Overeducation in Developing Economies: How can we test for it, and what does it mean?

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Abstract

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 increases in overeducation. Such increases are confirmed by rising education levels in menial jobs that offer very low returns to education. Overeducation is deemed a systemic problem if these jobs absorb a growing share of the educated labor force. Normatively, overeducation should sometimes be seen as a shortage of skilled jobs, not as a surplus of educated workers. We find substantial evidence of overeducation in the Philippines, mild evidence of it in India, and none in Thailand. We validate our approach by applying it alongside traditional approaches involving "objective" measures of required education to Mexican census data. [JEL: I21, J24, J33]

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1. Introduction

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 the phenomenon in Mexico, and Abbas (2008) studies it in Pakistan. This is because the standard tests for overeducation require data that typically have not been collected in developing countries. Overeducation could have rather different normative implications if it is found in developing economies where income and education levels are low. This paper proposes a new method for testing whether workers in developing countries are overeducated, and clarifies the normative implications of finding that they are.

An individual worker is said to be overeducated if he/she has acquired more education than is "required" to perform his/her job. Confirming that this is the case 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

Overeducation is often taken to imply that resources are wasted, because the marginal levels 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. This paper proposes a new approach to examining these issues in a developing country context. We apply it to study overeducation in India, the Philippines and Thailand. As a validation exercise, we also implement our overeducation test on Mexican data and compare the results to those obtained by using the mean and mode level of education in each occupation to proxy for required schooling.

If overeducation is widespread, then the distortion it represents can assume macroeconomic proportions, with aggregate returns to investments in human capital falling, on the margin, below

[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).

those to physical capital. Some early studies seeking evidence of such inefficiencies compared the aggregate returns to education with the cost of funds for physical capital investments. Psacharopoulos (1973) summarized the evidence on this for many countries. Harberger (1965) studied the Indian data, and concluded that if individual worker productivity were all that mattered for development, then physical capital investments should be prioritized over education.

However, because such studies use OLS estimates of returns to education, they are unsuitable for working out the *marginal* productivity effects of education. Certainly, if markets for education and education finance functioned efficiently, workers would receive education in declining order of expected returns, and these OLS estimates would systematically overestimate the gains from education expansion. In this case, the approach would be biased against finding that workers are overeducated, rendering any such finding all the more noteworthy. Unfortunately, there is little evidence that education in developing economies is efficiently allocated,[2] and plenty of theoretical reasons to think it might not be. In any case, overeducation usually only afflicts portions of the labor force, not all workers. While aggregate returns to education are indicative of general education scarcity, they are therefore unlikely to prove helpful for identifying overeducation. This requires disaggregated analyses, which so far do not exist for most developing economies.

The main reason for the lack of disaggregated studies of overeducation in developing countries is the lack of data necessary to identify the education levels required for specific jobs. Developed country studies determine required education levels either subjectively, by asking employers or workers to identify the education level required for a given job; or objectively, by using required education levels suggested by professional job analysts, or by considering education levels close to the occupational mean to be required. 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,

[2] For example, Duflo (2001) utilizes a natural experiment – a plausibly exogenous schooling expansion program in Indonesia to calculate IV estimates of the returns to education and finds that they are statistically indistinguishable from her OLS estimates. Sakellariou's (2006) IV estimates using age at the time that the Philippines extended free education to secondary school exceed OLS estimates. The same is broadly true of most of the studies summarized by Card (2001). If ability biases are assumed to exist, the data are therefore more consistent with the notion that there are constraints on obtaining education. The variables used to instrument for education determine whose returns to education are being estimated (Angrist and Krueger, 2001), so Sakellariou and Duflo's qualitative findings are most relevant when considering public interventions to reduce the cost of attending secondary school in developing countries.

estimates of occupational mean education levels cannot be measured precisely enough to obtain accurate measures of required and surplus schooling. This is because, for example, the number of years of schooling completed by a worker reporting an incomplete lower-secondary education is unknown. The use of the occupational modal education level also raises some interpretational problems, as we demonstrate in section 5.

We therefore develop an overeducation test that relies on history. We argue that if a job paid a negligible return to education in the not too distant past, then the prior education profile of the workers in that job was adequate. Each job must be tightly defined for this argument to make sense, so that it is reasonable to assume that workers in that job, irrespective of education level, perform essentially the same tasks. Low returns to education within jobs then imply a limited effect of education on productivity in performing those tasks. If the technology applied to those tasks does not change in a skill biased way over time and the quality of education does not deteriorate, then initial education levels in that job should continue to be adequate. If the probability of a newly educated worker entering such low-return jobs rises, this indicates that a society is becoming overeducated. The assumption that no skill biased technological change occurs is important, and is invalidated if both the returns to schooling and the utilization of educated workers within an occupation rise over time.

We use this procedure to test for overeducation in India, the Philippines and Thailand during the 1990s and early 2000s. Educational attainment has been rising in all three countries, but at very different rates. Moreover, while Indian women are much less educated than Indian men, the opposite is true in the Philippines, and Thai women and men are roughly equally educated. Finally, per capita GDP differs significantly across countries - Thailand's is roughly thrice India's and twice the Philippines' in PPP terms; as do patterns of structural change – manufacturing employment grew in Thailand and become more sophisticated, the Philippines de-industrialized, and high-skill services grew rapidly in India (Mehta et al., 2009). These variations permit interesting comparisons to be made that shed light on how to interpret overeducation if it is found. Cohn and Ng (2000) and Cohn el al. (2000) study Hong Kong, Abbas (2008) and Hung (2008) studies Taiwan, so the study of our three, rather different countries helps to fill out the picture of overeducation in Asia.

The rest of this paper is structured as follows: The data, from India, the Philippines and Thailand, are discussed in the next section. Section 3 presents trends in educational attainment and overall

returns to education. The test for overeducation is defined and demonstrated using data from India, the Philippines and Thailand in section 4. Section 5 utilizes data from Mexico that permit results from our approach to be compared with those obtained by using the mean and mode years of schooling in each occupation to proxy for required schooling. Section 6 makes the case that in some circumstances it is more appropriate to think normatively of overeducation as a shortage of skilled jobs than as a surplus of educated workers, and concludes.

2. The Data

The 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). They have several merits. First, all surveys include workers in the formal and informal sectors, and utilize multistage stratified random sampling (using national censuses as sampling frames), to deliver nationally representative estimates of the structure of employment, supply of education and distribution of wages. These are the only datasets from these countries from which these estimates can be obtained. Second, the sample sizes are all large, ranging from 49,902 workers in the Philippines in 1991 to 200,380 in India in 1993. This permits precise measurements to be taken on tightly defined sub-groups of the work-force. Third, notwithstanding some changes and adaptations over the years and across countries, the surveys are mostly based on common international occupational classifications.

Two samples are drawn from each country-year pair: a quantity-sample includes all employed persons, and a wage-sample includes only employees. We exclude public employees from the wage-sample in the Philippines, and public and cooperative employees in Thailand. India did not distinguish between public and private employees in 1994, so all Indian employees are considered. Only workers aged 15-60 are included. While productivity studies are best conducted using hourly wages, and we do so for Thailand, the manner in which earnings information was elicited requires that we use daily wages in the Philippines and weekly earnings in India. Where workers hold down multiple jobs, wages are reported only for the primary occupation.

Jobs are identified by a combination of occupation code, gender, and where appropriate, the type of employer (e.g., firm vs. private household). Identifying workers belonging to tightly defined jobs in India was easy, as the occupational classification did not shift over time and was available

at the 3-digit level. The classification changed between rounds in the Philippines and Thailand, and the Philippine classification is only available at the 2-digit level for 2004. The number of jobs that could be tightly defined and identified is therefore smaller in these two countries. The Appendix provides the criteria for identifying jobs.

Education is measured ordinally in all surveys. In India the highest level of education successfully completed is reported (primary, middle-school, lower-secondary, upper secondary and college). Filipino respondents pick from the following options: none, incomplete elementary complete elementary, incomplete secondary, complete secondary, incomplete college, and complete college. Thais do likewise, but report incomplete and complete, lower and upper secondary schooling.

