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Overeducation in developing economies: How can we test for it, and what does it mean?☆

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ABSTRACT

A worker is said to be overeducated if he/she has acquired more education than is required to perform his/her job. In the absence of data measuring the number of years of schooling required to perform particular jobs, we propose a new approach to testing for overeducation. Overeducation is confirmed if we observe that education levels rose in jobs that offer very low returns to education and that underwent little technological change. Using labor force surveys from four developing countries, we find evidence of overeducation in unskilled jobs in the Philippines, mild evidence in Mexico, and little evidence in India and Thailand. We show that a job's mean and modal years of schooling are poor proxies for required education. We also show that overeducation sometimes increases within unskilled jobs, even while a growing share of educated workers enter skilled jobs. This may be because the quality of education segments the labor market.

1. Introduction

A worker is said to be overeducated if he/she has acquired more education than is required to perform his/her job. Many studies have endeavored to measure the number of overeducated workers in developed economies.[1] To our knowledge, only two have done so in a developing economy: Quinn and Rubb (2005, 2006) study overeducation in Mexico, and Abbas (2008) studies it in Pakistan. This reason for this dearth of studies is that the standard tests for overeducation require data that typically have not been collected in developing countries – namely, the number of years of schooling required to perform a given job. Overeducation could have rather different normative implications if it is found in developing economies where incomes are low, education levels are rising fast from a low base, and the quality of education is highly variable. This paper proposes a new method for identifying overeducated workers, applies it to data from India, Mexico, the Philippines and Thailand, and considers the implications of finding that they are becoming more common.

Confirming that workers are overeducated typically involves two steps. First, the researcher systematically arrives at an estimate of the level of education required for each job. Any amount of education a worker has obtained in excess of this is deemed to be surplus. Second, these estimates of required and surplus schooling are entered separately as explanatory variables in a standard Mincerian earnings regression. Overeducation signals potential inefficiencies if the returns to surplus education are found to be lower than those to required education. It is often taken to imply that resources are wasted because the marginal lev-

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[1] Seminal studies include Duncan and Hoffman (1981), Rumberger (1987), Hartog and Oosterbeek (1988), Sicherman (1991), Alba-Ramirez (1993), Cohn and Khan (1995) and Groot and Van den Brink (1997).

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els of education received by the overeducated worker cost more than the productivity advantage they confer given the jobs available. From a policy perspective, finding that workers are overeducated might therefore motivate a reexamination of policies expanding access to education, or an investigation of why more education-intensive jobs are not available.

Unfortunately, we know of no worker or employer surveys, nor lists compiled by job analysts, that shed light on education levels required for particular jobs in developing countries. Further, as most labor force surveys in developing countries collect education data by the stage of the school system completed, rather than by years of schooling, estimates of occupational mean education levels cannot be measured precisely, precluding the use of the occupational mean as a measure of required schooling (henceforth, the "mean method"; e.g. Verdugo & Verdugo, 1989).[2] The use of the occupational modal education level (Kiker, Santos, & Mendes de Oliveira, 1997) as a proxy for required schooling also raises some interpretational problems, as we will show. We therefore propose a new test that gets around the data constraint by reversing the typical test procedures: we begin by identifying those jobs in which education pays returns that are too small to justify their employees' schooling, and then go on to examine how many educated workers these jobs employ.

Our test uses labor force surveys on a country at two points in time, and works as follows. We first identify "unskilled" jobs in each time period – those that pay rates of return to secondary and tertiary education that are below some cutoff. We drop from consideration those jobs that were likely subject to skill biased technical change (SBTC), because advancing education levels in these jobs need not signal rising overeducation. We argue that increases in the fraction of workers in the remaining unskilled jobs that have secondary or tertiary education reflect advancing overeducation in these jobs, because above-primary educated workers in these jobs earn little reward for their schooling. Conversely, growth in the share of above-primary educated employees that labors in unskilled jobs signals a widening problem. The interpretation of the test is subject to the usual caveats about unobserved worker characteristics, which we consider at the end of the paper. For example, low education quality could explain the presence of educated workers in unskilled jobs.

There is a good theoretical reason to look at unskilled jobs. Early studies of overeducation (e.g. Harberger, 1965) relied on OLS estimates of returns to schooling, arguing that a society is overeducated when these returns fall below the estimated marginal return on physical capital investments. A problem with this approach is that OLS estimates capture some sort of average return to schooling, whereas what is required for assessing this sort of arbitrage opportunity is the marginal return – the return to the schooling of the marginal educated worker. This, in turn, requires an empirically workable definition of who the marginal educated workers are. Our approach explicitly identifies the marginal educated workers as those working in unskilled jobs.

There are two further reasons for taking conditions in unskilled jobs seriously. First, many educated workers may be employed in these jobs in overeducated societies. For example, there are so many maids in the Philippines that analysis of just this one unskilled job reveals that, in 2004, one in five female employees with more than primary education was overeducated. Second, the traditional overeducation test procedure, which classifies workers as overeducated or not *before* considering the return to schooling they obtain in their jobs, may suffer from type 1 and type 2 errors (failing to identify workers who obtain low returns to education as overeducated, and vice versa). By reversing the procedure, we find that amongst Mexican employees in technologically stagnant jobs the mean method has a 75% type 1 error rate.

These benefits of examining conditions in unskilled jobs notwithstanding, educated workers in unskilled jobs need not be "canaries in the coalmine". We demonstrate this by using a two-step regression analysis that asks whether educated workers have moved into jobs that offer below average schooling returns. We find that educated Mexicans moved into higher return jobs even as overeducation grew slightly in unskilled jobs. This suggests that high- and low-return job markets are segmented. We suspect that school quality may play a role, and we will return to this issue in the discussion section.

We study a diverse group of countries. Educational attainment rose in all four countries, but at very different rates. Mexico's per capita GDP is almost twice Thailand's and over four times India's and the Philippines' in PPP terms. And, while all four countries saw large declines in agricultural employment, job creation patterns differ: manufacturing employment grew and became more skilled in Thailand; India mainly added jobs in low skilled manufacturing and services; Mexican manufacturing employment became more skilled, but did not grow, pushing workers into low-skill services; and the Philippines de-industrialized (Airola & Juhn, 2008; Mehta, Felipe, Quising, & Camingue, 2009). Because skills demand varies across sectors, this suggests that the incidence of overeducation may vary a lot across countries and over time. The study of our three Asian economies also helps to fill out the picture of overeducation in Asia. Existing papers study Hong Kong (Cohn, Johnson, & Ng, 2000; Cohn & Ng, 2000), Pakistan (Abbas, 2008) and Taiwan (Hung, 2008).

