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WHERE HAVE ALL THE EDUCATED WORKERS GONE? SERVICES AND WAGE INEQUALITY IN THREE ASIAN ECONOMIES

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ABSTRACT

The wage returns to college have risen relative to those to secondary education in many developing economies. In India, the Philippines and Thailand, this is related to the expansion of services employment. We show this using decompositions connecting shifts in the returns to education to changing job opportunities. High-skill services employment grew slowly while relative demand in the sector shifted from secondary to college graduates, pushing workers with secondary education into low-skill intensive services. These polarizing trends in services employment account for the growing convexity of the Mincerian wage profile, and may constrain governments seeking to use educational expansion to alter the wage distribution.

1. INTRODUCTION

There is growing concern in many rich countries that an ongoing shift of employment into services is generating greater inequality. For example, Spence (2011) argues that growing structural inequality in the USA is driven in large measure by the demise of manufacturing and moderately skilled services jobs. These economic transformations push workers into service positions that are high and low-skilled, with little in-between. This analysis

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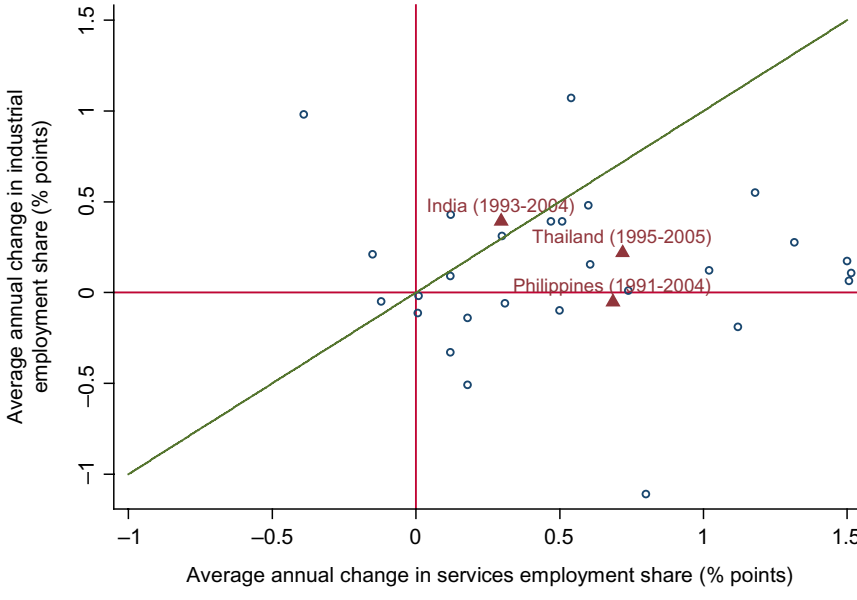

Figure 1. Changes in industrial and services employment shares.
Notes: Data from World Development Indicators, except for India, Philippines and Thailand, where sources are as indicated in section 2. Shifts in employment share are $[s(t) - s(t-k)]/k$, where $s \in [0, 1]$ is the employment share; t is the latest year for which data are available for the country in question; k (restricted to be over a decade for accuracy) is the shortest gap prior to t for which data are available. All low- and lower middle-income countries for which data are available are included. Earliest observation $(t - k)$ is 1980. Dashed line is $y = x$.

echoes previous concerns about polarization induced by technological changes that eliminate jobs in the middle of the wage distribution (Braverman, 1974; Appelbaum and Albin, 1990; Autor *et al.*, 2006; Goos and Manning, 2007). Specialization in services and high-tech industry is thought to widen several wage gaps, including the gap between workers holding college degrees and workers holding high-school degrees (Sassen, 1996). The political-economy literature has noted that the increase in earnings inequality due to services growth leaves governments wishing to respond with hard fiscal choices (Iversen and Wren, 1998).

Rich countries may not be alone in this. Employment in many developing economies is also moving into services, as workers leave agriculture and manufacturing's employment share expands slowly, if at all. Figure 1 shows that over the past 30 years, services employment has grown faster than industrial employment in the majority of low and lower middle-income countries. In developing countries too, wage inequality has tended to rise, and the

key fault line is between college and high-school educated workers (Asian Development Bank, 2007b). What remains unclear, and is the focus of this paper, is whether these changes in wage inequality across education classes are connected to the growth in services employment. We examine data from India, the Philippines and Thailand in the 1990s and early 2000s and conclude that they are.