3. The Scarcity of Educated Workers

We consider men and women separately for two reasons. First, men and women engage in different activities in our countries, so the jobs available to educated workers vary by sex. Second, they have differing education levels. Table 1 shows that amongst employed workers, Indian women are far less educated than Indian men, while in the Philippines women are more educated than men. In Thailand women are more likely to have graduated from college than men, but less likely to have completed primary school.

Graduation-year specific imputed lower secondary (LS) graduation rates amongst the employed[3] have trended up rapidly in the Philippines and Thailand, but not in India, where they remain extremely low, especially for women (Figures 1-3). Indian women are 1/3 as likely as women in Thailand and the Philippines to have finished secondary school. In Thailand, female LS graduation rates have only recently caught up with male rates. While Filipina workers have dominated their male counterparts educationally since the 1960s, the dominance has grown acutely since the early 1980s when male secondary completion rates stagnated. Taking these differences in education supply to be exogenous, overeducation appears more likely in the Philippines to affect women than men, and it is more likely to be found amongst Thai men than Filipino men. Indians are unlikely to be overeducated. However, if trends in LS completion rates are considered endogenous responses to demand conditions, one might suspect that it is Filipino

[3] This is the percentage of the male and female quantity samples in the latest survey who (without repeating grades) should have completed lower secondary school in a given year, that report having done so.

men, not women, who have been overeducated. Of course, one possibility is that legal changes in these countries, which raised free or mandatory secondary education levels, encouraged education expansion. While Sakellariou (2006) is able to obtain enough signal from the Filipino expansion to identify its local average treatment effect on earnings, albeit using a different dataset, Mehta et al. (2007) find that secondary completion rates in Thailand and the Philippines imputed from the labor force surveys display roughly the same upwards momentum before and after the legal change.

To move from availability to scarcity, we estimated wage returns to schooling using the specification:

$$(1) \qquad w = \sum_{l \in levels} \beta_l y_l D_l + \sum_{l \in levels} \delta_l I_l + \gamma_1 Exp + \gamma_1 Exp^2 + \varepsilon \; ;$$

where *Exp* denotes potential labor market experience, $D_l = 1$ indicates that the worker has completed education level *l* and may have progressed further, y_l is the number of years that must be successfully completed to pass level *l*, and $I_l = 1$ indicates that a workers schooling was terminated part-way through level *l*. Table 2 provides OLS estimates of the Mincerian-returns to a year of schooling (β_l) for every education level that could be estimated. For example, for young Filipinos, returns to primary schooling cannot be estimated, as there are too few sampled workers with no education to measure how much workers without primary schooling earn. To investigate the idea that education is becoming less scarce among 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 imply that they are more likely to be overeducated (Walker and Zhu, 2007).

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 is more evident for women than for men. Female Indian wage employees are moving out of agriculture and going mainly into services, while men are moving out of agriculture and going mainly into manufacturing[4]. This is consistent with Mehta et al's. (2007) conclusion that this increasing convexity, which has been observed in many countries (Hasan, 2007), is driven by trends in the services sector. The decline in lower secondary returns is most pronounced amongst the young,

[4] The fraction of Indian male employees working in agriculture fell by 8.6 percentage points and 75% of this labor moved to the industrial sector. For women, agriculture's employment share fell 7.5 points and 87% of this labor moved into services.

which is consistent with the view that the increased prevalence of basic education has eroded its value.

In the Philippines, returns to secondary education fell for everybody. Consistent with the possibility that Filipina workers are overeducated, secondary returns fell more sharply for women, while college returns fell significantly for women only.

The only significant shift in Thailand is a drop in returns to upper secondary education, which is more pronounced for the young. The 1997 Thai constitution introduced a right to 12 years of free and mandatory education, effectively extending subsidies from lower to upper secondary. The drop in returns among recent upper secondary graduates is certainly consistent with this.

Returns to experience remained unchanged for all Thais and for Indian men. They rose for Indian women, and fell for all Filipinos. To the extent that education and experience are substitutes, this would be consistent with a declining scarcity of human capital in the Philippines, and rising scarcity amongst India's poorly educated women.

Thus far, then: (i) despite rapid educational expansion there is no hint that Thai workers are becoming overeducated, other than a drop in returns to upper secondary school; (ii) India's education-wage profile became more convex as women moved into services, demand for workers with tertiary education grew, and the supply of workers with secondary education outstripped demand; and (iii) the scarcity value of education in the Philippines fell; and it fell faster for Filipina workers, whose education levels are outstripping those of their male counterparts. The question is whether any of this has led the payoffs to education, appropriately defined and measured, to fall far enough to justify labeling groups of workers overeducated.

4. Testing for Overeducation

Our test for overeducation is simple. We will argue that there is overeducation when education levels advance substantially in jobs that pay an inadequate return to schooling. If these jobs employ a large and growing share of the educated workforce, we deem overeducation to be a growing concern. The results of this test will depend upon how we define an "inadequate" return to education, a "substantial" advance in education levels, and a "large and growing" employment share. Because those determinations are subjective, we provide a full set of numerical results in

the tables. This permits readers who disagree with the cutoffs that we have chosen to conduct the tests with different cutoffs.

The literature on overeducation takes returns within jobs that are less than the return to required education to signal a potential inefficiency. Because we do not have measures of required education, we cannot estimate the returns to required education. We must therefore seek a normative alternative. Since secondary education is largely publicly funded, one possibility is to consider investments in education to be surplus if educated workers end up in professions in which they earn returns that are lower than the cost of public funds – typically assumed to be 10-12%. This is conceptually problematic, as returns would be below these cutoffs at efficient levels of education investment because education confers substantial non-wage benefits. Unsurprisingly, by this metric, advancing secondary education levels in almost all professions in our countries would signal overeducation.

Instead, we opt for a softer, more flexible standard, and propose graduated cutoffs of 5-7%. Almost every study measuring the returns to surplus education in a given job cited by Rubb (2003a) and McGuinness (2006) that finds evidence of overeducation, has found returns to surplus education in the 2-7% range. Four entries in Rubb's (2003a) list of 53 estimates exceed 7%. Moreover while 5-7% private returns on investment may appear satisfactory, this excludes the publicly and privately borne direct costs of education, which are high relative to wages.[5]

We present estimated returns within tightly defined jobs in Table 3. We report returns to a particular education level only if the number of sampled workers in the profession with that degree and the number with one degree lower each exceed 30. Returns that are insignificantly different from zero are presented in bold type. When the shift in returns to a particular level of education is statistically significant we underline the estimated returns in both survey years. We note that the levels of education at which our sample sizes permit returns to be estimated rise over time, as education levels in these professions increase. We also note that the within-job returns to middle school education in India are mostly insignificant by 2005.

[5] Under the simplifying assumptions that workers never retire, and that wages do not vary with experience, we can express the full rate of return (r) to a year of an education level that lasts d years, as a function of the annualized Mincerian return (β) and the cost of a year of schooling relative to the marginal product of labor without that level of education f as follows: $r = (1/d)\{\ln[e^{\beta d} + f] - \ln[1 + f]\}$. This is derived from equations presented in Mincer (1958), generalized to permit non-zero direct schooling costs. Back of the envelope calculations based on educated guesses for f in our countries suggest that for secondary education, $r<0.045$ when $\beta=0.06$. Details of this calculation are available on request.

Under our 5-7% rule, there are five jobs that stand out as obvious potential indicators of overeducation: drivers and maids in Thailand and the Philippines, and guards in Thailand obtain low returns to education in both years. In addition, Indian painters of buildings, Indian female sweepers and saleswomen in the Philippines also obtain very low returns in the subsequent year. Drivers in India obtain low returns to most levels of education in both years.