The rest of this paper is structured as follows: the data are discussed in the next section. Section 3 presents trends in educational attainment and overall returns to education. Section 4 presents our test for overeducation in unskilled jobs. Section 5 compares results from our test focused on unskilled jobs with those obtained by using the mean and mode method for measuring required education. Section 6 implements a regression based analysis of changes in the skill composition of employment. Section 7 interprets our results, and asks what conclusions may be drawn from them.

[2] For example, in our 1991 dataset from the Philippines, 42% of workers report dropping out partway through a schooling level, leaving the number of years of schooling they have completed unknown.

2. Data

Our data are drawn from pairs of labor force surveys from India (National Sample Survey – Schedule 10, 1993 and 2005), the Philippines (Labor Force Survey, 1991 and 2004) and Thailand (Labor Force Survey, 1995Q3 and 2005Q3), and Mexican Census data from 1990 and 2000 (Minnesota Population Center, 2009). The datasets have several merits. First, they include workers in the informal sector. Second, the Mexican data are from a census, and the Asian surveys utilize multistage stratified random sampling using national censuses as sampling frames, so that all should deliver nationally representative estimates of the structure of employment, supply of education and distribution of wages. These are the only datasets from our Asian countries from which these estimates can be obtained. Third, the labor force survey sample sizes are moderately large, ranging from 49,902 workers in the Philippines in 1991 to 200,380 in India in 1993; while the two Mexican samples together cover 2.5 million employees. This permits characteristics of small groups of workers to be reliably measured.

Two samples are drawn from each survey: a quantity-sample that includes all members of the labor force, and is used only to study the supply of educated workers; and a wage-sample, which includes only employees, that is used to analyze the distribution of jobs and to estimate wage equations.[3] In an attempt to exclude workers whose wages might reflect institutional arrangements rather than market forces, we drop public employees from the wage-samples in the Philippines and Mexico, and public and cooperative employees in Thailand. The Indian questionnaire did not distinguish between public and private employees in 1993, so all Indian employees are considered in 1993 and 2005. Only workers aged 15–60 are included. The manner in which earnings information was elicited requires that we use hourly wages in Mexico and Thailand, daily wages in the Philippines and weekly wages in India. Where workers hold down multiple jobs, wages are reported only for the primary occupation.

While the Mexican data report the years of schooling successfully completed, education is measured ordinally in the three Asian countries. In India and Thailand the highest level of education successfully completed is reported. Filipino respondents also report on secondary and tertiary education levels which they did not complete.

3. The scarcity of educated workers

Table 1 presents the distributions of education attainment in each country's labor force, and amongst workers who completed their schooling between 5 and 10 years prior to the survey year.[4] Differences in the number of years of schooling at each level and in survey dates preclude a clean ranking of countries by educational attainment. However, comparisons over time and between all and younger workers permit the following generalizations: With respect to initial levels of education in the whole labor force, India is the least educated country, followed by Thailand; Mexico and the Philippines have the most educated workers. Education levels grew fastest in Thailand and climbed faster in Mexico than in the Philippines. Education levels increased rapidly in India, but from a very low base.

To move from availability to scarcity, we estimated wage returns to schooling using the following specification in the three Asian countries:

$$\ln W = \alpha + \sum_{l \in levels} \beta_l y_{R,l} D_l + \sum_{l \in levels} \delta_l I_l + \gamma_1 Exp + \gamma_2 Exp^2 + \varepsilon, \quad (1)$$

where W measures the wage, Exp denotes potential labor market experience, $D_l = 1$ indicates that the worker has completed education level l and may have progressed further, $y_{R,l}$ is the *required* number of years that must be successfully completed to pass level l, and $I_l = 1$ indicates that a worker's schooling was terminated part-way through level l. We do not estimate a return to primary schooling because too few workers have gone without any primary education to estimate it. We use a variant of this specification in Mexico, where we have a measure of workers' years of schooling. Letting $y_{A,l}$ denote the *actual* number of years of schooling actually completed at level l, we regress:

$$\ln W = \alpha + \sum_{l} \beta_l y_{A,l} + \gamma_1 Exp + \gamma_2 Exp^2 + \varepsilon, \quad (1')$$

Table 2 provides OLS estimates of β_l. To investigate the idea that education is becoming less scarce amongst younger cohorts, we present returns from regressions that pool all experience levels as well as regressions with relatively recent entrants into the labor force. Lower returns for younger workers suggest that they are more likely to be overeducated (Walker & Zhu, 2008).

In India, returns to lower secondary education shrank while returns to upper secondary education and college rose. This increased convexity of the education-wage profile also appears in Thailand, although here upper secondary returns declined as well. This suggests that higher education is becoming scarce while moderately educated workers are becoming abundant in both countries. In Mexico, it appears that educated workers, especially younger ones and those who have finished college, are becoming scarce. Returns in the Philippines are more suggestive of a growing abundance of educated workers: returns to secondary education declined sharply, and declined more sharply for the young, while returns to

[3] We drop self-employed workers from these analyses (approximately half of each country's labor force) for three reasons (see Glewwe, 2002): (1) most surveys do not record their individual earnings; (2) these earnings anyway derive from unobserved capital as well as schooling, so their inclusion in the sample would bias estimated returns to schooling; and (3) the self-employed are likely to undertake a variety of tasks that employees in the same occupation do not (e.g. bargaining, accounting, business planning, etc.), and so may in fact occupy different jobs.

[4] Workers with 0–5 years of work experience are excluded, because some less educated workers were too young to be queried on their labor force participation when they left school.

Table 1
The supply of educated workers.

	Years of schooling	Distribution of level of schooling completed (%)			
		All workers		Recent entrants	
A. India		1993	2005	1993	2005
Less than primary	–	60.1	49.0	37.5	22.1
Primary	4	12.2	13.9	16.3	18.4
Middle school	7	11.8	15.7	18.4	24.6
Lower secondary	10	7.6	8.9	12.6	13.9
Upper secondary	12	3.7	6.3	6.9	10.5
Post-secondary	15	4.6	6.2	8.3	10.4
B. Mexico		1990	2000	1990	2000
Less than primary	–	32.5	22.2	10.6	5.4
Primary	6	22.3	19.1	15.4	9.3
Incomplete LS	–	4.7	5.1	6.2	5.4
Complete LS	9	20.9	21.7	31.5	28.2
Incomplete US	–	4.5	5.3	9.4	11.1
Complete US	12	5.5	12.9	10.8	20.8
Incomplete college	–	2.8	4.7	7.7	9.2
Complete college	16	6.8	9.1	8.4	10.7
C. The Philippines		1991	2004	1991	2004
None	0	3.0	1.9	–	–
Incomplete primary	–	20.5	15.6	9.1	6.5
Primary	6	24.3	17.0	19.0	11.0
Incomplete secondary	–	13.6	14.0	18.5	16.0
Secondary	10	18.5	24.9	24.9	29.0
Incomplete college	–	9.2	12.8	12.8	16.0
College	14	10.9	13.8	15.8	21.4
D. Thailand		1995	2005	1995	2005
None	0	3.6	3.1	1.5	0.7
Incomplete primary	–	49.7	32.9	48.1	11.6
Primary	6	23.8	23.8	20.9	28.8
Lower secondary	9	9.4	14.7	14.8	27.5
Upper secondary	12	6.5	12.3	6.2	10.4
Diploma	–	2.6	4.0	8.5	21.0
College	16	4.5	9.2	4.5	9.2

