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Higher Schooling Investments and Poverty in the Indian Economy

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1. Introduction

The Government of India has historically placed a relatively high weight on investments in higher schooling, presumably because of the correlation between higher schooling investments and economic growth. Because credit constraints forge a close dependence of schooling attainment on household income, this pattern of schooling expenditure disproporionately favours wealthy households, whose children are more likely to complete the elementary and secondary schooling cycles and so enter into higher education. The likely impact of this expenditure pattern on schooling, and hence income, inequality could, however, be mitigated through the labour market, if the consequent increase in the supply of highly schooled skilled workers generated an increase in the demand for poor unskilled labour, and hence in unskilled wages. However, as discussed later in this paper, there appears to be no correlation between the stock of skilled labour and unskilled wages in the urban Indian economy.

This paper argues that the lack of correlation between higher schooling investments and the wages of the poor reflects the imperfect functioning of labor markets, specifically, wage fixation at above market-clearing levels in the formal economy and the effect of this wage policy on public sector employment. Put differently, the combination of labor market imperfections and a schooling policy which places excessive weight on higher schooling creates an environment conducive to the perpetuation of poverty and inequality in the Indian economy.

A theoretical literature provides the underpinnings for the hypothesis that market imperfections may limit pecuniary externalities and therefore affect the distribution of incomes in an economy. Banerjee and Newman (1993), Aghion and Bolton (1997) and others argue that lack of development of credit markets may limit the

growth of an entrepreneurial sector which uses hired labor, and hence the demand for unskilled labor. Low demand, combined with a large supply of unskilled labor, may generate persistent poverty and increased income inequality.

These models assume that there is only one productive sector which uses both skilled and unskilled labor. This is, of course, not so: most economies, particularly developing economies, comprise a formal (also referred to in the literature as the 'regulated' or 'covered' sector) and an informal sector. Labor market regulations, as well as regulations of other factor markets, which limit the growth of the formal sector, frequently result in a compensatory increase in informal sector production. Because the informal sector also provides the potential for skilled labor to combine with unskilled labor, market imperfections alone cannot explain the absence of pecuniary spillovers, though they may, of course, affect their magnitude.

This suggests that the lack of pecuniary externalities which operate through the demand for labour must be explained in the context of a three-sector model, in which employment conditions in the third sector have the potential to generate the economic segregation of skilled and unskilled labour. I argue that the public sector constitutes such a sector in the Indian economy.

The argument is simple. An increase in skilled labor (generated, for example, by an increase in government schooling expenditures) could generally be expected to lower wages for skilled labor and, perhaps, increases wages of unskilled labor through positive pecuniary externalities on the demand for unskilled labour. However, wage-setting and other market-distorting policies in covered sectors imply that wages in the informal unregulated economy are no longer determined by the aggregate demand for, and supply of, skilled labour. Instead, they will reflect *sectoral* demand and supply. Because

labor market imperfections curtail employment growth in the formal sector, an increase in the availability of skilled labor would still result in lower skilled wages in the informal sector, and possibly higher unskilled wages. However, if the government responds to lower skilled wages by offering increased employment to skilled labour, then the effects of schooling increases on informal sector wages may be minimal. Many have argued that reductions in the incomes or earning opportunities of politically influential groups *do* generate pressures for increased public sector employment (Gelb, Knight and Sabot 1991).

This paper is organized as follows. Section 2 provides descriptive statistics on schooling and public sector employment. It documents the higher-schooling bias which has historically charactertized the schooling policy of successive Indian governments. It also documents the raw correlation between the stock of skilled labour and unskilled wages. It then turns to descriptive data on the occupational profile of skilled labor. These data attest to the importance of public sector employment in the urban Indian economy.

Section 3 sketches a theoretical framework which shows how labour market distortions, specifically public sector employment rules, affect the availability of skilled labour to the informal sector and, through this, the wages of unskilled labour. Because these labour market distortions affect wages through their effect on the demand for labour, the theoretical framework emphasizes labour demand; the supply of unskilled labour is taken to be exogenous. I use this framework to show the wage effects of a schooling policy which increases investments in higher schooling only, thereby keepinig fixed the number of the unskilled. Clearly, increases in government expenditures for all levels of schooling do not fall in this category; increases in funding for elementary

schooling will almost certainly reduce the supply of unskilled labour. The results of this section are therefore best interpreted as evidence of the wage effects of a schooling policy which increases per capita expenditures on higher schooling relative to per capita expenditures on elementary schooling.

Section 4 provides regression evidence of the effect of the stock of skilled informal labour on the wages of the poor. First stage regressions on the determinants of the proportion of skilled labour in the private sector reveal that this proportion is increased by government investments in higher schooling, but that the effect of higher schooling expenditures is *lower* in regions where public sector wages are high. Taken together with complementary research (Kochar 2003) which shows that government employment increases with public sector wages, these results suggest that public sector employment reduces the effect of government higher schooling expenditures on the private workforce. Second stage regressions of the wages of the poor on the proportion of skilled labour in the private workforce provide evidence that increases in skilled labour employment in the private workforce do increase unskilled wages. Taken together, these results suggest that reductions in public sector wages would significantly increase the spillover benefits from government expenditures on higher schooling for the poor.

The policy implications are clear. Schooling policies which favour higher schooling must be accompanied by labor market reforms to ensure that their benefits percolate to the poor. Specifically, reforms which reduce the public-private sector wage differential and so reduce public sector employment to efficient levels need to be

implemented. In the absence of such reforms, a concerted effort must be made to ensure that the poor are able to access *all* levels of schooling, including higher schooling.

2 Schooling and Public Sector Employment in India

2.1 *Trends in Schooling*

The Government of India has, historically, placed great emphasis on higher schooling investments. Indeed, in the early stages of planning, the level of expenditure on higher education exceeded the amount spent on elementary schooling: In the Second Five Year Plan period, the financial provision for University, Technical and Vocational Eduction by the Centre and the States, at Rs. 105 crores, far exceeded the Rs. 89 crores for elementary schooling.

Since then, then Government has substantially increased its expenditure on elementary schooling, which now accounts for 49% (1998-99) of total schooling expenditures by central and state governments. Expenditure on university and higher schooling currently account for 13% of the schooling budget. However, India still spends relatively more on higher schooling than do many Asian economies with higher levels of schooling attainment. Figure 1 graphs the distribution of government schooling expenditures across primary, secondary and tertiary levels of schooling for various economies, and also displays their secondary enrollment rates as one measure of schooling attainment. India's allocation to tertiary schooling is on par with countries such as Malaysia, the Phillipines, Thailand and China, all economies with far higher levels of schooling attainment.

More importantly, the data reveal that India's *per student* schooling expenditures remain highly skewed in favour of higher levels of schooling. Government expenditures

per student enrolled at higher levels of schooling amounts to Rs. 9,125.6 (1998-99). This figure far exceeds expenditure per student in elementary (Rs. 1,617.5) and secondary (Rs. 5,436.1) levels.[1] Moreover, per student expenditures at higher levels of schooling have grown faster than expenditures at elementary levels. In 1980, India's per student expenditure on primary schooling, as a percentage of GNP per capita was 10.5%. By 1997, this had increased marginally to 11.4%. Conversely, per student expenditure on tertiary schooling as a percentage of GNP per capita increased from 88.2% to 99.8% in this same period.

India's disproportionate allocation to higher schooling is most evident when we compare economies in terms of their per student expenditure at different schooling levels as a percentage of per capita GDP (1997). Figure 2 graphs the data for a number of economies. The percentage expenditure on higher schooling (per student) in India (99.8%) ranks amongst the highest of all economies, far exceeding corresponding figures for economies such as Malaysia (57.3%), Thailand (26.7%), the Philippines (14.8%), and even the United States (24.6%) and the United Kingdom (40.7%).[2]

Given the dependence of schooling attainment on household incomes, the substantial bais in government expenditures towards higher schooling suggests that government expenditures are likely to accrue disproportionately to wealthy households. Survey data (NSS 50th round, 1999-2000) reveal, for example, that only 8% of males from the lowest quartile of the per capita expenditure distribution have completed 12 or more years of schooling, in comparison to the 45% of those in the highest expenditure quartile who have done so. To estimate government schooling expenditures per student

[1] Data are from Government of India, Ministry of Education (2000-01) and from Ministry of Science and Technology (2000-01).
[2] These data are from the 2000 World Development Indicators.

by expenditure quartiles, I construct a weighted average of government schooling expenditures at different levels (elementary, secondary and tertiary), with the weights given by the proportion of children in the relevant age and expenditure group enrolled in *public* schools at the level under consideration.[3] Figure 3, which tabulates these estimates of the mean government expenditure per student for each quartile of the (regional) per capita expenditure distributio, clearly reveals the regressive nature of public schooling expenditures.