Of these nine jobs that we will follow for evidence of overeducation, only Filipina maids and saleswomen experienced statistically significant shifts in returns: college returns for saleswomen and secondary returns for maids declined. Shifting within-job returns over time are inconsistent with the joint hypothesis that workers of different education levels take on the same tasks (i.e., they are perfect substitutes) and that technology, broadly conceived, remained the same. It follows that the declining returns reflect a shift in technology, or, more likely, in the composition of tasks, towards less education intensive work. Returns in the remaining seven jobs are consistent with our maintained hypothesis, as none of them shifted significantly.

Figures 4-6 show that there has indeed been significant education inflation in eight of the nine country-job pairs just listed. In the first-order dominance sense, the workers in each job are more educated in the subsequent year. The only exception is Thai maids, amongst whom higher-education prevalence is falling. Educated Thai women therefore appear to be finding other, presumably better, jobs.

Because the first five jobs listed paid low returns in the initial and subsequent years, it is clear that if any new technologies were introduced to these professions in the interim, they were not skilled-labor augmenting.[6] Casual empiricism in any case suggests that the passenger car, bus, jeepney, motorized tricycle, broom, mop, bamboo scaffold, paint-brush, Billy-club and pistol have evolved little in the past fifteen years. Sales techniques could have evolved to be skilled-labor augmenting, but falling college-returns suggests otherwise for saleswomen in the Philippines.

Therefore, we have evidence that some workers are overeducated. But does the problem assume macroeconomic proportions? After all, some amount of education inflation within jobs is only to

[6] This is subject to the assumption that jobs are sufficiently tightly defined that workers of different education classes in the same job are perfect substitutes for each other.

be expected as the supply of educated workers expands (Mason, 1996). The share of educated workers who end up laboring in low-return jobs is therefore more important than the share of workers in low-return jobs who have been educated. Table 4 presents the proportion of workers who completed (at least) a given level of education, who have then found work in each of our nine indicator jobs. It also presents the share of all workers working that job. To complete the comparison, Indian maids are included in Table 4 also, even though they receive reasonable returns to secondary education.

Table 4 leads us to the following conclusions. First, overeducation amongst some Filipino workers of both sexes rose significantly – the employment shares of drivers and maids rose to extraordinary levels, and did so in all education classes. Matters look even worse than Table 4 suggests if we restrict our focus to tighter subsets of the labor force. As a share of non-agricultural employment, drivers' employment share rose to 17.8%, and that of maids to 11.9%. The numbers for maids are even starker if attention is restricted to private wage employment. Fully 24.5% of Filipina wage-employees work as maids. Educated women are also moving into retail sales just as returns in that profession collapse. Second, rising overeducation is not a problem in Thailand. While the employment shares of guards rose amongst most education classes, maids' employment shares fell in all classes, and drivers' shares fell in aggregate. Six times more Thai men are employed as drivers than as guards. Third, there is only a slight indication of growing overeducation in India. While employment shares crept up in all four jobs, they reached rather low levels, even as a share of non-agricultural employment.

5. Validation

The foregoing results rely on a new approach to testing for overeducation. In this section, we compare the results using this approach to those from two standard methods in order to gauge their relative performance. The first standard approach considers workers whose years of schooling are more than one standard deviation above (below) the occupation mean years of schooling to be overeducated (under-educated). The second standard approach assumes that workers with more (less) than the modal years of schooling in their occupation are overeducated (undereducated).

The mean method requires a cardinal measure of the years of schooling, and so cannot be attempted using the data from our three countries of interest, which measure schooling ordinally.

To make comparisons between our method and standard ones possible, we therefore utilize data on Mexican male wage earners, aged 16-65, drawn from the 1990 and 2000 Census available from IPUMS International. Usefully, these data offer very large samples – on the order of a million observations in each year, a 4-digit occupational classification that does not change much between years, and a measure of years of schooling successfully completed. We replicate the cleaning procedures utilized by Mehta & Acuna-Mohr (2010) to arrive at their "wage-sample" – a sample of private wage employees, which we use for the analysis in this section.

Table 5 shows the percentage of workers estimated to be overeducated and undereducated in each year using the mean and mode criteria. Consistent with the results to Quinn and Rubb (2006) overeducation in Mexico in the 1990s increased slightly while undereducation decreased slightly under the mean criteria. Curiously, under the mode criterion we would conclude the exact opposite - the share that is overeducated declined sharply, while the share that is undereducated rose sharply.

To make sense of this result, and to make comparisons with our own method, we now limit our focus to wage employees in five occupations. The occupations selected are the largest occupations that satisfy our two criteria: (i) we consider it plausible that they were not subject to skill-biased technological change in the 1990s; and (ii) the return to each year of schooling at any level is less than 7%. The returns to years of schooling are estimated using a piecewise linear specification:

$$(2) \qquad \ln W = \alpha + \sum_{l=e,l,u,p} \beta_s y_s + \gamma_1 Exp + \gamma_2 Exp^2 + \varepsilon;$$

where W is the hourly wage, l indexes the level of schooling (l = *e*lementary, *l*ower secondary, *u*pper-secondary, *p*ost-secondary), y_s is the number of years of schooling at that level completed (bounded between zero and the number of years it takes to complete the level), and *Exp* is potential labor market experience (age minus imputed school-leaving age).

Table 6 provides key regression results and cross tabulations for these five occupations by year. They confirm the consistently low returns to schooling in each occupation (consistent with the joint hypothesis of broadly unchanged technology and linear isoquants), recommending the use of these occupations as our "canaries in the coalmine". Tabulations of the number of observations by cell (a combination of education class and occupation) show that each cell is represented by

between 39 and 35,727 observations, implying that our estimates of returns at each level should be considered reliable. The table also shows a noticeable, but not enormous, increase in the overall percentage of workers employed as drivers, bakers and painters; while the shares employed as butchers registers a negligible decrease and the share of gardeners increases negligibly. This is consistent with the finding using the mean method, that overeducation increased, but only slightly. This impression is confirmed in the same panel when the employment shares are presented conditional on education class.

Table 6 also shows why the modal measure of required schooling can be misleading. While the mean years of schooling rose by between 0.67 and 1.23 in each of our 5 occupations, the modal education level in each profession either remained constant or shifted abruptly from 6 to 9. Mehta and Villarreal (2008) show that the large majority of Mexican workers terminate their education upon completion of a diploma year of schooling, rather than dropping out after non-diploma granting years. Indeed the modal number of years of schooling in our sample is 6, 9, 12, 14, 16 or 17 in every one of our 797 occupation-year cells. These are all diploma years in Mexico. 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. Drivers or butchers with six years of elementary education suddenly became "undereducated". Such abrupt shifts occur frequently in our sample, and this appears to explain mechanically why, according to the modal measure of required education, overeducation shrank while undereducation grew in Mexico in the 1990s.

This mechanical problem underscores Hartog's (2000) concern that both the mean and mode measures of required schooling are simply equilibrium outcomes with no demand-side or technological interpretation (p.133). These measures of "required" education can shift even if production technology and the jobs-pool do not. This problem is likely to be more acute for the mode.

We therefore recommend comparing our results with those using the mean rather than the mode measure of required schooling. On this comparison, our approach performs well, as it appears capable of detecting a rather small increase in the incidence of overeducation. Moreover, we note that our approach and the mean method measure slightly different things. Our approach

potentially has a more structural interpretation, but it requires more assumptions, and it is not capable of identifying overeducation in small occupations or small samples.

For completeness Table 5 reports the returns to overschooling and underschooling using the mean and mode measures, and the standard regression specification (Duncan and Hoffman, 1981):

$$(3) \qquad \ln W = \alpha + \beta_r s_r + \beta_o s_o + \beta_u s_u + \gamma_1 Exp + \gamma_2 Exp^2 + \varepsilon ,$$

where s_r is the required years of schooling, s_o is the number of years of overeducation ($max[s\text{-}s_r , 0]$) 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.

6. What does it mean?

What should a developing country government faced with rising overeducation do? One answer might be to reduce efforts to expand educational attainment. We believe that there are at least two unambiguous arguments against doing so, and two empirical considerations that could support or oppose the case for reduced educational effort.