Note: Distributions are calculated from the quantity sample. Recent entrants are workers with between 5 and 10 years of potential labor market experience.

college rose for older workers but stagnated for younger workers. Returns to experience did not change by economically significant amounts in India, Mexico and Thailand. However, they dropped by a third in the Philippines. To the extent that education and experience are substitutes, this would be consistent with a declining scarcity of human capital in the Philippines.

Thus far, then, the data suggest that: (1) secondary-educated, younger tertiary-educated and experienced workers became abundant in the Philippines; (2) secondary educated workers may have become more abundant over time in India and Thailand, but college educated workers became scarce; and (3) educated workers have mostly become more scarce in Mexico. What do these trends in average returns to schooling imply for overeducation? To examine this we now look at returns to schooling amongst marginal educated workers.

4. Testing for overeducation in unskilled jobs

4.1. Methodology

Our test asks how many workers in "unskilled" jobs – those that offer low returns to secondary and tertiary schooling – have obtained secondary or tertiary education. We implement it as follows.

First, we identify the unskilled jobs in each year. To do so, we estimate schooling returns using specification (1) ((1′) for Mexico) on subsamples of wage-employees in each job. A job is considered unskilled in a given year if it pays below 7% returns to each year of secondary and tertiary schooling. We will justify the 7% cutoff below. The "unskilled" label is only meaningful if jobs are identified sufficiently tightly that workers with different levels of schooling in a given job are plausibly responsible for the same set of tasks (i.e. they are close substitutes). Low returns to education within jobs then imply a limited effect of education on productivity in performing those tasks. Here jobs are principally defined on the basis of occupation and gender. We split jobs by gender because we do not wish to combine dissimilar jobs, and because estimated schooling returns in otherwise indistinguishable jobs often differ by gender suggesting that male and female workers may be assigned different tasks.

We label those jobs that paid low (i.e. below 7%) returns in both years "consistently unskilled"; those paying low returns in the first year only "initially unskilled" and those paying low returns in the subsequent year only "subse-

Table 2
Returns to years of education and experience.

	All workers			Recent entrants		
	1993	2005	Change	1993	2005	Change
A. India						
Returns to:						
Middle school	0.096	0.092	−0.004	0.089	0.073	−0.017
Lower secondary	0.223	0.189	−0.033***	0.141	0.105	−0.036
Upper secondary	0.129	0.217	0.089***	0.166	0.208	0.042
College	0.145	0.194	0.049***	0.177	0.242	0.065***
20th year of experience	0.023	0.024	0.002***			
Sample size	*77,654*	*81,839*		*11,095*	*12,107*	
B. Mexico						
Returns to:						
Lower secondary	0.062	0.067	0.005***	0.051	0.058	0.007***
Upper secondary	0.114	0.100	−0.014***	0.105	0.111	0.006***
College	0.121	0.186	0.065***	0.130	0.186	0.056***
20th year of experience	0.014	0.013	−0.001***			
Sample size	*1,089,007*	*1,516,278*		*284,058*	*353,430*	
C. The Philippines						
Returns to:						
Secondary	0.128	0.090	−0.039***	0.169	0.110	−0.059***
College	0.151	0.175	0.024***	0.170	0.166	−0.004
20th year of experience	0.025	0.016	−0.009***			
Sample size	*23,260*	*33,928*		*5378*	*7178*	
D. Thailand						
Returns to:						
Lower secondary	0.120	0.109	−0.011	0.090	0.053	−0.037
Upper secondary	0.156	0.135	−0.021**	0.161	0.089	−0.072**
College	0.152	0.195	0.043***	0.153	0.168	0.015***
20th year of experience	0.032	0.031	−0.001			
Sample size	*36,122*	*47,414*		*5606*	*7370*	

Note: Estimates from regression specifications (1) and, for Mexico (1′). Recent entrants have 5–10 years of potential labor market experience.
* Indicates that changes in returns are significant at the 10% level.
** Indicates that changes in returns are significant at 5% level.
*** Indicates that changes in returns are significant at 1% level.

quently unskilled". We exclude the initially unskilled jobs because the observed increases in returns to education in those jobs may indicate that they have experienced skill-biased technical change. If so, rising education levels in these jobs would indicate advancing education requirements, not overeducation. To further shield against this possibility, we drop from consideration any job that the literature or even casual empiricism suggests may have been subject to skill biased technical change. For example, factory jobs, agricultural jobs, and all jobs likely to involve computers are excluded.

Second, we ask how many workers in each remaining unskilled job-year pair have more education than they require. We presume that all unskilled jobs require primary education, because too few workers lack primary schooling to enable us to estimate returns to primary education in most jobs. We take workers with secondary or tertiary education employed in these jobs to be overeducated, either because we estimated low returns to schooling in these jobs, or because employers have hired so few workers with post-primary education that we cannot even estimate the return to post-primary schooling in these jobs.

Third, we ask whether the assignment of educated workers to these unskilled jobs changed. Here we will report: (i) whether the distribution of education in a job in the second year first-order dominates the distribution in the first year; (ii) the change in the share of employees in a job who have more than a primary education; and (iii) the change in the share of post-primary educated employees who work in a job. The first outcome provides the most general, ordinal test of rising education levels in these jobs. The second provides a cardinal measure of how many more people have become overeducated in the consistently unskilled jobs. It underestimates this increase in subsequently unskilled jobs, because some post-secondary education may have been required initially. The third outcome sheds light on the systemically more important question of whether the fraction of educated workers employed in unskilled jobs has risen.