Not surprisingly, then, the Indian economy is characterized by signficant inequality in schooling attainment (Kochar 2002). Figure 4 uses National Sample Survey data (rounds 38 and 50) to graph mean years of schooling of urban males between the ages of 15 and 20, by expenditure quartiles, for the years 1983 and 1999. Youth from wealthy households are more educated and have experienced the fastest growth in schooling years. The improvement in schooling for those in the bottom expenditure quartile has been marginal, reflecting the strong influence of household wealth on schooling, but also, perhaps, schooling policies which continue to disproportionately favour investments in higher schooling.

As noted in the previous section, this substantial bias in favour of higher schooling may still percolate to the poor if the growth in skilled labor increases the demand for unskilled labor and hence unskilled wages. However, survey data from the 55th round of the National Sample Survey reveal very little correlation between the numbers of skilled labor and the wages of those in the bottom quartile of the expenditure distribution. Figure 5 plots the regression line from regressions, run

[3] Specifically, I use two rounds of the NSS surveys which report enrollment in public and private schools (NSS 42nd and 52nd rounds, for 1986 and 1995 respectively). 42nd round data provide details of elementary school attendance for those of ages 6 to 13, while 52nd round data provide details of enrollment for the same cohort, but at higher levels of schooling.

separately for each of the major states, of the real daily wages of the poor[4] on the proportion of the regional labor force with 12 or more years of schooling. It also plots a similar line based on a residual wage regression, which controls for state-level determinants of wages, as well as for age effects.[5] There is little evidence of any positive effect of the stock of skilled labour in any given region on wages of the poor.

To understand the correlation (or lack thereof) between the availability of skilled labour and the wages of the unskilled, it is necessary to examine where the highly-skilled are employed. The data reveal that a significant proportion of the skilled are employed in the public sector. I discuss the occupational profile of the population and the nature of the public sector below.

2.2 Public Sector Employment in India

It is difficult to underestimate the importance of the public sector for employment in India, particularly urban India. ILO data on public employment as a proportion of total (formal) employment for a set of 72 developing and developed economies places India at the top of this list, with public sector employment accounting for as much as 70% of total formal employment (1995). This contrasts with a proportion of 36% in China, 19% for the UK, 16% for the US and Mexico, 8% for Japan and 5% for the Philippines (figure 6).

The very high percentage is, of course, a reflection of the small size of India's formal sector. However, NSS data on the occupational distribution of the population reveal that public sector employment is significant, even for the economy as a whole

[4] Here and in the remainder of this paper, I take the poor to be individuals in households whose per capita expenditure places them in the lowest quartile of the regional per capita expenditure distribution.
[5] The dependent variable is the residual from a regression of log daily wages on age, squared age and a set of dummy variables for the state of residence.

(table 1). In 1993, of urban males between the ages of 25 and 60, as many as 27% were employed in the public sector.[6] The data also confirm the very large role of the government sector in wage employment (casual and salaried): It accounts for 48% of total wage employment and 60% of employment amongst those who earn regular salaries.

In 1999-2000, just over half of public sector employment (51%) was in community, social and personal services. The second largest sector was transport, storage and communication (16%). Manufacturing accounted for just 8% of public sector employment, while the financial, insurance and real estate sectors accounted for 7%.[7] In contrast, employment in the (organized) private sector is concentrated in the manufacturing sector, which, in 2000, employed 59% of the private workforce. 19% of private sector employment was in the community, social and personal services sector, while the financial, insurance and real estate sectors employed 4% of the total.

The concentration of public sector employment in the community, social and personal services sector, a skill intensive sector, results in the government employing a disproportionate number of the highly educated. Disaggregating the data by three broad levels of schooling (primary or less, middle and secondary, and higher secondary or more) reveals that, in 1993, fully 45% of the urban "skilled" population, those with at least a higher secondary education (12 years of schooling), were employed in the public sector (table 1). Of the skilled in "salaried" jobs, 73% were government employees. Looking across the public sector, in contrast to the 30% of the population schooled to the level of higher secondary school or beyond, 50% of government employees fall in

[6] Restricting attention to the economically active population raises this percentage marginally to 28%.
[7] All data are from the Ministry of Labor (DGE&T).

this category. And, only 16% of public sector employees have less than 6 years of schooling, even though this percentage is 37% for the male urban population as a whole.

The concentration of government employment amongst those with relatively high schooling implies that it is also concentrated amongst the relatively wealthy. By quartile of the per capita expenditure distribution, 42% of those in public sector employment in 1993 came from the highest expenditure quartile, and only 13% from the poorest. As a proportion of the population in each of these wealth categories, 39% of households at the top of this distribution were employed in the government sector, while only 11% of the poorest households were.

As in other economies, average wage earnings in the public sector exceed those in the (organized) private sector.[8] Data from the Annual Survey of Industries, 1996-97 (Table 2) reveal that the difference between the public and private sector daily wage for the country as a whole was Rs. 65 per day; it was as high as Rs. 220 in Madhya Pradesh, and Rs. 180 in Kerala.

A succession of Pay Commissions, appointed by the Government, review and recommend Central Government pay scales. A perusal of the deliberations of the Pay Commissions suggest that pay scales are set by factors other than the relative size of the government sector or the productivity of government employees. For example, the deliberations of the Fifth Pay Commission were guided by the disparity between the minimum and maximum salaries paid to government employees (it reversed the trend set by previous Commissions towards ever-narrowing disparities, increasing the pre-tax disparity ratio from 8.0 in 1996 to 10.7), and by the pay packet received by CEOs in the private sector.

[8] Gregory and Borland (1999) document this for the OECD economies.

The Pay Commission's recommendations are not binding on the Government, and the final decision regarding wage scales reflects a process of collective bargaining with government unions. In this process, many believe that the strength of public sector unions dominates.[9] And, though the Pay Commission recommends wages for Central Government employees only, pressure by state level unions has generally resulted in the recommendations also being adopted by state governments.

As in the public sector, wages in the formal private sector are not set competitively, but instead are the result of a collective wage bargaining process between management and industry-specific unions which operate at a regional level. Because the public and private sectors are concentrated in quite different industries, the unions which determine wages in each of these two sectors are correspondingly quite distinct.

The Fifth Pay Commission, whose recommendations were implemented in 1997-1998, sharply raised the salaries of Central Government employees: the salary bill and pension payments of the Central Government civil ministries and departments, including defense services, escalated by 34% and 35% respectively in this year.[10] As a consequence, salaries and pension payments now absorb more than one-fifth of the total revenue receipts of the Central Government. Pressures from state level unions resulted in state governments bringing salary levels more or less on par with central government salaries.

The Pay Commission recommended downsizing of the size of government by at least 30% over a 10 year period, primarily through attrition. While many have doubted

[9] Union Finance Minister, Yashwant Sinha, was candid enough to state that the United Front government buckled under the pressure of the unionized government employees in awarding government employees wage increases which, in some instances, exceeded the recommendations of the Pay Commission (Financial Express, 14 April, 1999).

[10] These data exclude wage payments for those employed in Telecom, Post and Railways.

the willingness of state governments to significantly reduce their size, NSS survey data reveal a considerable decline in the proportion of urban males employed in the public sector between 1993 and 1999-2000 (table 1). In 1993, 27% of males in urban India between the ages of 25 and 60 were employed in the public sector. By 1999-2000, this percentage had fallen to 18%. Despite this decline, the public sector remains large, particularly if one restricts attention to regular wage employees, of whom 45% are employed in the public sector.

The NSS surveys represent the only publicly available data set which surveys individuals on their employment in public and private sectors. Because the breakdown of employment between the public and private sectors is only available for the 55th and 50th rounds, it is not possible to verify the decline in the relative importance of the public sector, subsequent to the Fifth Pay Commission Report, through other NSS household surveys.

The only other source of data on public sector employment is the data collected by the Directorate General of Employment and Training, Ministry of Labour, under the Employment Market Information (EMI) programme which collects employment data from all organized sector establishments. These data, graphed in figure 7, show that the *total number* of people (male and female) employed in the public sector remained essentially unchanged between 1993 and 1999-2000. The number of *male* public sector employees, however, fell by approximately 3%. Since the number of males in the labour force increased by approximately 11% over this period, these data also suggest a significant decline in the proportion of the male lahour force employed in the public sector, of approximately 14%.

The EMI data do not report public sector employment separately for rural and urban areas. It is likely, however, that the proportion of males employed in the public sector in *urban* areas fell by more than the proportion for all males. One reason is that the urban workforce has been growing at approximately double the rate of the total workforce.[11] Thus, an equal decline in the number of males employed in the public sector in urban and rural areas would translate into a bigger relative decline in the *proportion* of the urban male labor force employed in the public sector. A breakdown of the data by industry (table 3) also reveals that public sector employment fell most substantially in manufacturing industries, which are concentrated in the urban sector.[12]

Finally, EMI data on public sector employment by state also suggest a relatively large decline in urban public sector employment. An examination of employment trends in primarily urban areas such as Delhi and the union territory of Chandigarh reveal that the decline in the proportion of the total workforce employed in the public sector was significantly larger in these areas then in other regions. In Delhi, the proportion of males employed in the public sector fell from 20% (1993) to 14% (1999-2000). The corresponding percentages for Chandigarh are 26% (1993) and 19% (1999-2000) respectively. While trends in other urban areas may certainly differ from those in Delhi and Chandigarh, these data are nevertheless suggestive of a significant decline in urban public sector employment in this period.