Beginning with the unambiguous arguments: First, analysis of wage information sheds no light on the non-pecuniary benefits of education. Proponents of the capabilities approach to development (e.g. Sen, 1999) argue that because education enhances people's capabilities (e.g. their ability to interact with persons in positions of power, take care of their health etc.) expanded access to education is part of the development process by definition. This argument is clearly more convincing when, as we have found in the Philippines, some workers with only a secondary education appear to be overeducated. Second, even if we know *ex-post* that maids and drivers in the Philippines derive no productivity gain from their surplus education, the literature has not provided governments any guidance on how to determine *ex-ante* whose education will turn out to be surplus.

The first empirical consideration is that simply detecting overeducated workers sheds no light on why they are overeducated. Is this because education levels rose too fast, or because the composition of employment evolved too slowly? To put this in the language of the `growth

diagnostics' literature (Haussman et al., 2008), what is more binding on productivity - constraints on the creation of employment opportunities, or distortions induced by educational subsidies? We note that Thai and Filipino workers had similar levels of educational attainment and Thai education levels grew *faster* - yet only the Philippines saw increasing overeducation. In our judgment the problems and opportunities in the Philippines are therefore on the employment side. This is, in our view, the main reason to test for overeducation in developing economies – it may provide a clear signal of serious problems with job creation.

The second empirical consideration relates to mobility and equality of opportunity. Even if the productivity benefits contingent on obtaining a particular job are low, education may nevertheless permit individual workers to escape low-wage employment. If so, overeducation implies an efficiency-equity tradeoff: while reducing educational subsidies might be efficient, it is also likely to reduce social mobility. The degree to which mobility is reduced depends empirically upon how education is related to access to jobs. This mobility argument is not only a normative consideration, but may help to explain patterns of educational attainment.

For example, it may help to explain why women in the Philippines acquire so much more education than men.[7] One possibility is that they intend to work overseas. While the 2004 Survey of Overseas Foreign Workers, which unfortunately includes only short term emigrants, estimates that only 50.7% of overseas foreign workers are female, it finds that 53% of female migrants work in "sales and other unskilled labor" and 61% of male migrants work in industrial jobs and transport. This "sales and unskilled labor" category probably includes a number of services jobs that do require foreign language skills, usually in English. Thus, depending on what gets classified as "unskilled labor", it may be that education is required for and rewarded by jobs in foreign markets that pay more than local jobs. This mobility argument may explain women's individual decisions to obtain further schooling even if it might not be productively applied in the Philippines economy.

[7] For example, Dale (2008) develops a model in which workers with higher productivity in the production of household services choose to work as maids, and are less likely to obtain formal education in order to qualify for higher wage jobs producing non-household goods and services. With increased female labor force participation, we expect that opportunities for young girls to make learning-by-doing improvements in their household productivity have declined. This implies a shift in comparative advantage which should induce women obtain more education and seek jobs producing non-household goods and services. This theory therefore can explain why secondary attainment rose rapidly amongst women, but implies that it is not for purposes of obtaining jobs as maids.

The above discussion leads to questions about whether labor export policies have caused overeducation, or whether the causality is reversed. Prina (2007) reviews the history of institutionalized labor export from the Philippines. She argues that while it was initially conceived as a development strategy which would see highly skilled workers return from overseas assignments with know-how, emigration has become increasingly permanent, and the emigrants and foreign jobs have become more moderately skilled (initial cohorts included more engineers and doctors while more recent cohorts include more nurses, caregivers and sailors). Thus a case can certainly be made that overeducation at home has driven the changing character of labor export, rather than the other way around. Further research is required to reach a firm conclusion on this point, and our results should be a useful input into such deliberations.

Could overeducation be a temporary phenomenon resulting from macroeconomic shocks? 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 there is no evidence of advancing overeducation in Thailand, but a lot of it in the Philippines, suggesting that the rising overeducation in the Philippines is a longer term structural problem. Thus the relative sizes of the macroeconomic shocks work in favor of the interpretations we have offered. On the other hand, in Mexico, where overeducation advanced slightly, this could be due to the 1994 Tequila Crisis and dislocations in the wake of NAFTA. Disruption free periods of time long enough to identify structural increases in overeducation are hard to come by in developing economies.

We conclude with a discussion of two other possible interpretations of overeducation. First, might education quality explain the differential incidence of overeducation in the Philippines, and the rising share of educated Filipinos working as drivers and maids? It is well understood that a failure to consider the heterogeneity in worker skills can lead to an overestimation of the problems associated with overeducation (e.g. Bauer, 2002; Chevalier, 2003; Frenette, 2004; McGuinness, 2003), so quality considerations are crucial.

Gundlach and Woessman (2001) confirm that the quality of education declined in the Philippines between 1980 and 1994 so that Filipino 8th graders scored significantly below their Thai counterparts in 1994. The Philippines' mathematics and science scores remained essentially unchanged in 2003 relative to 1994 (TIMMS, 2003). While we could not find measures of the quality of Thai education in the wake of Thailand's expansion of rights to schooling in 1997, it therefore remains likely that the quality of education was lower in the Philippines than in

Thailand through our sample period. However, we do not think this explains the dearth of skilled jobs in the Philippines. According to the World Bank's Enterprise Survey 2009 (not shown for brevity), far fewer firms perceive a skills shortage in the Philippines than in most countries of similar income levels, including Thailand. The same survey ranks the Philippines as the most difficult place to do business in Asia, other than Iraq and Afghanistan (ranking the Philippines 140th out of 181 countries surveyed). We therefore consider governance, inadequate competition policy, high electricity prices and other impediments to doing business identified in this and other surveys to be more likely explanations for why the Philippines faces a shortage of skilled jobs, while Thailand does not, than poor education quality. Also, because the evidence from TIMMS is that education quality remained roughly unchanged between 1994 and 2003, falling education quality cannot explain education inflation amongst maids and drivers.

Finally, it is possible that jobs in the Philippines as drivers or maids are only temporary (e.g. Rubb, 2003b; Sicherman, 1991; Sloane et al., 1999). In this case, overeducation would be a transitory phenomenon, and therefore less deserving of policy attention. Lacking longitudinal data, we cannot assess this possibility rigorously. However the statistics we have assembled imply that even if these are temporary jobs that upwardly mobile workers endure en route to more appropriate employment, these workers must, in a steady state, be spending a larger portion of their careers in transit to the career for which they obtained their schooling.

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Figure 1. India - Lower Secondary Graduation Rates By Expected Year of Graduation

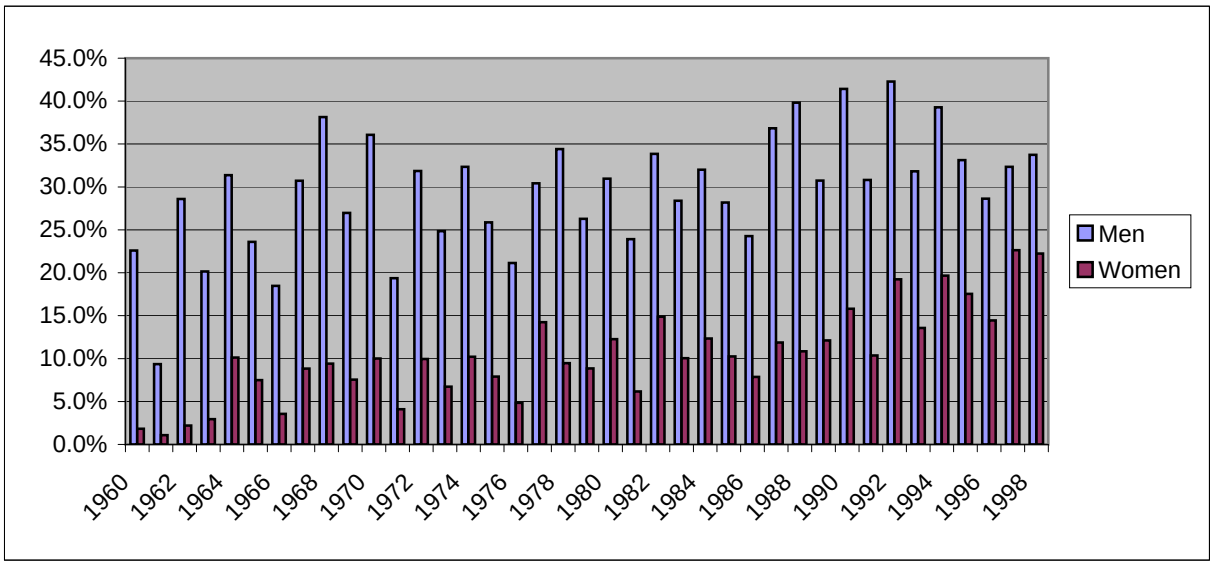

Figure 2: The Philippines - Secondary Graduation Rates By Expected Year of Graduation