One key difference between developed and developing countries is the level of educational attainment. While debates in developed countries focus on how to efficiently ensure access to tertiary education and improve the quality of basic education, developing countries are focused on expanding access to secondary education. Therefore, while developed country studies of wage inequality focus on explaining changes in the college premium, many developing country studies must focus on the wage-returns to both secondary and tertiary education levels. Here, 'convexification' of the relationship between schooling and wages is the key stylized fact: wage returns to basic education have tended to fall or remain flat, while wage-returns to higher education either have risen or have not fallen as fast.[1]

Expanding access to secondary education has been a key means by which developing country governments have attempted to increase equality of opportunity. In this context, convexification of the wage-returns to education entails a worrying reduction in governments' traction on the distribution of income. Uncovering the causes of convexification is therefore important for policy. Accordingly, we study the returns to both secondary and tertiary education. We seek to determine which sectors of the economy account for trends in returns to secondary and tertiary education, and how these trends are associated with changes in the allocation of secondary and tertiary educated workers to sectors. This sheds light on the opportunities available to employees occupying different positions in a country's educational class structure. Understanding these opportunities should be useful when designing appropriate education and redistributive (tax and social welfare) policies.

Our analysis is based on a reduced-form decomposition of the wage returns to schooling. The decomposition reveals which sectors make large contributions to the wage returns to each schooling level. A sector's contribution is large if it disproportionately employs workers with that education level or if it pays them well relative to workers without that education level.

[1] See, for example: Savanti and Patrinos (2005, Argentina), Esquivel and Rodríguez-López (2003, Mexico), Park *et al.* (2003, urban China), World Bank/DFID/ADB (2006, Nepal) and Nguyen *et al.* (2007, Vietnam).

Simple algebraic manipulation of this identity allows us to examine how much of the return to each level of education is accounted for by the fact that workers with that education level are more successful in accessing high-paying jobs than workers without that education level. This, in turn, allows us to comment on possible educational inflation—increases in the education level associated with access to good jobs. We have not seen this type of analysis of the returns to schooling before.

This methodological choice marks a break from the structural, neoclassical methods typically applied to account for shifts in schooling returns (e.g. Katz and Murphy, 1992; Card and Lemieux, 2001).[2] The methodological reason for this choice is that the identification of structural parameters requires strong aggregation assumptions regarding the distribution of wages across occupations and industries. For example, Mehta and Mohr (2012) show that a failure to allow for occupational wage differentials can predispose the Katz and Murphy framework to misattribute demand increases resulting from occupational change, to changes, such as skills biased technical change, that operate within industries and occupations. These structural approaches also assume away inter-industry wage differentials, which are statistically important but whose interpretation remains controversial (Gibbons *et al*., 2005). Unobserved differences between workers, for example, in the quality of the education they received, further complicate efforts to identify structural parameters.

Applying mainstream methods and assumptions could also rule out a range of theories that might be useful for making sense of the observed wage structure. For example, heterodox analysts argue that firms make capital investments that deskill labor both intentionally—to reduce wage rates (Braverman, 1974), and inadvertently—as they attempt to garner market share by shifting to technologies with greater scale economies (Botwinick, 1993). In either case, one outcome of this process is the relegation of workers who trained to seek jobs in core sectors to the reserve army of underemployed labor. From this perspective, an increase in inequality that is accounted for by the accumulation of secondary educated workers in menial services jobs is predicted by theory. Our decompositions uncover evidence that this has occurred.

We will show that the convexification of schooling returns and the expansion of services employment are linked as follows. Rising educational

[2] Katz and Murphy's method has been applied to study our three countries: see Kijima (2006) for India, Hasan and Chen (2003) for the Philippines and Richter (2006) for Thailand. Card and Lemieux's method has been applied to study India (Azam, 2009).

attainment, declining agricultural employment and slow employment growth in manufacturing and high-skill services pushed workers, especially those with secondary education, into low-skill services jobs. Meanwhile, more buoyant relative demand for college graduates in high-skill services lent support to the returns to college, and eased secondary graduates out of these jobs. The rising skill requirements of high-skill services, combined with the growing importance of low-skill services as an employer of secondary graduates, account for convexification.

