} \text{Min}_{\{q_{t,k}\}} \quad & \sum_{t=1}^N w(q_{t,k}) & (2) \\ \text{s.t.} \quad & A \geq \underline{A}_k \end{aligned}$$

$w(q)$: the wage schedule given q . \underline{A}_k : exogenous achievement target.

✧ **Equilibrium:** Skill-Clustering. In any school k , teachers will be matched at the same quality level; the equilibrium quality level depends on the achievement target (\underline{A}_k).

✧ Implications:

- (1) Given the achievement target and the skill-clustering mechanism, schools will tend to hire teachers who are below average quality. Example: If $q^* = q_{1k} \cdot q_{t-1,k} = (q+a) \cdot (q-b)$, then $a > b$: q is closer to q_L . High-skilled potential teachers may be over-qualified.
- (2) Given the skill-clustering mechanism, a high-skilled teacher will have the incentive to seek employment in a school with higher achievement target, and thus with high-skilled teachers (**Hypothesis 1**).
- (3) Given the skill-clustering mechanism, other teachers' quality drives up an individual teacher's wage (Figure 1; **Hypothesis 2**).

$$w(q_{i,k}) = (q_{i,k})^N \Theta_k \quad (3)$$

Θ_k : A composite measure of school characteristics.

- (4) Given the skill-clustering mechanism, achieving higher target is costly, as wage increases faster at higher quality level.

✧ **Empirical Framework:** Extended Mincerian (1974) wage equation:

$$\ln[w(q_{i,k})] = \ln(q_{i,k}) + \sum_{j \neq i} \ln(q_{j,k}) + \ln(\Theta_k) \quad (4)$$

$\sum_{j \neq i} \ln(q_{j,k})$: A measure of overall teacher quality of all other teachers in school k . Proxies for q : education, experience, teaching certification, etc.

Data:

- ✧ Gansu Survey of Children and Families (wave II) conducted in 2004.
- ✧ Sampling: County->Township->Village->2000 Children & their younger siblings-> All schools they attend + nearby schools-> All teachers in these schools.
- ✧ Teacher questionnaires collected information on individual teachers; principal questionnaires collected information on the overall characteristics of all teachers in the schools.

Empirical Results:

Table 2: Results of Testing H1 and H2

Variables	(1) H1	(2) H2
	Migration	Ln (Wage)
Edu	0.052 (0.021)***	0.063 (0.008)***
Exp	-0.030 (0.010)***	0.013 (0.004)***
Age	0.014 (0.010)	0.007 (0.004)*
Female	0.391 (0.021)***	-0.069 (0.021)***
PrimaryCert	0.100 (0.100)	0.527 (0.064)***
LowSecCert	0.144 (0.103)	0.616 (0.067)***
UpSecCert	0.136 (0.156)	0.531 (0.065)***
AvgEdu	0.159 (0.057)***	0.046 (0.022)**
AvgExp	-0.001 (0.006)	0.002 (0.002)
AvgFemale	0.752 (0.235)***	0.214 (0.089)**
AvgMarried	0.343 (0.237)	-0.125 (0.089)
%PrimCert	0.058 (0.328)	0.263 (0.107)**
%LowSecCert	-0.121 (0.279)	0.207 (0.102)**
%UpSecCert	1.190 (0.436)***	0.301 (0.145)**
Sample Size	2541	2541
(Pseudo)R ²	0.10	0.48

a. Migration: an ordered index of the extent of a teacher's migration status. Column (1) is estimated using the ordered probit model.
 b. wage: monthly wage = basic + Bonus + Benefits + Subsidy + Other (RMB). Mean wage=938 RMB.
 c. County fixed effects and a set of non-teacher characteristic variables are controlled for (not reported).

Conclusions:

- ✧ Theoretically, schools' cost minimization behavior could lead to high teacher salaries, even when there is no political factor that creates rents for teachers.
- ✧ Empirically, there is evidence of the skill-clustering mechanism in the teacher labor market in rural China:
 - (1) A high-skilled teacher is more likely to be a migrant. At the same time schools with high-skilled teachers are more likely to attract migratory teachers (**H1**).
 - (2) An individual teacher's wage is higher if he or she works with other high-skilled teachers (**H2**).