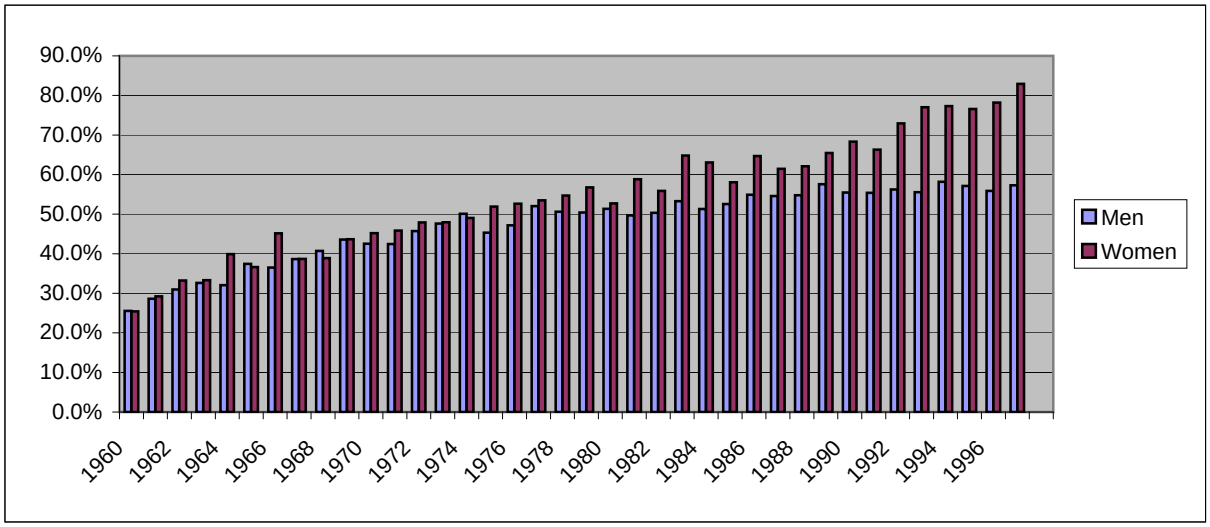

Figure 3: Thailand - Lower Secondary Graduation Rates by Expected Year of Graduation