The 7% cutoff we have elected to use is in line with the overeducation literature: almost every study that finds overeducation reports returns to surplus schooling of less than 7% (see the meta-analyses of Rubb, 2003a, and McGuinness, 2006). Moreover, the wage returns exclude the publicly and privately borne direct costs of education, which are high relative to wages. The real returns will therefore be considerably lower than 7%, and therefore too low to justify the resources invested from a productivity perspective.[5]

[5] Since secondary education is largely publicly funded, another possibility is to take the cost of public funds – typically assumed to be 10–12% – as our cutoff. This is conceptually problematic, as returns would be below these cutoffs even at efficient levels of education investment because education confers substantial private non-wage benefits.

Table 3
Returns to education by job.

A. India	1993					2005				
	Sample size	Middle school	Lower secondary	Upper secondary	College	Sample size	Middle school	Lower secondary	Upper secondary	College
Female Sweepers	*277*					*362*	0.055			
Male Servants	*303*	0.142				*241*	−0.075			
Male Sweepers	*446*	0.110				*581*	0.056			
Male Painters	*131*	0.108				*368*	0.048	0.056		

B. Mexico	1990				2000			
	Sample size	Lower secondary	Upper secondary	College	Sample size	Lower secondary	Upper secondary	College
Male drivers	*60,423*	0.039	0.038	0.032	*77,370*	0.044	0.042	0.052
Male bakers	*5985*	0.035	0.025	0.000	*8562*	0.031	0.032	0.030
Male butchers	*5131*	0.017	0.028	0.019	*6117*	0.019	0.014	0.061
Male painters	*4468*	0.021	0.043	0.034	*5741*	0.013	0.057	−0.023
Male gardeners	*4052*	0.041	0.051	0.026	*5560*	0.030	0.004	0.058
Female bakers	*1190*	0.089	0.027		*3670*	0.049	−0.001	
Female butchers	*346*	0.074	0.104		*707*	−0.006	0.040	−0.012

C. The Philippines	1991			2004		
	Sample Size	Secondary	College	Sample Size	Secondary	College
Male drivers	*1356*	0.066	0.068	*1893*	0.041	0.039
Maids	*1670*	0.045		*2314*	0.011	0.010
Saleswomen	*508*	0.103	0.160	*894*	0.062	0.062

D. Thailand	1995				2005			
	Sample size	Lower secondary	Upper secondary	College	Sample size	Lower secondary	Upper secondary	College
Female cooks	*243*				*284*	0.019	0.042	
Female waitresses	*338*	0.034			*403*	0.037	0.017	
Male guards	*229*				*435*	0.041	0.007	
Male carpenters	*968*	0.031			*746*	0.030		
Male drivers	*1306*	0.085	0.046		*1643*	0.052	0.028	

Notes: OLS estimates using specification (1) for India, The Philippines, and Thailand. OLS estimates using specification (1′) for Mexico. Underlined returns underwent shifts that are significant at the 10% level. Robust standard errors are used in all cases. Returns are only reported where they are "estimable" – i.e. when the sample contains at least 30 workers in the job with that level and 30 workers with one less level. The null hypothesis that the return in the subsequent year is greater than or equal to 7% is rejected at 5% significance for all estimable returns for five jobs: male servants in India, male drivers and female bakers in Mexico, and drivers and maids in the Philippines. The power of these tests varies significantly across countries due to differences in sample sizes.

4.2. Results

The process of identifying unskilled jobs varies across countries, given data constraints. To be compact, label the return to years of schooling at a level as "estimable" whenever at least 30 sampled employees report that level of schooling and 30 report one level less, and define a job as "large" in a given year if it contains at least 200 sampled workers. Then, in India and Mexico our initial jobs universe (split by gender) consists of every large job that can be cleanly matched over time. We defined jobs at the most disaggregated level at which they remained large but still reasonably tightly defined. The resulting gender-occupation pairs employ over 99% of sampled employees in Mexico, and over 90% in India. Table 3 includes every Indian and Thai job from this universe in which all estimable returns in the subsequent year are below 7% and in which SBTC is not suspected. In Thailand, where the occupational classification shifted and a complete occupational concordance was unavailable, we first identified every large 3-digit occupation-gender pair in 2005 in which all estimable returns were below 7%. Every one of those jobs that could be cleanly identified in 1995 and in which SBTC is not suspected is included in the table. In the Philippines, where the occupational classification shifted and occupation codes in 2004 were only released at the 2-digit level, we attempted to identify every job found to be unskilled in the other countries[6] and included it in our analysis if it could be matched cleanly over time, was large in both years, and all estimable returns were below 7% in 2004. Thus, our analysis is nearly exhaustive of unskilled employment in India and Mexico, but not in Thailand and the Philippines. The unskilled jobs are defined in the Appendix.

Table 3 presents the OLS-estimated returns within every consistently or subsequently unskilled job so identified. Casual empiricism suggests that none of them were subject to SBTC during the period of the study because the technologies they utilized (e.g. the car, bus, jeepney, motorized tricycle, broom, mop, bamboo scaffold, paint-brush,

[6] In the Philippines we make up for the lack of precision in occupation codes in 2004 with information about the type of employer in order to define jobs tightly.

Table 4
The distribution of education within jobs.

	Consistently/subsequently unskilled[a]	Share of employees in this job who are post-primary educated (%)[b]			First order dominance[c]	Employment share of male/female employees (%)[d]			Share of male/female employees with post-primary education employed in this job (%)[e]		
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
A. India		1993	2005	Change		1993	2005	Change	1993	2005	Change
Female sweepers	Consistently	4.0	12.4	8.4	Yes	1.1	1.4	0.3	0.4	0.9	0.5
Male servants	Consistently/subsequently	22.3	26.9	4.6	Yes	0.2	0.3	0.0	0.2	0.2	0.0
Male sweepers	Consistently/subsequently	16.8	33.6	16.8	Yes	0.7	0.8	0.1	0.3	0.6	0.2
Male painters	Consistently/subsequently	44.2	50.4	6.2	No	0.2	0.5	0.3	0.2	0.5	0.3
B. Mexico		1990	2000	Change		1990	2000	Change	1990	2000	Change
Male drivers	Consistently	40.9	59.2	18.3	Yes	7.2	7.8	0.6	6.7	8.0	1.3
Male bakers	Consistently	29.5	47.7	18.2	Yes	0.7	0.8	0.1	0.5	0.7	0.2
Male butchers	Consistently	40.5	51.8	11.3	Yes	0.6	0.6	0.0	0.6	0.5	0.0
Male painters	Consistently	35.5	47.0	11.4	Yes	0.5	0.6	0.0	0.4	0.5	0.0
Male gardeners	Consistently	21.8	34.9	13.1	Yes	0.5	0.5	0.0	0.2	0.3	0.1
Female bakers	Subsequently	27.4	43.3	15.9	Yes	0.5	0.9	0.4	0.2	0.6	0.4
Female butchers	Subsequently	26.9	35.0	8.1	Yes	0.1	0.2	0.0	0.1	0.1	0.0
C. The Philippines		1991	2004	Change		1991	2004	Change	1991	2004	Change
Male drivers	Consistently	66.6	77.4	10.8	Yes	10.8	10.5	−0.4	14.2	12.9	−1.3
Maids	Consistently/subsequently	50.2	60.8	10.6	Yes	20.5	22.8	2.3	18.8	19.7	0.9
Saleswomen	Subsequently	81.9	92.1	10.2	Yes	7.7	8.9	1.2	11.5	11.7	0.1
D. Thailand		1995	2005	Change		1995	2005	Change	1995	2005	Change
Female cooks	Consistently/subsequently	9.4	25.6	16.3	Yes	1.3	1.2	−0.1	0.6	0.8	0.2
Waitresses	Consistently/subsequently	19.3	49.7	30.5	Yes	1.5	1.9	0.4	1.5	2.5	1.0
Male guards	Consistently/subsequently	28.2	42.1	13.8	No	1.7	2.0	0.3	1.9	2.0	0.1
Male carpenter	Consistently/subsequently	7.9	9.8	1.9	No	8.2	3.6	−4.6	2.6	0.8	−1.7
Male drivers	Subsequently	22.8	42.2	19.5	Yes	10.0	8.7	−1.3	9.1	8.7	−0.3