The 1999 NSS data also provide a breakdown of employment in the organized and unorganized private sector. Organized sector employment remains very low: this

[11] The urban male workforce grew at 4% between 1990 and 2000, while the total male workforce grew at 2.2%. The comparative data for the workforce growth rate for males and females combined are 4.1% (urban) and 2.2% (total).
[12] The 1993 NSS survey reports that 83% of those who reported public sector employment in manufacturing industries were located in urban areas.

sector employs 6% of the urban male population. Of those with higher education, only 9% are employed in the formal sector.

3 Theoretical Framework

In this section, I sketch models of wage determination in multi-sector economies, emphasizing how the effect of higher schooling on unskilled wages is affected by occupational choice. I start with a simple two-sector model of the formal and informal sector. I then show how the introduction of a third sector, the public sector, affects the main results.

Because the objective of this paper is to examine the factors which condition the spillover effects from schooling investments on wages through production, the models of this section analyze "demand-side" effects only. More generally, schooling investments would affect both the demand and supply of labour, and the net effect on wages would depend on the relative magnitude of the shift in these schedules. The results of this paper are therefore best viewed as providing a framework for understanding just one side of the story: the effect of schooling on labour demand.

I isolate demand-side effects by assuming that the economy wide endowments of skilled and unskilled labour, L^s and L^u, respectively, are exogenously determined. This would be the case if skill categories are determined by the distribution of schooling in the economy, not by the level of schooling. For example, the unskilled may constitute the bottom quartile of the schooling distribution, so that their number remains fixed, even as their average level of schooling increases. In this framework, government

schooling investments increase the efficiency (human capital) of each type of worker, but have no effect on the numbers of skilled and unskilled workers.[13]

3.1 A Two-sector Regulated Economy

I start by considering a two-sector private economy comprising a regulated or formal sector (sector f) and an informal sector (sector i). Both sectors produce the consumption good y.

The formal sector does so using a capital-intensive technology which requires investment at some level exceeding a fixed minimum. Credit markets are imperfectly developed, so that access to credit and hence to formal sector production, is restricted by wealth. For simplicity, I assume that the formal sector employs only skilled labour. Wages are exogenously set by unions at w_f. At this level, the supply of skilled labour exceeds demand. Employment in the formal sector is therefore demand determined at $L^s_f = L_f(w_f, K)$, $L_{f\square}(w_f)<0$.

The informal sector (sector i) does not use capital, but produces the consumption good using efficiency units of skilled (H_i^s) and unskilled (H_i^u) labor, according to the production function: $y_i = y_i(H_i^s, H_i^u)$, where, for each individual j of skill type k,

(1) $$\ln H_j^k = f^k(X_j^k) \qquad k=s,u$$

The vector X includes individual characteristics which determine human capital, but also variables such as government investment in schooling which affect schooling

[13] This assumption is also incorporated in the empirical analysis that follows.

attainment. X is defined such that $f^{k'}(X_j^k) > 0$. For example, increased investment by the government in higher schooling would increase the availability, in efficiency units, of skilled labour.

The return to a unit of human capital of skill k in the informal sector (i) is ω_i^k:

$$\omega_i^k = \frac{\partial y_i}{\partial H_i^k}(H_i^s, H_i^u) \qquad k = \text{s,u} \tag{2}$$

This equation generates the aggregate demand for efficiency units of skilled and unskilled human capital in the informal sector, the summation of demand across all firms in this sector.

I assume that the existence of the informal sector guarantees full employment in the economy.[14] The total amount of skilled labour available to the informal sector is $L^s - L_f^s$, with associated human capital $\overline{H}_i^s$. Let K □ be the set of skilled workers who are not employed in the formal sector, and let g(X,θ) be the density of X, where θ is a vector of parameters. Then $\overline{H}_i^s = \int_{K'} f^s(X^s) g(X^s \mid \theta) dX^s$. Because employment in the formal sector, and hence the set K □□ ,reflects the formal sector wage, the sectoral supply of skilled workers varies with both X^s and w_f, $\overline{H}_i^s = \overline{H}_i^s(X^s, w_f)$. The aggregate supply of efficiency units of unskilled labour, $\overline{H}_i^u = \overline{H}_i^u(X^u)$, does not reflect w_f, since unskilled labour is employed only in the informal sector.

[14] This assumption distinguishes the model from probabilistic migration models, such as the Harris-Todaro model, which generate un-employment. Because the informal and formal economies exist in the same geographical space, there are no migration costs which generate un-employment. However, the assumption of full employment requires the assumption that, for all individuals, the market clearning wage exceeds their reservation wage.

Wth full employment, the following conditions must be met:

(3) $$H_i^{ds}(\omega^s, \overline{H}_i^u(X^u)) = \overline{H}_i^s(X^s, w_f)$$

$$H_i^{du}(\omega^u, \overline{H}_i^s(X^s, w_f)) = \overline{H}_i^u(X^u)$$

These conditions reveal the difference in wage determination in economies with imperfect labor markets, relative to those with fully competitive markets. As earlier noted, in a fully competitive labor market, the sectoral distribution of skilled labour has no implication for wages; all that matters is aggregate availability. This is no longer true in markets where wage rates are exogenously determined in some sectors at levels which exceed the market clearing wage. Employment, in these "covered" or regulated sectors, is demand determined. In uncovered sectors, wages will be determined by the market clearing condition (3). However, the relevant labor demand and supply schedules are the *sector-specific* schedules: wages reflect demand and sectoral labor availability.

From the first order condition (2) and the full employment conditions (3), the equilibirum wage per unit of efficiency labour, ω_i^k, k=s,u, is:

(4) $$\omega_i^s = \omega_i^s(X^s, X^u, w_f)$$

$$\omega_i^u = \omega_i^u(X^s, X^u, w_f)$$

Comparative static results for the effect of government investments in higher schooling (X^s) on skilled and unskilled efficiency wages can be derived from (3). In particular:

(5) $$\frac{d\omega_i^s}{dX^s} = \frac{\frac{\partial \overline{H}_i^s}{\partial X^s}}{\frac{\partial H^{ds}}{\partial \omega_i^s}}$$

(6) $$\frac{d\omega_i^u}{dX^s} = \frac{-[\frac{\partial H_i^{du}}{\partial \overline{H}_i^s(X^s)} \frac{\partial \overline{H}_i^s}{\partial X^s}]}{\frac{\partial H_i^{du}}{\partial \omega_i^u}}$$

Under standard assumptions on demand functions, $\frac{d\omega^s}{dX^s} < 0$.The effect of investments in higher schooling on unskilled wages depends on whether skilled and unskilled labor are complements or substitutes. If complements, then $\frac{d\omega^u}{dX^s} > 0$.

This result reflects the assumption that formal sector production does not depend on efficiency units of labour, but rather on physical units. Because of this assumption, and because schooling investments do not increase the number of the skilled, an increase in government expenditures on higher schooling increases the supply of efficiency units of skilled labor in the informal sector. If we relax this assumption, then the increased efficiency of skilled labor would increase the number of efficiency units of skilled labor employed in the formal sector, thereby reducing supply to the informal sector.

The primary objective of this research, however, is to examine how public sector employment affects the relationship bewteen higher schooling investments and unskilled wages. And, while allowing formal sector production to be dependent on efficiency units of labour alters the results of the two-sector model, it does not alter the

comparison of the results between the two-sector economy and the three-sector economy, which I discuss shortly.

The above analysis relates to efficiency wages. Given (1) and (2), the wage (per unit of labour) for individual j of skill type k in sector i is:

(7) $$\ln w_{ij}^k = \ln \omega_i^k + f^k(X_j^k) \qquad k=s,u$$

Because the unskilled have less than a high school education, government investments in higher schooling affect their wages only through their efficiency wages. However, investments in higher schooling (X^s) affect the wages of the skilled both through their effect on the price of an efficiency unit of skilled labor (ω^s) and through their effect on the efficiency of each worker. In what follows, I assume that the effect through ω^s dominates, so that $\frac{d\omega^s}{dX^s} < 0$.[15]

2.3 A Three Sector Economy with a Public Sector

I now incorporate an additional sector, the public or government sector, and examine the effect of public sector employment on wage determination in the informal sector, and on the relationship between schooling expenditures and wages. To keep the exposition simple, I abstract from political issues such as voters' preferences for different political parties or platforms, allowing only for the party in power to make choices regarding government employment on the basis of voters' utility functions. The model therefore emphasizes the redistributive and productive role of governments. The

[15] This accords with empirical evidence that the effect of aggregate conditions on individual wages dominates the effect of individual characteristics, such as schooling.

model is static, in that employment decisions do not take into account the effect of government produced goods, such as schooling, on future output.

I assume that government decisions reflect a two-stage process. In the first stage, the response of wages to any given level of government employment is determined. These conditional wage response functions serve as constraints on government employment in the second stage, where government employment is determined, taking into account the effect of employment on wages.