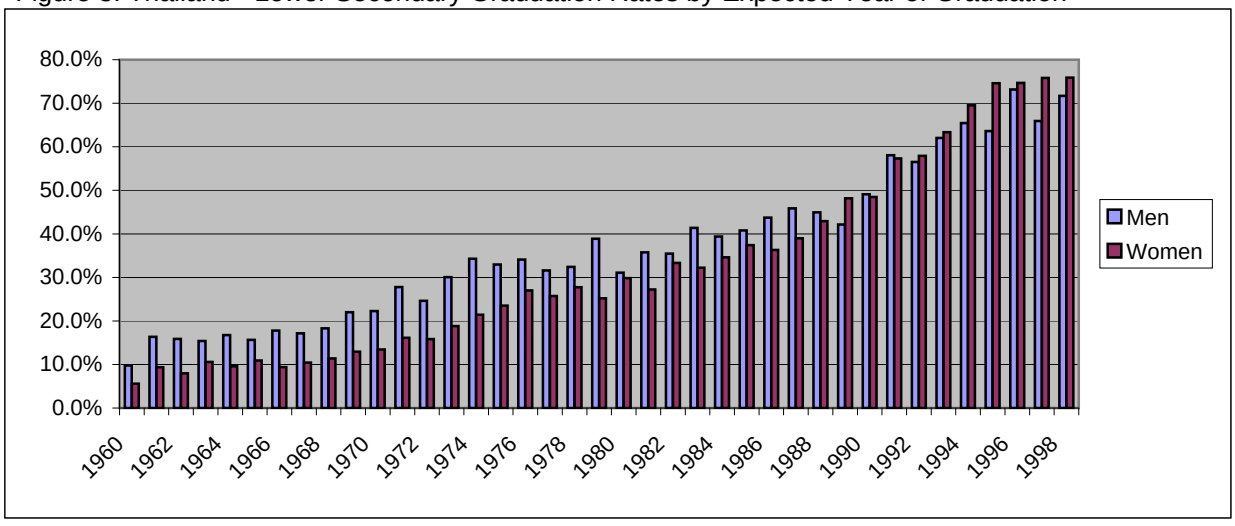

Figure 4: India, Cumulative Distributions of Education Within Jobs

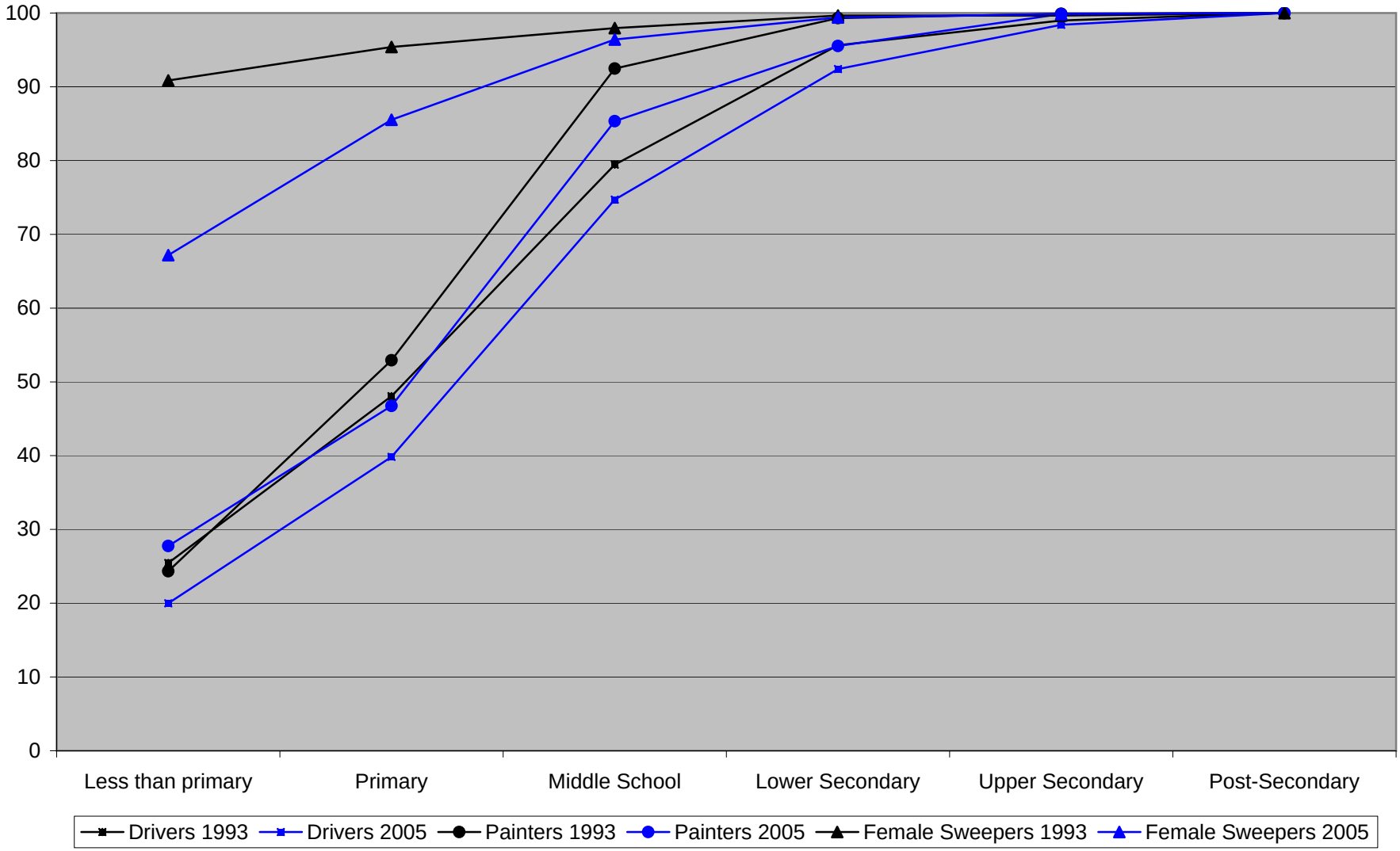

Figure 5: The Philippines, CDFs of Education within jobs

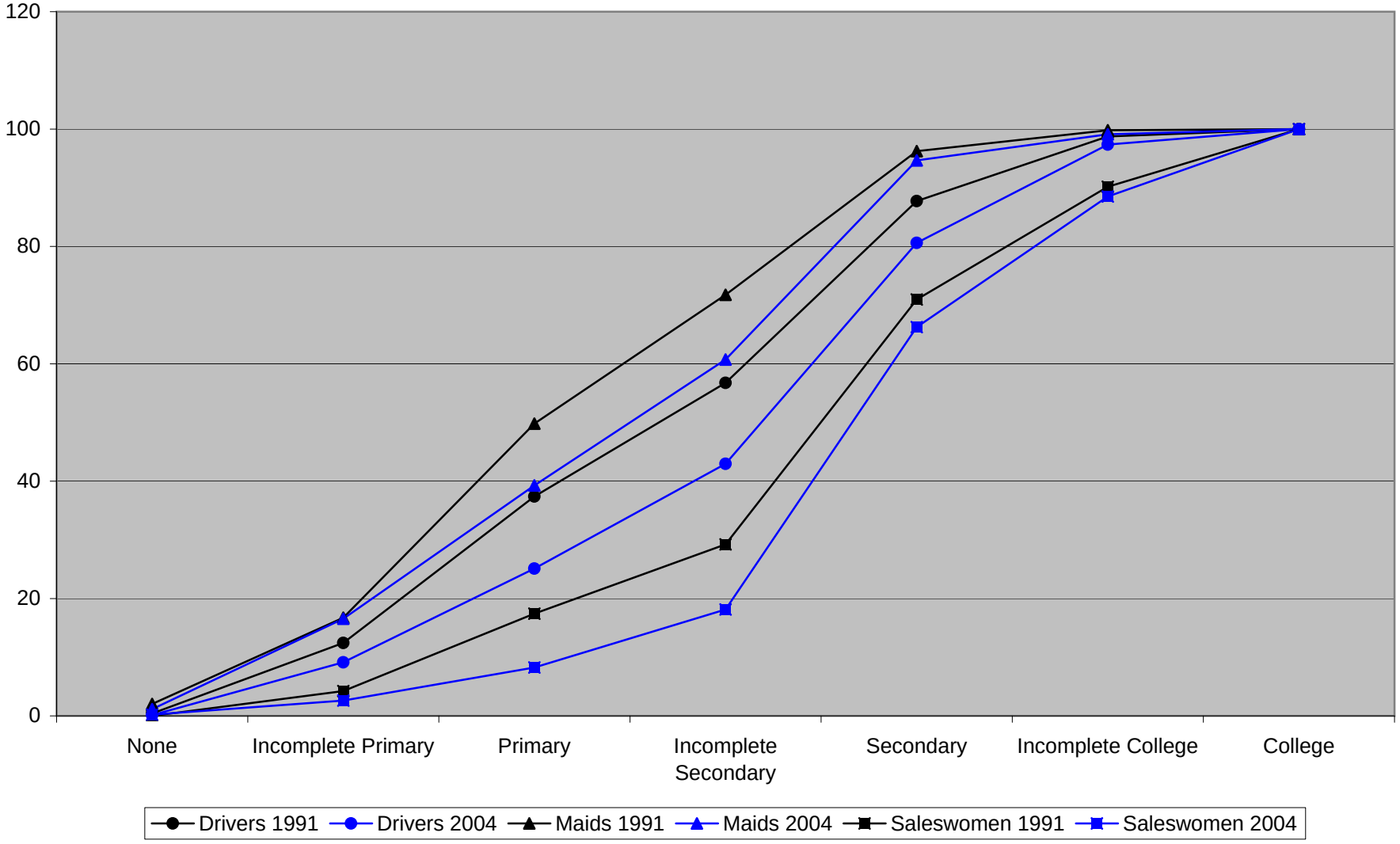

Figure 6: Thailand, CDFs of education within jobs

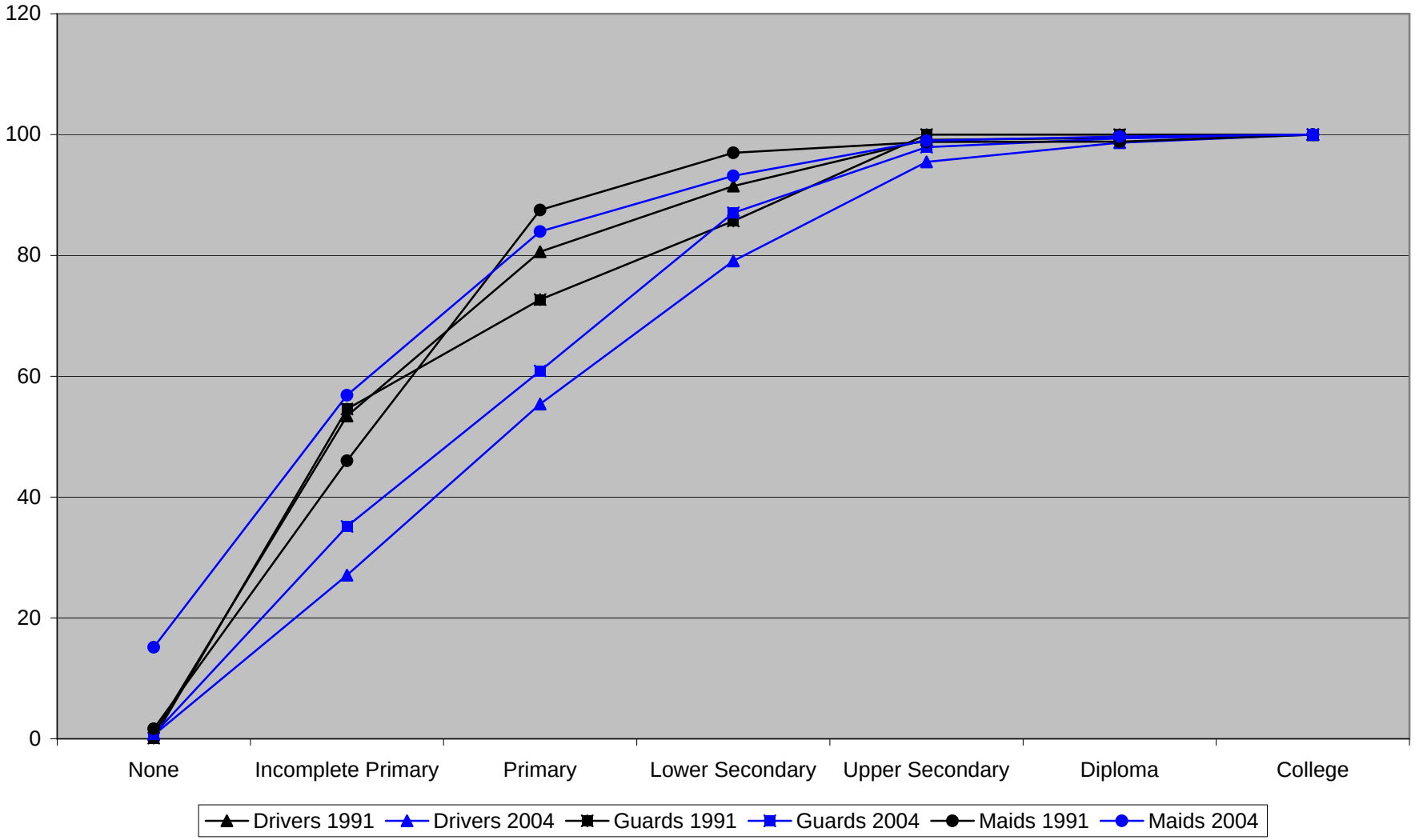

Table 1. Cumulative distributions of education attainment (%)