[a] 'Consistently' unskilled jobs paid below 7% returns to all schooling levels in both years. 'Subsequently' unskilled jobs paid less than 7% returns in the subsequent year only. 'Consistently/subsequently' unskilled jobs are those that paid measured returns of less than 7% in both years, but in which some returns could not be estimated in the initial year.

[b] Percentage of workers in this job who have more than a primary education.

[c] Is the subsequent year cumulative distribution of education in this job to the right of the initial year distribution?

[d] Percent of male employees in this job, or percent of female employees in this job.

[e] Entries in (8) and (9) are the employment shares in (5) and (6) multiplied by the percentage of workers with post-primary education in columns (1) and (2) divided by the share of male/female employees who have more than a primary education.

Billy-club, rifle, butchers knife, oven and gardening tools) evolved little during the interval considered. We report returns to years of schooling only at estimable levels. When the shift in returns to a particular level of education is even marginally statistically significant ($p \leq 0.10$), we underline the estimated returns in both survey years. With the exception of a slight increase in the college returns of male Mexican drivers (to only 5.2%), every statistically significant shift in returns in our selected jobs is negative, consistent with the view that the jobs did not become more skilled over time.

The number of unskilled jobs analyzed varies across countries, not only because of the above data constraints, but also because some jobs are unskilled in some countries, yet still pay over 7% returns in others. For example: Indian male drivers, as well as Indian, Mexican and Thai maids and saleswomen, could be identified over time, but are excluded because they earned over 7% returns to schooling. Yet all three are unskilled jobs in the Philippines. This suggests that the skill content of overtly similar jobs may have varied across countries, and may have been lower in the Philippines.

Table 3 also reveals that there are many education levels, particularly in India, for which within-job returns could not be calculated. This reflects the low utilization of educated workers in these jobs. However, these education levels sometimes became populated over time. For example, enough Filipina maids had college degrees to calculate returns to college in 2004, but not enough had them to do so in 1991. This reflects advancing education levels in unskilled jobs.

Table 4 presents our estimates of overeducation in these jobs. Columns 1–3 show that the share of workers that was overeducated increased in every job. The level of education in unskilled jobs tended to be highest in the Philippines and lowest in India, but grew fastest in Mexico and Thailand. This is consistent with the overall trends in the availability of educated workers in each country. It also suggests that overeducation is more likely to be a problem in the Philippines than in India. Similarly, the cumulative distributions of education shifted to the right in all but three jobs (column 4)[7]: Thai security guards became slightly less likely to have an upper secondary or college degree; and the share of Indian painters and Thai carpenters without a primary education grew. Neither trend would be expected if overeducation was a serious problem in the unskilled end of these two countries' labor markets.

The foregoing results are only important if unskilled jobs hire a lot of workers. Columns 5–7 present the percentage of employees of each gender who were employed in unskilled jobs. Given that our list of unskilled jobs is nearly exhaustive in India and Mexico, but not in the Philippines, it is noteworthy that in the Philippines in 2004, over 10% of male employees worked as drivers, while over 22% of female employees were maids, and over 8% worked in sales. Moreover, the share of Filipina employees working as maids and saleswomen rose over time. Conversely, only around 1.4% of Indian employees of each gender, 0.5% of Mexican women, and 10.3% of Mexican men worked in all the identifiable unskilled jobs taken together. Moreover, unskilled jobs grew modestly in India and Mexico. This suggests that overeducation is more pervasive in the Philippines than in India and Mexico. In Thailand, more unskilled jobs shrank than grew.

Finally we ask whether the odds of the educated entering unskilled jobs rose. Columns 8–10 provide the share of employees of each gender with more than primary education who work in each unskilled job. Here too, the Philippines stands out. In 2004, 19.7% of post-primary educated Filipina employees were overeducated maids. A further 11.7% of them were overeducated saleswomen, so that at least 31.4% of secondary or tertiary educated Filipina employees are identified as overeducated that year, up from 30.3% in 1991. Similarly, at least 13% of post-primary educated Filipino employees were overeducated in 2004 because they worked as drivers. Whether considered in terms of the level in the subsequent year, or the change over the time interval, overeducation is less apparent in the other three countries.

Nevertheless, there is mild evidence of advancing overeducation in unskilled jobs in Mexico (columns 3–4) and unskilled jobs came to employ slightly more of Mexico's educated (column 10). Quinn and Rubb (2006) similarly report, using three different methods but different data, that overeducation in Mexico grew during the same time period. We revisit the Mexican case in the next two sections to see how our results focused on unskilled jobs compare with those from the larger labor force. A similar benchmarking exercise for the Philippines would be helpful, but is precluded by changes in the Philippines' occupational classification.

5. Comparison with mean and mode measures of required education

We now take a critical look at the two standard methods for identifying overeducated workers that have been used on data from developing countries, and compare them to our own. The first method assumes that a worker is overeducated (undereducated) if his/her years of schooling are more than one standard deviation above (below) the occupation mean years of schooling. The second assumes that workers with more (less) than the modal years of schooling in their occupation are overeducated (undereducated). We limit this analysis to Mexico because the mean method requires a measure of years of schooling that is unavailable in the other three countries we study.