Government production:

The government sector, sector g, produces a public good Z (schooling, health) using only skilled labour (L^s_g) and fixed capital K_g. Production is given by the function $Z = Z(L^s_g; K_g)$. As in the formal sector, wages, w_g, are exogenously determined by government unions at a rate which exceeds the market clearing wage.

Informal Sector Wage Response Functions:

The set of skilled labour employed in the informal sector is now K″, and they number $L^s - L^s_f - L^s_g$, with aggregate human capital redefined as $\overline{H}^s_i = \int_{K''} f^s(X^s) g(X^s \mid \theta) dX^s$, $\overline{H}^s_i = \overline{H}^s_i(L^s_g, w_f, X^s)$. Positive government employment therefore reduces the stock of skilled labour available to the informal sector. Because aggregate labor supply of skilled labor to the informal sector varies with public sector employment, the wage equations (4) are modified to generate the conditional response functions:

(8)
$$\omega^s_i = \omega^s_i(X^s, X^u, w_f, L^s_g)$$
$$\omega^u_i = \omega^u_i(X^s, X^u, w_f, L^s_g)$$

An exogenous increase in government employment reduces the supply of skilled labor (and hence efficiency units of skilled labor) to the informal sector, generating an increase in the informal sector efficiency wage for skilled labor. The reduction in the equilibrium stock of skilled labor affects unskilled wages through the demand for unskilled labor. If skilled and unskilled labor are complements, then the reduction in skilled labor availability will *reduce* unskilled wages.

Preferences

I assume that there are two types of agents in the economy, the skilled and the unskilled. As previously discussed, the proportion of skilled agents is fixed at β. Both types derive utility from the consumption of the private good, y, and the public good, Z. Consumption of the private good is determined by income and hence by wages. For simplicity, I assume that the indirect utility function takes the separable form, V = v(w) + α_k Z, k=s,u. Expected utility of a skilled agent is therefore:

(9) $$V^s = \sum_m (v^s(w_m^s) + \alpha_s Z) p_m^s)$$

where m=f,i,or g, and $\sum_m p_m^s = 1$.

Expected utility of an unskilled agent is:

(10) $$V^u = v(w_i^u + T) + \alpha_u Z$$

where T represents monetary transfer payments from the government.

Government Employment

I assume a federal structure whereby the central government provides block grants (G) to state governments (financed by taxes on production in the formal sector) and state governments determine public sector employment. Let φ^s be the weight placed by the state government on the utility of skilled agents, and φ^u be the weight on the utility of the unskilled.[16] The state government chooses L_g^s, employment in the public sector, and transfer payments T to maximize:

(11) $\quad \text{Max} \quad \beta\varphi^s V^s(.) + (1-\beta)\varphi^u V^u(.)$

subject to the wage response equations and to the budget constraint:

$$w_g L_g^s + T \leq G$$

The first order condition for g is:

(12)
$$\frac{\partial Z}{\partial L_g^s}[\beta\varphi^s\alpha_s + (1-\beta)\varphi^u\alpha_u] + \frac{\varphi^s}{L}(v^s(w_g^s) - v^s(w_i^s)) + \beta\phi^s p_i^s \frac{\partial v^s}{\partial w_i^s}\frac{\partial w_i^s}{\partial L_g^s}]$$
$$+ (1-\beta)\varphi^u \frac{\partial v^u}{\partial w_i^u}\frac{\partial w_i^u}{\partial L_g^s} - \lambda w_g \quad = \quad 0$$

where λ is the Lagrange multiplier on the government's budget constraint.

The first order condition yields the following solution for skilled employment in the public sector:

[16] These weights will generally be a function of underlying variables. I ignore this for now, and think of them as parameters.

(13) $$L_g^s = L_g^s(w_g, w_f, X^s, X^u, G, \beta, \varphi^s, \varphi^u)$$

From (12), public sector employment is chosen not just with productivity considerations ($\frac{\partial Z}{\partial L_g^s}$) in mind, but also on the basis of the direct effect of government employment on incomes and utility. Specifically, the government recognizes that increases in public sector employment benefit the skilled, while reducing the welfare of the unskilled through their wages, w_i^u.

An analysis of the comparative statics of the problem[17] reveals how this trade-off affects the response of the government to changes in exogenous parameters such as w_g or w_f. For example, the effect of the public sector wage on government employment depends on how the government values the gains to the skilled relative to the cost to the unskilled; in addition to the effect of wages on utility, the relative weights, φ^s and φ^u, are important.[18] If greater weight is placed on the welfare of the skilled, then any union-bargained increase in government wages will increase public sector employment. Similarly, an increase in the (private) formal sector's skilled wage, w_f, because it reduces the demand for skilled labor in the formal sector, increases the supply of skilled labor to the informal sector. This will reduce skilled wages in the informal sector and, possibly, increase unskilled wages. The reduction in incomes of the skilled will generate an

[17] These are available from the author on request.

[18] Specifically, the effect depends on the sign of $[\frac{\varphi^s}{L}\frac{\partial v^s}{\partial w_g} - w_g^2[(1-\beta)\varphi^u v''(w_i^u + T)]^2 \frac{\partial w_i^u}{\partial L_g^s}]$

offsetting increase in government employment. The extent to which it does will, however, vary with the effect of increased government employment on unskilled wages, and the weight placed by the government on the welfare of the poor.

The effect of investments in higher schooling on government employment similarly reflects wage effects. The negative effect of an increase in skilled labour on skilled wages will generate an offsetting increase in government employment, which benefits the skilled. The increase in skilled labour will also affect unskilled wages. However, the net effect of higher schooling investments on public sector employment will remain positive, even if an increase in the stock of skilled labour reduces unskilled wages, as long as the government places greater weight on the preferences of skilled labour.[19]

Equilibrium Informal Sector Wages:

The solution for government employment (13) allows us to return to the informal sector wage equations and consider how the introduction of the public sector affects the relationship between higher schooling investments (a component of the vector X^s) and unskilled wages. Rather then (3), the full employment conditions are now:

$$(14) \qquad H_i^{ds}(\omega^s, \overline{H}_i^u(X^u)) = \overline{H}_i^s(X^s, w_f, L_g^s)$$

$$H_i^{du}(\omega^u, \overline{H}_i^s(X^s, w_f, L_g^s)) = \overline{H}_i^u(X^u)$$

[19] The effect of X^s on L^s_g is determined by the sign of:

$$\beta\phi^s[-\frac{1}{L}v'(\omega_i^s) + p_i^s v''(\omega_i^s)\frac{\partial\omega_i^s}{\partial L_g^s}]\frac{\partial\omega_i^s}{\partial X_i^s} + (1-\beta)\phi^u v''(\omega_i^u)[\frac{\partial\omega_i^u}{\partial L_g^s} - w_g]\frac{\partial\omega_i^u}{\partial X^s}$$

Consequently, the comparative static effect of investments in higher schooling (X^s) on unskilled wages now also reflects their effect on government employment:

$$(15) \qquad \frac{d\omega_i^u}{dX^s} = \frac{-\left[\frac{\partial H_i^{du}}{\partial \overline{H}_i^s}\frac{\partial \overline{H}_i^s}{\partial X^s} + \frac{\partial H_i^{du}}{\partial \overline{H}_i^s}\frac{\partial \overline{H}_i^s}{\partial L_g^s}\frac{\partial L_g^s}{\partial X^s}\right]}{\frac{\partial H_i^{du}}{\partial \omega_i^u}}$$

If skilled and unskilled labor are complements, then a positive effect of government investments in higher schooling on public sector employment *reduces* their otherwise positive effect on unskilled wages. Many believe that the government does, in fact, serve as an "employer of last resort," with public sector employment being response to income and employment conditions in other sectors of the economy (Gelb, Knight and Sabot 1991, Rodrik 2000). If so, the results of this section suggest that, under a set of assumption on informal sector production, public sector employment rules may limit the possibility of redressing schooling inequalities, caused by policies which favour higher schooling, through the labor market.

4. Empirical Evidence

In this section, I report regression results which show that the wages of the poor, those in the bottom quartile of the per capita expenditure distribution, *do* increase with the proportion of the labour force in the private sector with higher levels of schooling. Because the vast majority of the poor are employed in the private sector (89%), the regressions are based on the sample of the poor in this sector.

I report results from both OLS and instrumental variables (IV) regressions. In the IV regressions, the skilled labor force in the private sector is instrumented with variables which determine investments in schooling and the occupational choices of the skilled, including government expenditure on higher schooling and the public sector wage. The first stage regression results from the instrumental variables approach therefore also provide evidence on the factors which mediate the relationship between government expenditures on higher schooling and the availability of skilled labor in the private sector.

4.1 Data

The principal data source is the urban sample of the 50th (1993) and 55th (1999-2000) rounds of the National Sample Survey Data on Employment and Unemployment. These surveys provide data on wages, occupations and schooling levels for a large sample of urban (and rural) individuals, as do earlier surveys. The 50th and 55th rounds also provide information on whether the individual was employed in the public or private sector, thereby providing the necessary data for this analysis.[20] Each state is divided into a number of homogenous regions, and I calculate schooling aggregates by aggregating the survey data at the level of the region. I restrict the analysis to the 17 major states that, together, comprise 62 regions. The availability of two years of survey data enable controls for time-invariant determinants of wages (and schooling) through a set of regional dummy variables, thereby removing an important source of bias in the estimated coefficients.