India

	Years of schooling	Men 1993	Men 2005	Women 1993	Women 2005
Less than primary		51.3	39.8	81.8	70.0
Primary	5	65.5	55.3	89.1	80.4
Middle School	8	80.2	73.9	93.9	89.4
Lower Secondary	10	89.7	84.9	96.7	93.7
Upper Secondary	12	94.4	92.5	97.9	97.7
Post-Secondary	15	100.0	100.0	100.0	100.0

The Philippines

	Years of schooling	Men 1991	Men 2004	Women 1991	Women 2004
None	0	3.0	2.0	3.2	1.7
Incomplete Primary		25.0	19.8	21.0	13.5
Primary	6	49.3	37.4	45.2	29.6
Incomplete Secondary		63.7	52.2	57.4	42.2
Secondary	10	83.2	77.5	74.1	66.4
Incomplete College		92.6	90.3	82.9	79.2
College	14	100.0	100.0	100.0	100.0

Thailand

	Years of schooling	Men 1995	Men 2005	Women 1995	Women 2005
None	0	2.5	2.2	4.9	4.1
Incomplete Primary		50.4	33.1	56.7	39.2
Primary	6	74.9	58.0	79.7	61.8
Lower Secondary	9	85.9	74.7	87.1	74.3
Upper Secondary	12	93.2	88.2	92.6	85.1
Diploma		95.8	92.5	95.0	88.8
College	16	100.0	100.0	100.0	100.0

Source: Calculated from quantity samples using sample weights.

Table 2. OLS estimates of the returns to education and experience

India

	Men						Women					
	All experience levels			5-10 years of experience			All experience levels			5-10 years of experience		
	1993	2005		1993	2005		1993	2005		1993	2005	
Coefficients												
Middle School	0.085	0.086		0.081	0.071		0.099	0.066	*	0.060	0.032	
Lower Secondary	0.200	0.179	*	0.112	0.101		0.439	0.260	***	0.336	0.109	***
Upper Secondary	0.123	0.201	***	0.140	0.166		0.167	0.357	***	0.308	0.491	**
College	0.151	0.200	***	0.199	0.260	**	0.116	0.182	***	0.088	0.180	*
Sample Size	*58,940*	*62,016*		*8,681*	*9,674*		*18,714*	*19,823*		*2,414*	*2,433*	
Returns to experience for a worker with 20 years of experience[a]	0.025	0.026					0.013	0.018	***			

The Philippines

	Men						Women					
	All experience levels			5-10 years of experience			All experience levels			5-10 years of experience		
	1991	2004		1991	2004		1991	2004		1991	2004	
Coefficients												
Primary	0.092	0.062	**				0.037	0.043				
Secondary	0.111	0.075	***	0.146	0.103	***	0.147	0.087	***	0.183	0.122	***
College	0.171	0.164		0.167	0.159		0.247	0.222	***	0.244	0.205	***
Sample Size	*12,047*	*18,527*		*2,440*	*3,724*		*6,884*	*9,962*		*2,245*	*2,808*	
Returns to experience for a worker with 20 years of experience[a]	0.026	0.016	***				0.023	0.011	***			

Thailand

	Men						Women					
	All experience levels			5-10 years of experience			All experience levels			5-10 years of experience		
	1995	2005		1995	2005		1995	2005		1995	2005	
Coefficients												
Primary	0.049	0.058		0.033	0.082		0.048	0.036		0.038	0.083	
Lower Secondary	0.079	0.082		0.077	0.042		0.101	0.104		0.100	0.075	
Upper Secondary	0.133	0.094	**	0.107	0.047	***	0.105	0.088		0.116	0.061	***
College	0.231	0.248		0.215	0.216		0.204	0.220		0.196	0.198	
Sample Size	*13,210*	*19,397*		*1,982*	*3,086*		*11,113*	*16,567*		*2,346*	*2,886*	
Returns to experience for a worker with 20 years of experience[a]	0.026	0.028					0.017	0.021				

Note: OLS estimates from specification (1) using robust sample errors. Mean log-wages of Thai workers who opt for vocational diplomas are captured by separate dummies, not shown in the table. The symbols *, ** and *** indicate that a change is significant at the 10, 5 and 1% significance level respectively.

[a] First dervative of equation (1) with respect to *Exp* evaluated at *Exp* = 20.

Table 3. Returns to education by job.

India

	1993					2005				
	Sample Size	Middle School	Lower Secondary	Upper Secondary	College	Sample Size	Middle School	Lower Secondary	Upper Secondary	College
Men										
Drivers	*1,466*	0.061	**0.054**	**0.074**		*2,566*	0.045	0.069	0.076	**0.038**
Servants	*303*	0.142				*241*	**-0.075**			
Guards	*966*	0.078	0.121	**0.069**		*1,176*	0.108	**0.056**	0.113	0.098
Sweepers	*446*	0.110				*581*	**0.056**			
Painters	*131*	0.108				*368*	**0.048**	**0.056**		
Retail Salesmen	*1,613*	**0.026**	**0.042**	0.123	**0.058**	*2,556*	0.064	0.099	0.058	0.107
Book-keepers	*703*		0.132	0.110	0.158	*576*			**0.053**	0.196
Clerk	*4,153*	0.071	0.118	0.076	0.110	*3,956*	**0.028**	0.103	0.097	0.111
Women										
Maids	*1,146*	**0.003**	0.195			*2,148*	**0.025**	0.216	0.312	
Sweepers	*277*					*362*	**0.055**			
Retail Saleswomen	*62*					*149*		0.201		
Clerk	*734*	0.162	0.165	0.092	0.064	*857*	**0.039**	**0.090**	0.139	0.179

The Philippines

	1991				2004			
	Sample Size	Primary	Secondary	College	Sample Size	Primary	Secondary	College
Men								
Drivers	*1,356*		0.066	0.068	*1,893*		0.041	0.039
Retail Salesmen	*226*		0.097		*562*		0.095	0.111
Clerk	*261*			0.046	*417*			0.076
Women								
Maids	*1,670*	0.039	0.045		*2,314*	0.044	**0.011**	**0.010**
Retail Saleswomen	*508*		0.103	0.160	*894*		0.062	0.062
Clerk	*395*			0.098	*741*			0.092

Thailand

	1995				2005			
	Sample Size	Lower Secondary	Upper Secondary	College	Sample Size	Lower Secondary	Upper Secondary	College
Men								
Drivers	*1,306*	0.085	**0.046**		*1,643*	0.052	**0.028**	
Guards	*229*				*435*	**0.041**	**0.007**	
Retail Salesmen	*384*	0.126	**-0.097**		*536*	0.086	0.064	0.126
Book-keeper/cashier	*331*		0.228	0.179	*274*			0.164
Women								
Maids	*630*	**0.043**			*558*	0.056	0.101	
Retail Saleswomen	*599*	0.104	**-0.094**		*797*	0.101	0.085	0.084
Book-keeper/cashier	*963*		0.081	0.164	*719*	0.156	0.085	0.182

Notes: OLS estimates of specification (1). Returns highlighted in **bold** are insignificantly different from zero.at 10% significance. Underlined returns underwent shifts that are significant at the 10% level. Robust standard errors are used in all cases. Returns to a given level of education are reported only if the sample contains at least 30 workers with that level and 30 workers with one less level.