Table 5 shows the percentage of workers estimated to be overeducated and undereducated in each year using the mean and mode criteria. Here jobs are defined at near the 4-digit level, not segregated by gender. Consistent with the results to Quinn and Rubb (2006), and with our results in Section 4, overeducation increased slightly in the 1990s while undereducation decreased slightly under the mean criterion. Curiously, under the mode criterion we would conclude the opposite – the share of employees that is

[7] To make allowance for a very small number of highly educated outliers, we consider only whether the first-order dominance relationship holds until the 99th percentile of the education distribution.

Table 5
Overeducation amongst Mexican employees: mean and mode method.

	Approach to measuring required education			
	Mean		Mode	
	1990	2000	1990	2000
Sample characteristics[a]:				
# of occupations	315	331	315	331
Sample size	1,063,425	1,475,579	1,063,425	1,475,579
Incidence (% of sample)				
Overeducation	13.8	14.0	38.4	32.2
Undereducation	17.5	16.6	25.4	42.8
Returns to each year of[b]:				
Required education	0.112***	0.141***	0.099***	0.136***
Overeducation	0.067***	0.080***	0.065***	0.090***
Undereducation	−0.034***	−0.043***	−0.045***	−0.055***

[a] Only occupations for which at least 20 wage employees are observed are included in the sample.
[b] Returns calculated per Eq. (2).
*** Indicates significance at the 1% level using robust standard errors.

overeducated declined sharply, while the share that is undereducated rose sharply.

To see why this happened we examined the distribution of years of schooling within jobs. They are typically at least bimodal. Mehta and Villarreal (2008) show that the large majority of Mexican workers terminate their education at the end of a schooling level, rather than partway through one. It is therefore not surprising that in 614 out of 616 of our job-year pairs modal years of schooling coincide with the end of some level of education. Now, consider what happened when the share of drivers and butchers with complete lower-secondary education came to exceed slightly the share with elementary education. The modal education level shifted upwards abruptly from 6 to 9 years, and drivers and butchers with six years of elementary education suddenly became "undereducated". Such abrupt shifts occur frequently in our sample (modal years of schooling rose by between 3 and 11 years in 137 out of 302 jobs for which we have at least 20 observed workers in both years), and this appears to explain mechanically why, under the modal measure, overeducation shrank while undereducation grew.

This mechanical problem underscores Hartog's (2000, p. 133) concern that both the mean and mode measures of required schooling are simply equilibrium outcomes with no demand-side or technological interpretation. They can shift even if the production technology and the jobs-pool do not. This problem is likely to be much more acute for the mode given the multi-modality of years of schooling. In contrast, our approach using unskilled jobs has a more structural interpretation, but requires more assumptions.

Nevertheless, the mean method detects mild increases in overeducation in the full labor force that are similar to those we found in unskilled jobs. We ask next whether this is because both methods classify similar workers as overeducated. To permit a clean comparison with the unskilled jobs test we first re-evaluated which workers were overeducated under the mean method when jobs are split by gender. We then examined the statistical relationship between the two indicators of overeducation.

Focusing on the 2000 data (results in 1990 are similar), workers who are overeducated under the unskilled jobs test are roughly twice as likely to be overeducated under the mean criterion as those who are not overeducated under the unskilled jobs test; while those who are overeducated under the mean criterion are three times as likely to be overeducated using the unskilled jobs test. This said, the correlation between the two overeducation measures is only .0635. This is at least partly because we have not labeled jobs that may have experienced SBTC as unskilled. A more meaningful statistic is that only 25% of the overeducated under the unskilled jobs test are classified as overeducated by the mean method. In other words, 75% of workers who we identify as earning low returns to their education are not classified as overeducated by the mean method, because their education levels are not atypical. This high type 1 error rate amongst technologically stagnant jobs suggests that reversing the order of the overeducation test procedure may be useful.

Obviously, the rate of type 2 error under the mean method (workers earning high returns being classified as overeducated simply because their education levels are high), cannot usefully be discussed unless the no-SBTC requirement is dropped. In the interests of focus and rigor, we plan to tackle this issue in a separate paper with a different set of countries.

Finally, for comparison with other studies in the overeducation literature, Table 5 also reports the returns to overschooling and underschooling using the mean and mode measures, and the standard over-required-under education (ORU) regression specification (Duncan & Hoffman, 1981):

$$\ln W = \alpha + \beta_r s_r + \beta_o s_o + \beta_u s_u + \gamma_1 Exp + \gamma_2 Exp^2 + \varepsilon \quad (2)$$

where s_r is the required years of schooling, s_o is the number of years of overeducation ($max[s - s_r, 0]$) and s_u is the number of years of undereducation ($max[s_r - s, 0]$). Consistent with most overeducation studies (Rubb, 2003a), the returns to required schooling exceed the returns to surplus schooling, which exceed (the absolute value of) the returns to underschooling. The preceding results suggest why this finding is common – workers found to be overeducated under the mean method are at least somewhat more likely to work in low-return jobs.

6. A regression analysis of changes in the composition of employment

We have defined marginal educated workers as those working in jobs that offer below 7% returns to their schooling investments. We now ask whether conditions for marginal workers are a reflection of the opportunities available to non-marginal workers. Intuitively, if overeducation arises due to an oversupply of educated workers, one would expect most workers in an overeducated society to be funneled into lower return jobs over time. We investigate this using a 2-step regression strategy.[8]

6.1. Methodology

The analysis is restricted to India and Mexico, where occupational classifications could be concorded over time. We employ a two-step regression analysis. We consider all employees who are recent entrants into the labor market, because mismatches between education and jobs tend to afflict recent entrants more.

We first estimate the following wage regression, on separate subsamples by job (j) and year:

$$\ln W_i = \alpha + \sum_l \beta_{j,l} y_{i,l} + \boldsymbol{\gamma}_i' \mathbf{z}_i' + \varepsilon_i, \quad (3)$$

where i indexes the worker, $y_{i,l}$ is years of schooling at level l, and $\mathbf{z}_i$ includes a gender dummy, potential work experience and its square. In Mexico, l indicates, in turn, primary, lower secondary, upper secondary and college education. In India, where for reasons of sample size, we had to pool middle, lower-secondary, and upper-secondary school together, it stands for primary, secondary and college. While the Mexican data measure years of schooling, for India we impute the years of schooling from the categorical schooling completion responses. Denote the estimated job-specific returns to schooling in the initial and subsequent years by $\hat{\beta}_{j,l,0}$ and $\hat{\beta}_{j,l,1}$ respectively.

In the second step, we regress the change in the share of some employee pool working in each job (ΔE_j) on $\hat{\beta}_{j,0}$. The regression is weighted by the number of observations in each job in the initial period, and we include a proxy measure of SBTC (λ_j). The specification is:

$$\Delta E_j = \delta_0 + \sum_{l \neq primary} \delta_l \hat{\beta}_{j,l,0} + \phi \lambda_j + u_j. \quad (4)$$

Returns to primary education are excluded because too few recent entrants in most jobs are completely uneducated to estimate returns to primary schooling.