[20] The 50th round provides this breakdown only for those in "salaried" jobs (status group 31). I define public sector employment in the 1999-2000 survey correspondingly. The 1999-2000 survey reveals that, of those in "casual wage" employment, only 2.8% report employment in the public sector: public sector employees almost exclusively earn regular salaries.

The basic survey data is matched with data from a large number of secondary sources on government schooling expenditures, government revenues, private sector wages and the number of teachers. Private sector wages are wages in "formal" manufacturing industries reported in the Annual Survey of Industries. These data, reported by 3-digit industry classification, are aggregated to the regional level, based on the proportion of regional employment in each of the industries. I base this aggregation only on wages in the manufacturing sector, since this sector provides the major source of employment in the private sector. Since the public sector undertakes little manufacturing activity, it is unlikely that the manufacturing wage reflects unobserved determinants of government employment.

The measure of government schooling expenditure is constructed by using a time series of data on total schooling expenditure (by central and state governments) at the secondary and higher secondary level, commencing from 1951-52. I divide the adult male population (ages 25 to 60) into five-year cohorts and, for each cohort, I identify the relevant per capita schooling expenditure for the time period when the cohort was of ages 15 to 20. I then measure government schooling expenditure by weighting the cohort-specific per capita schooling expenditures by the proportion of the adult population in the relevant cohort.

Appendix A provides information on all data sources.

4.2 The Empirical Wage Equation

The wage equation I estimate derives from equation (7), which shows that the wages of the unskilled in the informal sector vary with the aggregate amount of skilled

labor in the private sector.[21] Rather than define the unskilled by levels of schooling,[22] I define them by expenditure group. Under the assumption that the private market for unskilled labor encompasses both the formal and the informal market,[23] the wage equation is estimated on the sample of private sector wage-earners in the lowest expenditure quartile in the region. The empirical equation takes the following form:

$$(16) \qquad \ln(w_i) = \alpha_o + \alpha_1[\overline{\Pr(skilled \mid private)}] + W_i' \alpha_2 + \alpha_3 \lambda_i + \varepsilon_i$$

The vector $\mathbf{W}_i$ represents determinants of wages such as age, age squared, an indicator for scheduled caste or tribe, per capita expenditure (as a proxy for wealth), and regional variable such as the average per capita expenditure in the region and the share of the region in the state's population. Because the regression is run only on the sample of wage-earners, a control is necessary for sample selection bias. Following standard procedures (Heckman 1979), the regressors therefore include λ_i, the inverse Mill's ratio, estimated from a probit regression on particpation in the wage labor markets.[24] The wage equation also includes a full set of regional dummy variables. This ensures that the estimated coefficient on the aggregate schooling variable does not reflect any time invariant unobserved region-specific factors.

[21] In allowing individual wages to depend on aggregate quantities, I follow research by Heckman, Layne-Farrar and Todd (1996), who in turn build on earlier work by Sattinger (1993).

[22] Doing so would make it difficult to control for sample selection bias, since selection into the sample would reflect the individual's schooling, which is, of course, a direct determinant of wages.

[23] The NSS data for 1999-2000 reveal that only 3% of those in the lowest expenditure quartile were employed in the formal sector. Any bias caused by aggregating formal and informal private sector employment is therefore likely to be small.

[24] In addition to the usual non-linearities which identify the selection correction term, I also include the demographic composition of the household (the proportion of the household in 12 sex-age groups) on the assumption that these factors affect the household's choice between self-employment and wage work.

I report results from both OLS regressions and instrumental variable (IV) regressions. The IV regressions control for the endogeneity of the aggregate schooling variable, the proportion of the private labor force with higher levels of schooling. The instrument set I use derives from the recognition that the proportion of skilled labor in the private workforce reflects the joint decision on investment in higher schooling and the occupational choice decision to enter the private sector. As shown by Lee (1982), any bivariate distribution can be proxied by a non-linear univariate function of the determinants of each of the marginal distributions. I therefore include determinants of higher schooling (government expenditures on higher schooling), determinants of the choice between public and private sector employment (public and formal sector wages and government revenues), and their interactions in the instrument set. Kochar (2003) estimates a bivariate model of schooling and occupational choice, and shows that these variables (government expenditure on higher schooling, government revenues, and public and formal sector wages) affect schooling and the choice between employment in the public and private sectors.

4.3 Results

Table 4 reports results from the first stage regression of the proportion of the private work force with higher schooling. These results confirm that the effect of government higher schooling expenditures on this proportion *does* depend on the alternative opportunities of the skilled in the public sector. Specifically, an increase in the public sector wage reduces the effect of higher schooling expenditures on the skill composition of the private sector: The coefficient on government schooling expenditure, calculated at the mean level of all relevant variables, is only 0.14, but increases to 0.67 if

we set the public sector wage equal to zero. These results suggest that high public sector wages[25] substantially reduce the spillover benefits from government higher schooling expenditures.

The reduced form first stage regression results reflect the combined effect of the regressors on the probability of receiving a higher education and the choice between public and private sector employment. Thus, while based on a model of occupational choice, they cannot be used to infer the determinants of public sector employment, and hence the direct effect of public sector employment on the skill composition of the private sector. As previously noted, Kochar (2003) reports results from a structural bivariate analysis of schooling and occupational choice, which confirms the role of the public sector wage and government revenues in public sector employment rules.

Table 5 reports the results from an OLS regression of (log) real wages of the poor in the private sector on the proportion of the private labour force with more than 12 years of schooling, as well as a set of instrumental variable regressions based on the first stage regression results of the previous table. Both the OLS and the first IV regression reveal that an increase in the ratio of skilled workers to total workers in the private sector *does* significantly increase the wages of the poor employed in this sector. The higher IV estimates suggest that the failure to control for the endogeneity of the occupational choice to work in the private sector would under-estimate the magnitude of this effect. Calculated at the mean value of the regressors, the estimates sugggest that a 10% increase in the proportion of the private labor force with 12 or more years of

[25] The survey data reveal that public sector wages (averaged over the two survey years) are higher than the all-India mean in the states of Andhra Pradesh, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Punjab, Tamil Nadu and Uttar Pradesh.

schooling would increase wages of those in the lowest per capita expenditure quartile by approximately 2%.

The inclusion of government schooling expenditures and government revenues in the set of instruments may not be valid: higher schooling investments may be correlated with investments at lower levels of schooling, and government revenues may directly affect the wages of the poor through their effect on infrastructural investments and other programs which affect the poor. The second IV regression of table 5 therefore includes government schooling expenditures and revenues as explanatory variables, removing their (linear) effect from the instrument set. The results remain unchanged: an increase in the skill composition of the private labor force substantially affects the wages of the poor. Moreover, higher schooling expenditures have no significant direct effect on the wages of the poor; they influence wages primarily through their effect on the stock of skilled labor in the private sector.

Taken together with the first stage regression results reported in table 4, the results of this paper suggest that government expenditures on higher schooling, while having no direct effect on the wages of the poor, *do* have the potential to signficantly increase the skill composition of the private work force, and through this, the wages of the poor. However, the first-stage regression results also find that this effect of higher schooling expenditures is weakened by high public sector wages. These results suggest that high public sector wages may partly explain the low correlation between government expenditures on higher schooling and the wages of the poor, documented in section 3 of this paper.

5 Conclusion

This paper argues that the Government of India's emphasis on higher schooling generates only marginal increases in the wages of the poor, and that this in turn is attributable to labor market imperfections and public sector employment rules which, in combination, attract the skilled away from the private sector to the public sector. A theoretical model demonstrated the conditions on production and government employment rules which could generate this result. Using NSS data, the paper also provided empirical support for this hypothesis.

Unless changes are made in either schooling policy or in the labor market, the results of this paper suggest that growth in the Indian economy will be accompanied by persistent inequality and poverty. While the Government of India has, in recent years, increased the relative share of elementary schooling in the schooling budget, it may be justifiably argued that economic growth *does* require signficant investments in higher schooling. If so, concern for the poor may necessitate difficult labor market reforms – specifically, the narrowing of public and private sector wage differentials and the reduction of public sector employment to efficient levels – which can ensure that growth is accompanied by significant improvements in the incomes of the poor.

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Data Appendix

Household level data on education, demographics, occupation and wages are from the National Sample Survey (NSS) 50th (1993) and 55th (1999-2000) round. Data in constant Rupees were calculated using state-wide CPI indexes from the Reserve Bank of India's *Report on Currency and Finance.*

Data on state-level revenue receipts and expenditures come from the Reserva Bank of India's *Report on Currency and Finance.* Revenue includes all revenue from state taxes, share in central taxes, and grants from the center.