Table 4: Employment shares of 10 indicator jobs, by education level

India

	Men				Women			
Level	Drivers		Painters		Maids		Sweepers	
	1993	2005	1993	2005	1993	2005	1993	2005
Primary	1.84	3.06	0.18	0.34	1.97	2.59	0.22	0.59
Middle School	1.81	3.12	0.16	0.34	1.48	2.18	0.19	0.38
Lower Secondary	1.29	2.47	0.07	0.16	1.27	1.57	0.15	0.18
Upper Secondary	0.62	1.38	0.04	0.08	0.72	1.01	0.04	0.05
College	0.27	0.62	0.00	0.00	0.01	0.58	0.07	0.02
Total	*1.22*	*2.26*	*0.12*	*0.3*	*1.85*	*2.58*	*0.51*	*0.61*

The Philippines

	Men		Women			
Level	Drivers		Maids		Saleswomen	
	1991	2004	1991	2004	1991	2004
Primary	8.23	11.68	7.89	8.84	3.45	4.31
Secondary	9.13	12.76	4.94	6.22	4.8	5.37
College	1.98	3.72	0.11	0.39	1.6	2.19
Total	*6.93*	*10.2*	*7.49*	*9.17*	*2.85*	*3.83*

Thailand

	Men				Women	
Level	Drivers		Guards		Maids	
	1995	2005	1995	2005	1995	2005
Primary	6.18	6.49	0.67	1.05	1.71	0.78
Lower Secondary	5.99	6.29	0.89	1.07	0.9	0.46
Upper Secondary	4.28	5.16	0.73	0.72	0.39	0.3
College	0.56	1.70	0.00	0.09	0.32	0.05
Total	*6.61*	*6.26*	*0.79*	*1.07*	*1.38*	*1.1*

Note:Figures are the fraction of all workers with the indicated education level or higher, who are employed in each job.

Table 5: Standard Tests for Overeducation Amongst Mexican Men

	Approach to Measuring Required Education			
	Mean		Mode	
	1990	2000	1990	2000
Sample Characteristics:[a]				
# of Occupations	415	382	415	382
Sample Size	823,698	1,080,257	823,698	1,080,257
Incidence (% of sample)				
Overeducation	13.8	14.1	39.7	24.7
Undereducation	18.0	17.1	32.0	44.5
Returns to each year of:[b]				
Required Education	0.115 ***	0.145 ***	0.101 ***	0.139 ***
Overeducation	0.061 ***	0.072 ***	0.058 ***	0.082 ***
Undereducation	-0.029 ***	-0.040 ***	-0.043 ***	-0.051 ***

[a] To ensure that the estimated mean, mode and standard deviation of occupational years of schooling are representative, only occupations for which at least 20 wage employees are observed are included in the sample.

[b] Returns calculated per equation (3). *** indicates significance at the 1% level using robust standard errors

Table 6: Overeducation amongst Mexican Men

	Drivers		Bakers		Butchers		Flat-Brush Painters		Gardeners	
	1990	2000	1990	2000	1990	2000	1990	2000	1990	2000
Sample Size										
Overall	60,423	77,370	5,985	8,562	5,131	6,117	4,468	5,741	4,052	5,560
By Highest Education Level										
Primary Or Less	35,727	32,865	4,218	4,628	3,053	3,120	2,881	3,060	3,170	3,648
Incomplete or Complete Lower Secondary	17,246	30,712	1,372	2,961	1,585	2,278	1,268	2,154	690	1,420
Incomplete or Complete Upper Secondary	6,242	11,707	340	867	417	644	280	478	152	445
Incomplete or Complete Post-Secondary	1,208	2,086	55	106	76	75	39	49	40	47
Returns to a year of schooling[a]										
Primary	0.015	0.026	0.015	0.025	0.010	0.025	0.006	0.022	0.024	0.030
Lower-Secondary	0.039	0.044	0.035	0.031	0.017	0.019	0.021	0.013	0.041	0.030
Upper Secondary	0.038	0.042	0.025	0.032	0.028	0.014	0.043	0.057	0.051	0.004
Post-Secondary	0.032	0.052	0.000	0.030	0.019	0.061	0.034	-0.023	0.026	0.058
Employment Share (%)[b]										
Unconditional	7.19	7.82	0.71	0.83	0.61	0.58	0.53	0.58	0.48	0.49
Conditional on Education Class[c]										
At least some primary	7.56	7.51	0.89	1.02	0.65	0.66	0.61	0.72	0.67	0.74
At least some lower-secondary	8.84	10.25	0.7	0.96	0.81	0.73	0.65	0.7	0.35	0.41
At least some upper-secondary	6.49	8.05	0.35	0.58	0.43	0.45	0.29	0.32	0.16	0.25
At least some post-secondary	1.58	2.05	0.07	0.1	0.1	0.08	0.05	0.05	0.05	0.03
Mean/Mode Years of Schooling[b]										
Mean	6.52	7.67	5.51	6.74	6.23	7	6	6.67	4.47	5.65
Mode	6	9	6	6	6	9	6	6	6	6

[a] OLS estimates using specification (2).

[b] Sample weights used in 2000. Sample weights are all unity in 1990.

Appendix

Country	Occupation	Description	Occupation Code	
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 and pressing clothes, etc.	541	91
	Salesperson	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
	Clerks	male or female workers who record, organize, store and retrieve work-related information and compute financial , statistical and other numerical data; asks include stenography and typing, operating word processors or data entry, calculating, bookkeeping and similar office machines, carrying out secretarial duties, recording and computing numerical data, keeping office records, carrying out clerical duties in libraries, receiving, checking, filing and sending documents, etc.	311-314; 381-383; 385-387; 389	41
INDIA			**1993**	**2005**
			1968 NCO	1968 NCO
	Drivers	male tram car and motor vehicle drivers	986	986
	Servants	male or female household servants working as ayaha, nurse, maids, domestic servants, and other related housekeeping service workers	53	53
	Guards	male worker part of protection force, home guards and security workers	573	573
	Sweepers	male or female sweepers, cleaners and relted workers working in private establishments	541	541
	Painters	male construction workers whose main task is painting	931	931
	Salespersons	male or female working in private retail establishments as shop assistants, salespersons and demonstrators	430; 439	430; 439
	Bookkeepers	male working as bookkeepers, accounts clerks, cashiers, and other related workers	330; 331; 339	330; 331; 339
	Clerk	male or female working as clerks in general, store keepers, receiptionists, library clerks, time keepers, coders, ticket sellers, collectors, checkers and examiners, office attendants, proofreaders and copy holders	350-359	350-359
THAILAND			**1995**	**2005**
			1958 ISCO	1988 ISCO
	Drivers	male tram, motor vehicle (car, bus, light and heavy lorry, and motorcycles), and other motorized vehicle drivers	8321-8321	6410-6419
	Servants	male or female housekeepers in private households, stewards and matrons; restricted only to workers who render personal and domestic services to individuals and families	9190-9199	9131
	Guards	male guards whose tasks include the maintenace 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
	Retail salesmen	male or female salepersons, shop assistants and demonstrators who sells goods on a retail basis or carry out a variety of other selling tasks	3310-3313; 3390-3399	5220
	Bookkeepers	male or female book-keepers, accountants, cashiers and auditors.	2010-2019; 0Y10-0Y19	4221-4122; 4211-4212; 4114

Note: PSOC = Philippines Standard Occupational Classification; NCO = National Classification of Occupations; ISCO = Internatinoal Standard of Industrical Classification. Thailands classification schemes involve very minor modifications of the ISCO.