We run this using ΔE_j calculated within several different employee pools. The choice of employee pool changes the interpretation of the δ_l coefficients. First, we run the regression taking the change in employment share amongst all employees as our dependent variable. In this case, if $\delta_l > 0$ for higher education levels and $\delta_l < 0$ for lower education levels this indicates that the job mix is becoming more skill intensive (and vice versa). This exercise simply reveals changes in the composition of employment.

Second, to examine changes in the composition of employment *relative to the supply of educated workers*, we focus on sub-sets of the employee pool containing only those who terminated their schooling part-way through, or at the end of, each level of education. To illustrate how these regressions are to be interpreted, suppose that we are examining employment trends amongst workers with at least some college education. Then, if, $\delta_{college} < 0$ and $\delta_{secondary} > 0$, we would conclude that college-educated workers moved out of jobs that previously rewarded college into jobs that previously rewarded secondary education. Note that this need not indicate that these college educated workers are overeducated: while they have moved into jobs that offer below-average returns to college education, those returns may nevertheless remain large enough to justify the investment (i.e. they may exceed 7%).

We include a proxy for SBTC in the second stage regression to allow for shifts of educated workers across jobs that are driven by technical change. We expect ϕ to be positive, particularly in more educated employee pools, because education requirements rise in jobs subject to SBTC. We have experimented with four different proxies for SBTC: $\Delta\hat{\beta}_{j,college}$; the residual from the regression of $\hat{\beta}_{j,college,1}$ on $\hat{\beta}_{j,college,0}$ (the "innovation" in returns); the change in the share of the total wage bill in each job paid to college graduates; and the analogous "innovation" in the college-wage-bill share. We tried this range of proxies to ensure that our results are robust, and because each proxy is conceivably endogenous to changes in jobs' employment shares. For the same reasons, we also ran the regressions without the SBTC correction. None of this significantly alters the conclusions. Nevertheless, we emphasize the descriptive, non-causal interpretation of our results.

We refrain from splitting jobs by gender in order to allow for trends in the matching of educated workers to jobs that might change with feminization of the workforce and/or rising education levels. For example, if women are more educated than men (e.g., Mexico and the Philippines), educated women entering the labor force might take on jobs that previously hired less educated men.

6.2. Results

Table 6 provides the second step regression results. We could consistently identify 91 jobs in India and 351 in Mexico, but included in the regressions only those jobs with at least 50 workers in each year, and in which returns to all secondary and tertiary education levels could be identified. Running the Mexican analysis using a more aggregate, 115-job classification (for comparison with the Indian results) did not alter the outcome qualitatively. The jobs included in the regression analysis, being large, account for over 90% of employees in each country and year. In Mexico we were able to conduct the analysis on a sample restricted to those with 10 or less years of labor market experience. To obtain a large enough sample in India we had to include workers with 20 or less years of experience.

[8] We are grateful to the editor, Mikael Lindahl, for suggesting the following regression analysis.

Table 6
Did educated young employees[a] move into jobs offering higher returns to schooling? 2nd stage regression results.

A. India	2nd stage employee pool: All employees	Workers terminating school at level:	
		Secondary	Post secondary
Independent variables	(1)	(2)	(3)
Constant	−0.077***	0.015***	−0.020
Returns in 1993 to years of:			
Secondary	0.215***	−0.093***	−0.091***
Post secondary	0.135***	−0.028**	0.176***
Change in PS wage bill share[b]	0.220*	−0.016	0.069
Sample size (# of jobs)	62	62	61

B. Mexico	All employees	Workers terminating school at level:		
		Lower secondary	Upper secondary	Post secondary
Independent variables	(1)	(2)	(3)	(4)
Constant	−0.001	0.000	−0.004	−0.009***
Returns in 1990 to years of:				
Lower secondary	0.005	0.000	0.001	0.000
Upper secondary	−0.016	−0.018	−0.016	0.006
Post secondary	0.042**	0.046**	0.078***	0.071**
Change in PS wage bill share[b]	0.041**	0.029**	0.048***	0.110***
Sample size (# of jobs)	232	232	232	232

Results to regression specification (4). All regressions use Huber-White standard errors. Only jobs for which 50+ workers are observed are included. Included jobs in all regressions account for over 90% of young employees in all years.

[a] Young employees are wage employees with less the 10 years of potential labor market experience in Mexico, and less than 20 years in India.
[b] Share of the total wages paid out in this job that are paid to workers with at least some post-secondary education.
* Correspond to 10% significance level.
** Correspond to 5% significance level.
*** Correspond to 1% significance level.

The coefficient on the change in the share of the wage bill received by workers with tertiary education (see Table 6), or on the innovation in that wage bill share (not shown), is always positive when it is significant. The results when we proxy for SBTC with the change or the innovation in the returns to college (also not shown) are usually positive or insignificant. This is consistent with these proxies picking up some SBTC. The estimates of δ_l are qualitatively invariant to the choice of proxy for SBTC, or even to its exclusion.

The analysis of all young Indian employees (column 1) shows that jobs that previously paid higher returns to secondary and college education grew more than those that paid lower returns. Yet, the analysis of secondary-educated employees (column 2) shows that they moved slowly out of jobs that offered higher returns to tertiary education, and rapidly out of jobs that offered high returns to secondary education. This may be partly because they were replaced by college graduates in those jobs that reward college as (column 3) college-educated employees moved into them. Put together, these trends suggests that while employment in general shifted in a more education-intensive direction, education levels climbed faster, college graduates replaced secondary graduates in the highest skill jobs, and jobs that used to reward secondary education came to employ fewer of them. This contrasts with the lack of evidence of overeducation in unskilled jobs in India. We therefore conclude that prospects for the secondary educated worker diminished, but not enough to render them overeducated.

In Mexico, the analysis of all employees (column 1) indicates that the employment shares of jobs that paid high returns to lower and upper secondary education did not grow, but the shares of jobs that placed a high premium on college education did. Moreover, educated workers moved into jobs offering higher college returns, often giving up jobs that reward upper-secondary education (columns 2–4). Moreover, when we run the regressions on workers with 20 or less years of experience (to facilitate comparison with the Indian results), these trends are only strengthened in significance. These trends suggest growing opportunities for educated workers, and contrast with the experience in Mexican unskilled jobs, where a slight increase in overeducation is observed.