The manufacturing wage index was calculated using total wage and employment data from the *Annual Survey of Industries.* The weighted average manufacturing wage by state-region was constructed from these wages using the distribution of occupations by region from the NSS data.

Data on international public sector employment is from ILO, "Statistics on Public Sector Employment: Methodology, Structures and Trends. Working Paper.

Table 1: Occupational Distribution, Males ages 25-60, Urban India

	Full sample	Self-employed	Casual wage	Salary		Formal private
				Public	Private	
By schooling level and year						
1993						
Full sample	100.00 (100.0)	38.3	11.5	26.8	17.7	--
Primary or less	100.00 (37.1)	42.7	24.0	11.7	16.8	--
Middle/ second	100.00 (33.8)	40.6	7.0	27.4	19.7	--
Higher	100.00 (29.8)	30.1	0.8	45.0	16.7	--
1999						
Full sample	100.00 (100.0)	39.7	12.3	18.4	22.9	5.9
Primary or less	100.00 (32.5)	42.6	26.0	7.4	18.4	3.1
Middle/ second	100.00 (35.1)	41.7	9.5	17.9	25.2	5.7
Higher	100.00 (32.4)	34.6	1.5	29.9	25.1	9.0

	Prop. w/ higher schooling	Self-employed	Casual wage	Salary		Formal private
				Public	Private	
By expenditure quartile and year						
1993						
lowest	7.70	42.40	27.02	13.18	17.41	--
second	15.60	44.20	15.00	21.13	19.67	--
third	29.29	42.30	8.29	30.26	19.15	--
fourth	47.41	36.95	2.86	41.81	18.39	--
1999						
lowest	7.94	43.61	29.53	6.71	17.17	2.98
second	17.23	48.09	15.39	13.17	18.70	4.66
third	29.41	46.93	7.38	21.74	17.97	5.99
fourth	45.41	41.98	2.15	32.80	13.98	9.09

Note: Self-employed includes household helpers (NSS status categories 11, 12, and 21); casual wage includes work in public works (NSS status categories 41 and 51). For 1999, data for "private" include private formal.

Table 2: State-wise data on public sector employment and public and private wages

State	Proportion in government		1997-98 (Rupees)	
	1993	1999	public wage	private wage
Andhra Pradesh	24.69	16.99	183.0	121.3
Assam	28.65	22.35	267.1	114.2
Bihar	27.96	12.79	351.7	353.1
Gujarat	20.19	15.06	347.7	217.2
Haryana	22.93	14.92	351.9	254.8
Himachal Pradesh	57.35	37.56	241.1	157.3
Jammu Kashmir	40.24	20.46	204.1	113.8
Karnataka	24.31	15.51	331.7	210.1
Kerala	16.55	13.86	343.8	163.7
Madhya Pradesh	33.94	19.93	400.2	179.9
Maharashtra	20.94	18.52	320.1	364.4
Orissa	33.75	25.72	271.6	188.7
Punjab	21.78	15.11	178.0	161.6
Rajasthan	26.78	21.21	253.7	200.5
Tamil Nadu	18.60	11.64	350.8	207.4
Uttar Pradesh	22.33	13.63	296.1	245.1
West Bengal	25.92	16.31	273.1	215.1
India	24.5	16.9	292.5	227.7

Note: Data on wages are from the Annual Survey of Industries 1996-97, and are the average labor cost per manday worked (in Rupees), with average cost being the sum of salaries and wages, bonuses, contributions to provident and other funds, and workmen staff welfare expenses. Data on proportion in government are from NSS survey data.

Table 3: Public Sector Employment, by Industry (in millions)

	1993	1995	1997	1998	1999-200
Agriculture and hunting	0.56	0.54	0.53	0.53	0.52 (-7.1%)
Mining and quarrying	0.99	1.02	1.00	0.90	0.90 (-9.1%)
Manufacture	1.85	1.76	1.66	1.62	1.48 (-20.0%)
Electricity, Gas and W	0.93	0.93	0.96	0.95	0.95 (2.2%)
Construction	1.15	1.16	1.13	1.11	1.08 (-6.1%)
Wholesale and retail trade	0.14	0.16	0.16	0.16	0.16 (14.3%)
Transport, Storage and communication	3.05	3.11	3.09	3.08	3.04 (-0.32%)
Financing, Insurance a Real Estate	1.25	1.28	1.29	1.29	1.29 (3.2%)
Community, Social and Personal services	9.37	9.50	9.75	9.74	9.82 (4.8%)
Total	19.32	19.46	19.56	19.38	19.23 (0.5%)

Source: Ministry of Labour, Directorate General of Employment and Training.
Note: Figures in brackers are percentage change between 1999-2000 and 1993.

Table 4: First Stage Regressions on Proportion of the Private Sector Labor Force with Higher Schooling.

	Coefficient	Std. Error
Govt. exp. on higher schooling	0.591*	(0.117)
Public sector wage	0.001*	(0.0001)
Public sector wage x govt. exp. on higher schooling	-0.016*	(0.002)
Formal sector wage	0.001*	(0.0001)
Formal sector wage x govt. exp. on higher schooling	-0.001	(0.004)
Govt. revenues (per capita)	1.768+	(1.008)
Govt. revenues (per capita) x govt. exp. on higher schooling	122.00*	(23.16)
Dummy, year 2	0.223*	(0.003)
(ln) regional per capita exp.	-0.003	(0.007)
Ratio of regional pop. to state Pop	-0.043*	(0.014)
Sample size	9,287	
Regression F(76,9210)	2126.35	(p=0.000)

Note: The regression includes a full set of regional dummy variables.

Table 5: OLS and IV Regressions of (log) Wages
Sample: Male wage earners in the private sector, ages 20-65, from the lowest per capita expenditure quartile

	OLS	IV	IV
Proportion of males in private sector with higher schooling	0.84* (0.05)	0.99* (0.05)	1.04* (0.07)
Govt. higher schooling exp. (per capita)	--	--	-0.67 (0.83)
Govt. revenues (per capita)	--	--	25.15 (16.64)
Govt. revenues x schooling exp.	--	--	-770.16* (386.4)
Age	0.06* (0.01)	0.06* (0.01)	0.06* (0.01)
Age squared	-0.001* (0.00)	-0.001* (0.00)	-0.001* (0.00)
Scheduled caste/tribe	-0.02 (0.02)	-0.03 (0.02)	-0.03 (0.02)
(ln) hhold per capita exp.	0.23* (0.03)	0.23* (0.03)	0.23* (0.03)
(ln) regional average per capita expenditure	-0.06 (0.09)	0.06 (0.10)	0.05 (0.10)
Ratio of regional population To state population	0.56* (0.21)	0.63* (0.21)	0.65* (0.22)
Inverse Mill's ratio	0.35* (0.13)	0.32* (0.12)	0.31* (0.12)
Sample size	9,287	9,287	9,287
Regression F	43.66 (p=0.000)	45.01 (p=0.000)	43.20 (p=0.000)

Note: All regressions include a full set of regional dummy variables. IV regressions are based on the first stage regressions reported in table 4.

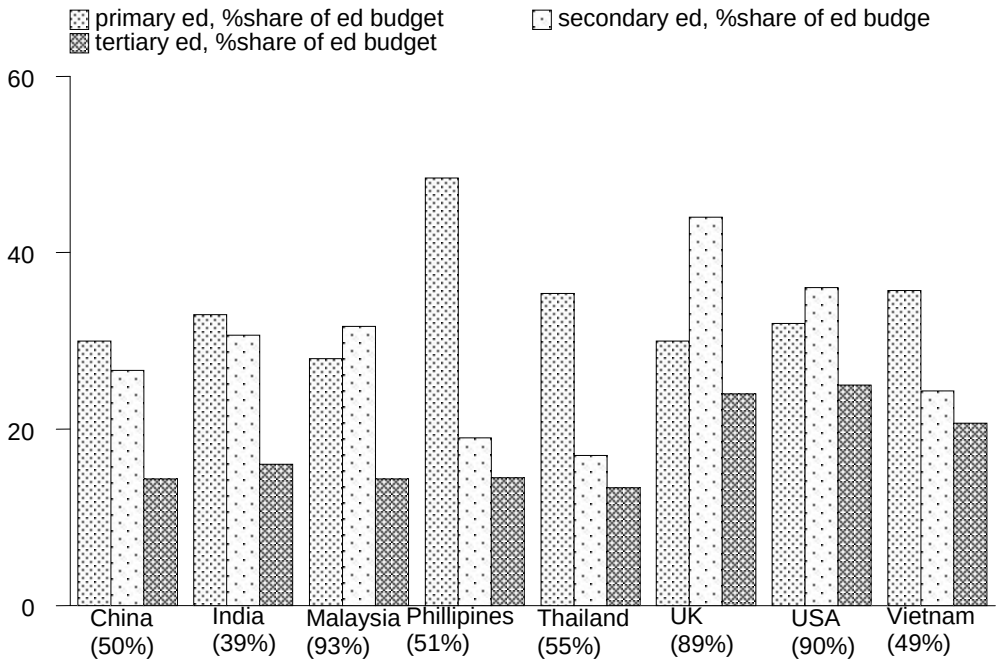


Figure 1: Distribution of Schooling Expenditures across stages of schooling (Figures in brackets are net secondary enrollment rates, 1998)

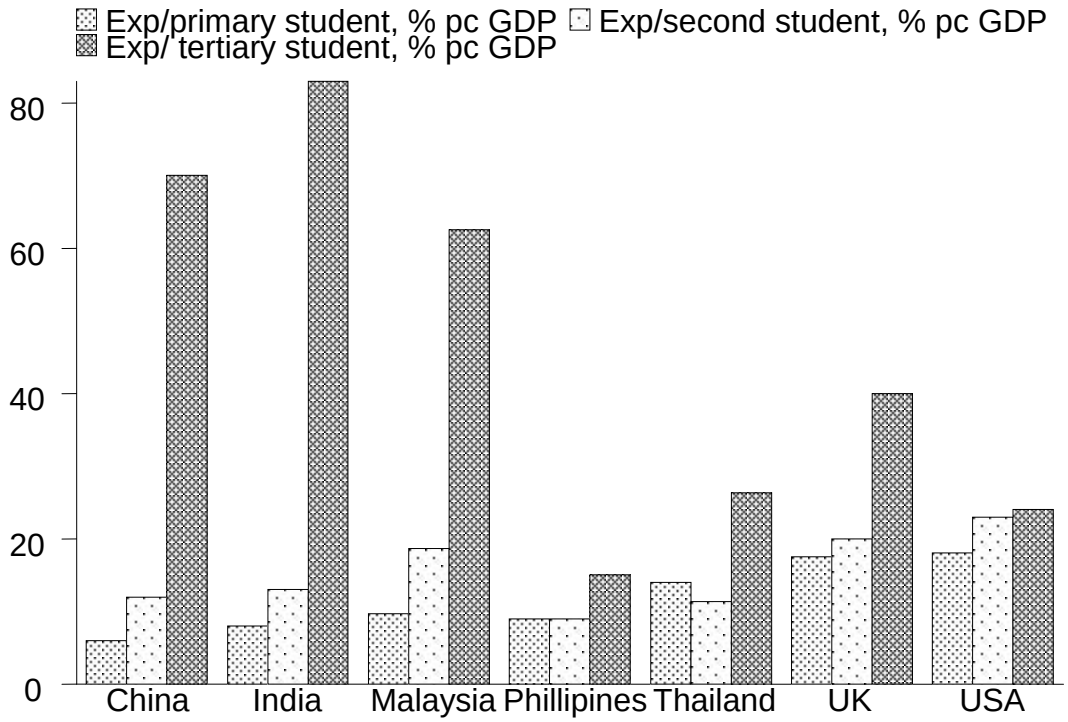


Figure 2: Per student expenditure as a percentage of per capita GDP, by stage of schooling.

Source: World Development Indicators, 2000.

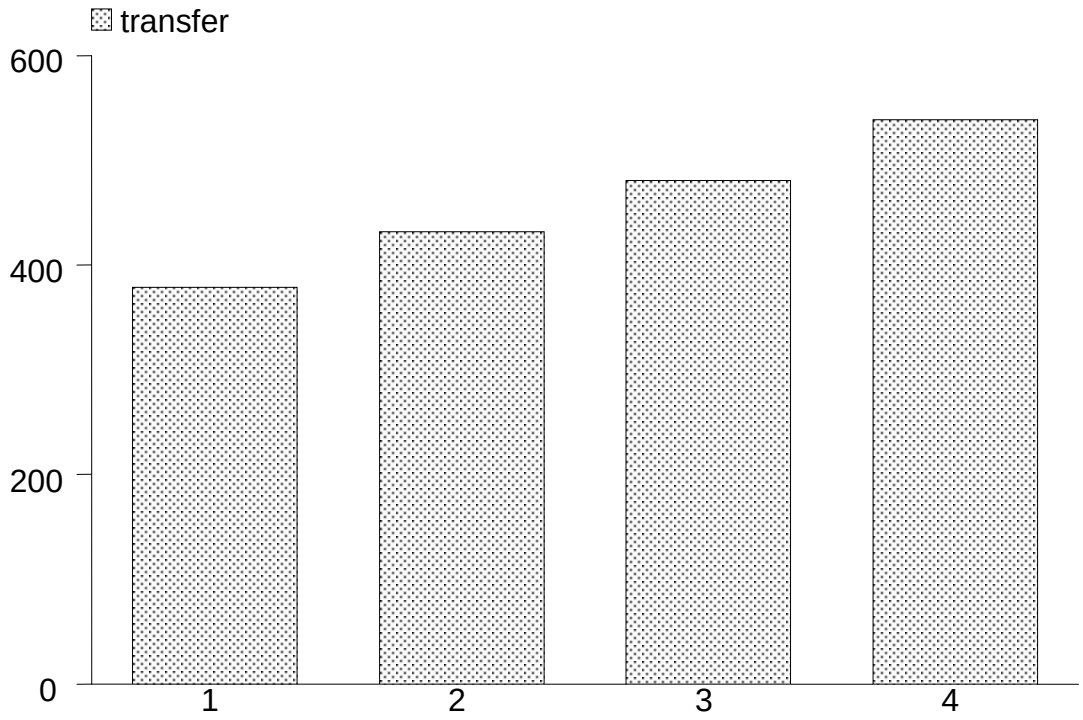


Figure 3: Government schooling transfers by expenditure groups

Note: Transfers are calculated as a weighted average of per student expenditure by government on different schooling levels. The weights are the proportion of children between the ages of 15 and 18 who completed the relevant schooling level in public schools. This calculation is based on data on schooling (including information on attendance of public schools) from the 42nd and 52nd rounds of the NSS.

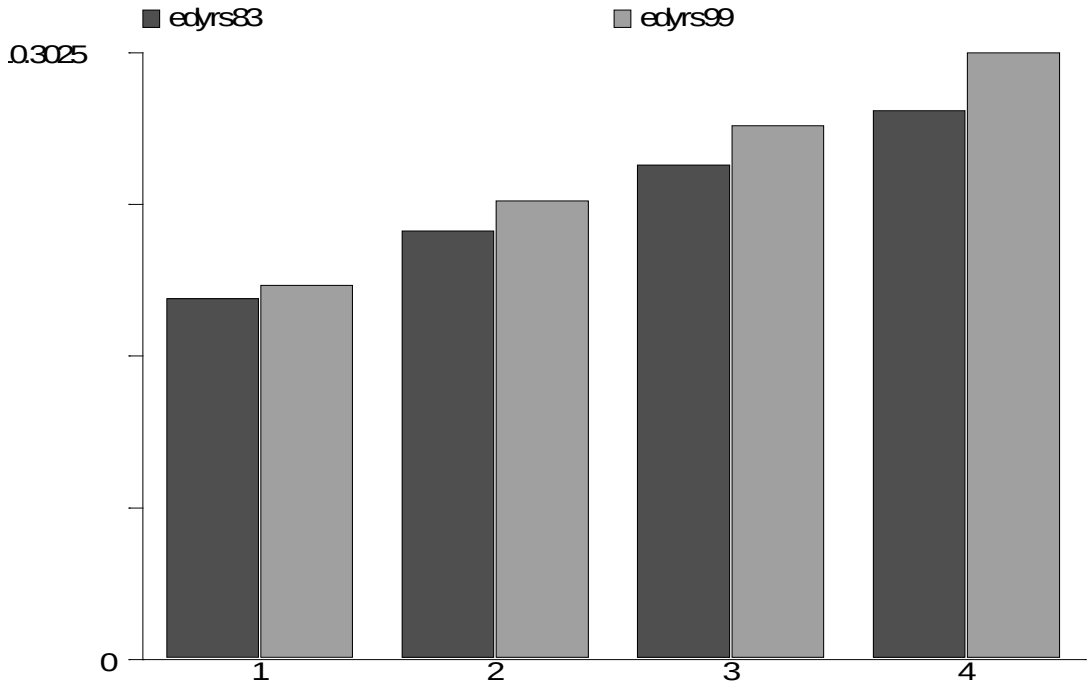
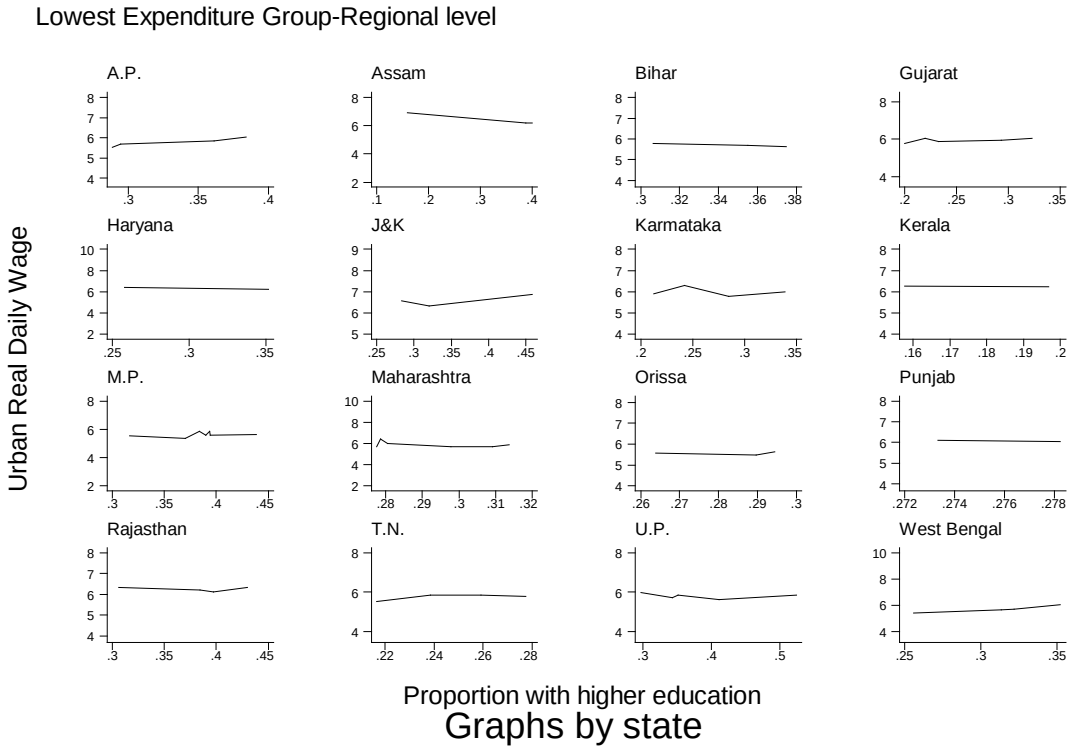