7. What does it mean?

Standard overeducation tests first determine which workers, and how many, have more schooling than they "require" and then estimate the return to "surplus" schooling. We recommend reversing the procedure – asking first which jobs do not pay a reasonable return to schooling, and then determining how many workers those jobs employ. This eliminates the need for a priori measures of required education, which are often unavailable in developing countries. We have also shown that two standard measures of required education (the occupational mean and modal years of schooling) are conceptually and empirically problematic.

Our test reveals evidence of growing overeducation in technologically stagnant unskilled jobs in the Philippines, milder evidence of it in Mexico, and little evidence of it in India and Thailand. We now ask what should be inferred from the results from Mexico and the Philippines.

Consider Mexico first: employment of all educated workers grew substantially faster in higher-return jobs and in those experiencing SBTC, and returns to secondary and tertiary schooling rose. These trends all point to an increase in demand for educated workers that outstripped supply. Yet, overeducation rose slightly in unskilled jobs. These contradictory trends are difficult to reconcile with an unsegmented labor market. The simplest possible segmentation mechanism, and to us the most intuitive, involves variations in the quality of schooling. If workers who obtained low quality education are only qualified for unskilled jobs, but grew in proportion to the labor force, then rising skill demand would lead to growing employment opportunities in high-return jobs and rising schooling returns, even while the poorly educated accumulate in unskilled jobs. In this view, overeducation is not tied to a general abundance of educated workers, but to a scarcity of quality education. Workers with many years of schooling employed in unskilled jobs are, from a productivity perspective, overschooled (resources were spent on their schooling), but not necessarily overeducated (limited education was delivered). The policy implication is that more, not less, educational effort is required, but that these efforts must target the quality of schooling offered to the students most likely to enter unskilled jobs. In this view, the overeducation literature should examine the educational and economic background of workers who are likely to end up overschooled for their jobs more carefully.

It is harder to interpret the high level and growth of overeducation in unskilled jobs in the Philippines, because too few jobs can be tracked over time to implement the mean method or the regression-based test. However, trends in the overall return to schooling do suggest that educated workers are becoming abundant. The Philippines mathematics and science scores remained essentially unchanged in 2003 relative to 1994 (TIMSS, 2003), which suggests that a generalized decline in education quality is not responsible for falling schooling returns. Nor are increases in the quantity of education supplied likely to provide a convincing explanation: education levels rose faster in Thailand and Mexico, but both countries' schooling returns were more buoyant than the Philippines'. This suggests that weak demand for educated workers in the Philippines played a role.

What might lead to this confluence of strong supply expansions and weak demand? A macroeconomic crisis is one possibility. The time interval we study spans the 1997 Asian Financial Crisis, which had stronger and longer-lived effects in Thailand than in the Philippines (Harrigan, 2007). Yet, in contrast with the Philippines, there is no evidence that overeducation increased in Thailand, suggesting that overeducation in the Philippines is a longer term structural problem. On the other hand, in Mexico, where overeducation in unskilled jobs advanced slightly, this could be related to the 1994 Tequila Crisis and dislocations in the wake of NAFTA. Another possibility is that workers invested in education to apply it abroad, but found work in menial jobs while awaiting emigration opportunities. This is but one example of how overeducation can arise as a temporary phenomenon (e.g. Rubb, 2003b; Sicherman, 1991; Sloane, Battu, & Seaman, 1999). If this is the relevant explanation of overeducation, it suggests a delayed or incomplete adjustment of labor demand to an increased availability of educated labor.

Our findings yield two useful insights. Most obviously, our findings for the Philippines are significantly at variance with the view, ubiquitous in the country's policy debates that work is everywhere becoming more skill intensive, and that education supply yields its own demand. Mehta et al. (2009) show that, despite high and rising levels of education, the Philippines did not see a significant expansion in education-intensive jobs. The current paper shows that this results in significant overeducation in unskilled jobs. We believe that this is an argument, not for curtailing educational effort, but for paying attention to other constraints on skilled employment growth.

Finally, in keeping with the rest of the overeducation literature, we have determined that a worker whose education has not raised his/her productivity in the current job enough to justify the resources expended on it, is overeducated. Some of these overeducated workers have as little as a seventh grade education. Overeducation at such a low education level underscores a potential problem with focusing only on the beneficial effects of schooling on worker productivity: a person's education may be justifiable on the strength of its other benefits (e.g., empowerment, improved health outcomes, gender equity, etc.), even if skilled job opportunities are scarce.

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Appendix. Definition of unskilled jobs

	Description	Occupation code	
A. India		1993	2005
		1968 NCO	*1968 NCO*
Servants	Male or female household servants working as ayaha, nurse, maids, domestic servants, and other related housekeeping service workers	53	53
Sweepers	Male or female sweepers, cleaners and related workers working in private establishments	541	541
Painters	Male construction workers whose main task is painting	931	931
B. Mexico		1990	2000
		1990 NCO	*2000 NCO*
Drivers	Male drivers, driver's assistants, and operators of cars, buses, taxis and trams	552	552
Bakers	Male or female bakers	5202	5202
Butchers	Male or female butchers	5200	5200
Painters	Male painters of buildings	5261	5261
Gardeners	Male gardeners	8124	8125, 8203
C. The Philippines		1991	2004
		1977 PSOC	*2003 PSOC*
Drivers	Male motor vehicle drivers; restricted to land transport only; excludes operators of heavy equipment and agricultural machinery	985	83
Maids	Female helpers working in private households; tasks performed include cleaning the house, cooking and serving meals, washing, pressing clothes, etc.	541	91
Saleswomen	Male or female working in private retail establishments as models, salespersons and demonstrators; tasks usually include posing as models for advertising and display of goods, selling goods, and demonstrating goods to potential customers	451	52
D. Thailand		1995	2005
		1958 ISCO	*1988 ISCO*
Cooks	Female cooks who prepare food in public and private eating places, excluding food-processing plants	912	5122
Waitresses	Female waitresses and bar tenders in commercial establishments, clubs and institutions	921	5123
Carpenters	Males who cut, shape and erect various wooden structures using hand or power tools (excludes cabinet makers)	771	7124
Drivers	Male tram, motor vehicle (car, bus, light and heavy lorry, and motorcycles), and other motorized vehicle drivers	8321–8321	6410–6419
Guards	Male guards whose tasks include the maintenance of law and order (exclude prison guards) and protection of property; include doorkeepers, watchpersons and related workers, and other protective services workers not elsewhere classified.	9092; 9099	9152

Note: PSOC, Philippines Standard Occupational Classification; NCO, National Classification of Occupations; ISCO, International Standard of Industrial Classification. Thailand's classification schemes involve very minor modifications of ISCO 1958 and ISCO 1988.

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