Figure 4: Mean schooling years, 1983 and 1999, males ages 15-20, by per capita expenditure quartile.



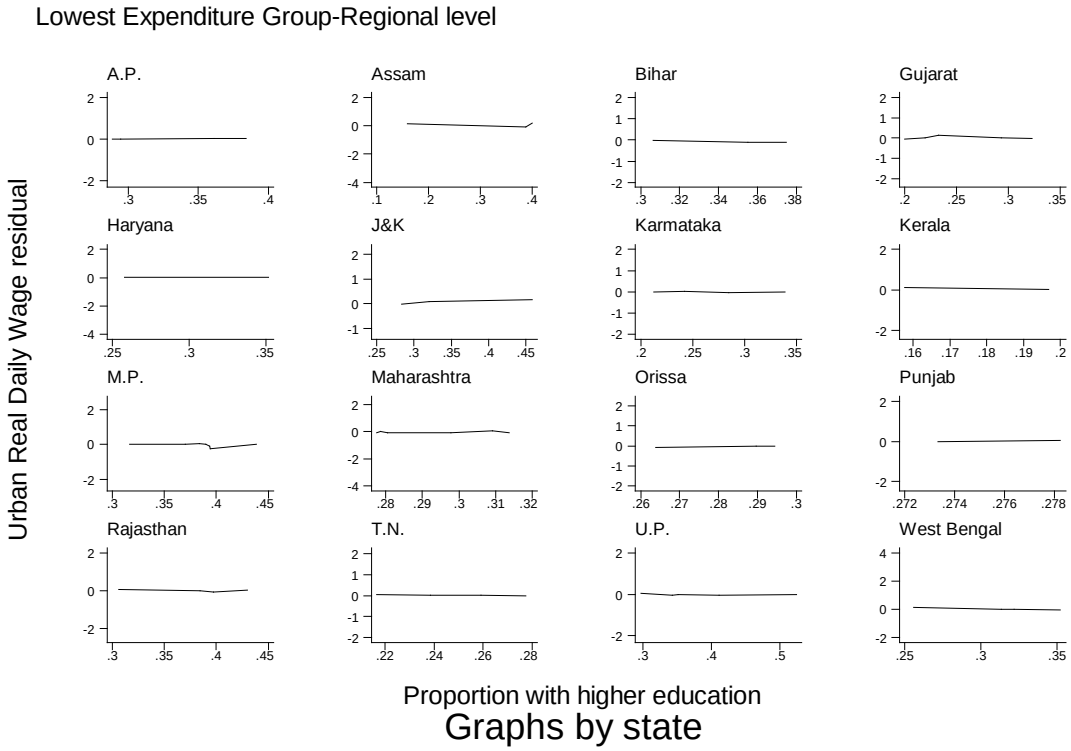


Figure 5: Graphs of wage and residual wage for the poor, by proportion of males in the region with higher education, 1999.

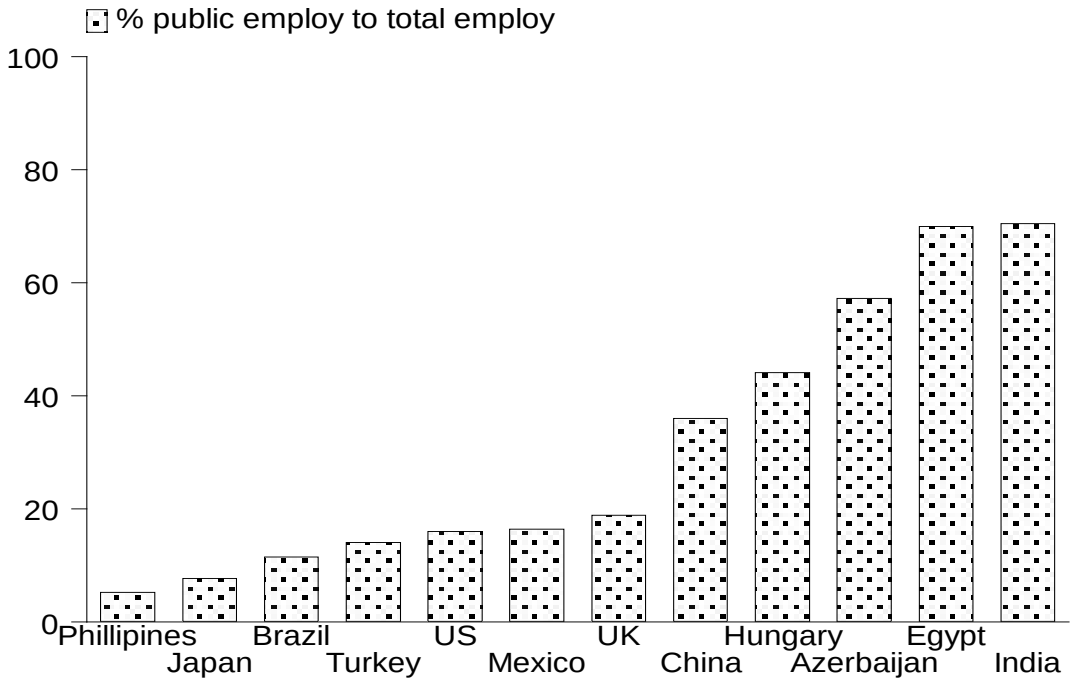


Figure 6: Percentage Importance of the Public Sector in Different Economies

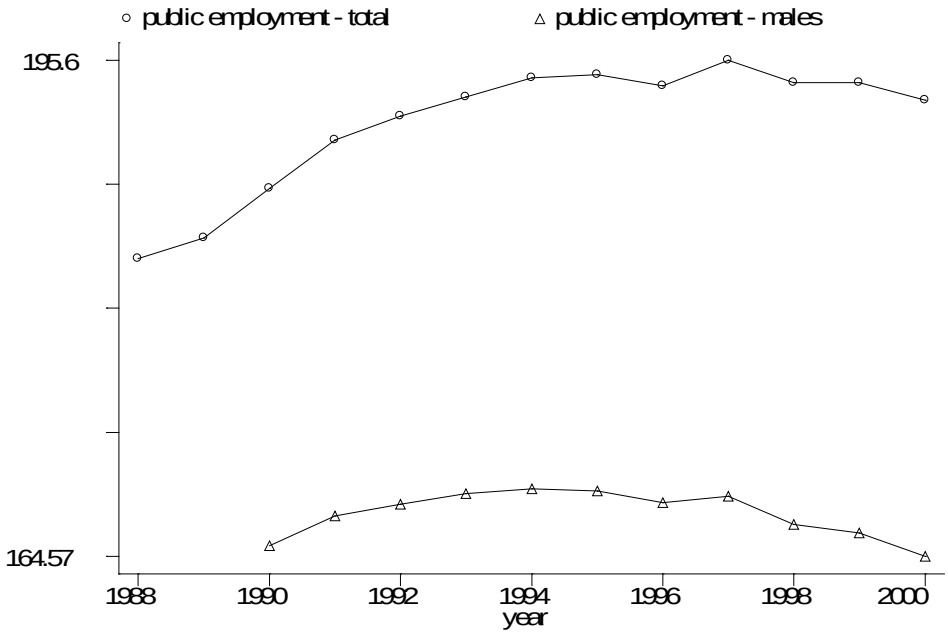


Figure 7: Public sector Employment (in '00,000) in India
Source: Government of India, Ministry of Labor (DGE&T)