We emphasize that these findings do not constitute a theory of convexification. Without committing to a theory of how wages are determined it seems impossible to build a theory to explain why wage distributions fracture. However, our intention is to uncover a set of stylized facts regarding commonalities in the ways that they fracture. If confirmed in other environments, such stylized facts should be helpful for developing better theories of structural transformation, education and wage inequality.

The rest of the paper is structured as follows. Section 2 introduces the data sets we utilize. Section 3 provides estimates of the returns to education and shows that convexification is the norm across time and cohorts. Section 4 describes the educational expansions in our three countries, and the policies that may have influenced them. In section 5 we explain the decompositions we will use. Section 6 uses these decompositions to describe how the economies have transformed and locates shifts in the returns to education in their shifting employment structures. Section 7 discusses the implications of our findings.

2. EMPIRICAL CONTEXT AND DATA

We use two rounds of national labor force survey data from India (National Sample Survey Organization, 1993, National Sample Survey Organization, 2004), the Philippines (Philippines National Statistics Office, 1991, 2004) and Thailand (National Statistics Office, 1995, National Statistics Office, 2005). The choice of countries is deliberate. While sharing some regional affiliations, the countries differ significantly in terms of educational success, and the composition and trajectory of employment. It should be useful to know whether the effects of services' expansion are similar in these diverse environments. Moreover, it is important to understand the relationship between the composition of employment, education and inequality in all three countries, albeit for slightly different reasons. The Philippines continues to struggle to industrialize, and government officials have advocated services-led development as a means of exploiting the

country's early lead in educational attainment. Thailand has had more success in generating industrial employment, and has significantly increased educational attainment, but its political institutions are wracked by conflict over economic inequality. India is struggling to expand the availability of quality education and industrial jobs to facilitate a massive, ongoing shift of the workforce out of agriculture, and hopefully, to reduce inequality.

These household surveys use multistage stratified random sampling schemes (using national censuses as sampling frames) designed to deliver unbiased estimates of the national structure of employment, unemployment, education attainment and wages. They survey workers in both the formal and informal sectors and are useful for measuring outcomes in the largely unskilled, informal services sector. They are the only data sets from these countries from which these estimates can be obtained. The sample sizes are reasonably large, ranging from 49,902 workers in the Philippines in 1991 to 200,380 in India in 1993. This allows us to estimate accurately employment outcomes for tightly defined groups of workers.

Changes over time in how wages, hours worked, education and industry are recorded limit us to specific years of the surveys, and implied some compromises. We have had to develop new concordances of industries to link data sets across years within countries. At our most disaggregated level of analysis, the concordances map to similar, but not identical industrial classifications, in each country. However, at higher levels of aggregation (eight or fewer industrial sectors in the economy) industry definitions are comparable across countries. In the case of Thailand, the educational classification itself shifted, requiring the construction of yet another concordance. Data constraints force us to use weekly wages in India, daily wages in the Philippines and hourly wages in Thailand.

After many internal consistency tests, we have found only one data problem of note. By comparing educational distributions between years and with other sources, we suspect that roughly 4–6 per cent of young Thai lower secondary graduates have been misclassified as not having completed ninth grade in the 1995 survey. Given that we do not know which observed workers were misclassified, we refrain from *ad hoc* cleaning measures and reflect on the impact of this measurement error where relevant.

As is standard in studies of skill premiums, we have two samples for each country. Analyses of the supply of educated workers and of changes to the composition of employment, neither of which involve wage data, utilize a sample that includes all members of the workforce. We refer to this as the 'quantity sample'. Analyses that do involve wages are conducted on wage or salaried employees only. The Philippines and Thailand surveys identify public employees and we exclude them from this 'wage sample' in order to

focus on emerging private sector employment opportunities.[3] It was not possible to do this in India, because the survey does not distinguish between public and private employees.

Our data sets only record the level of schooling a worker has obtained. They offer no information about the type or quality of school attended by sampled workers. This, together with the lack of the necessary instruments for even modestly disaggregated sector choice, prevents us from controlling for selection into sectors. To our knowledge researchers interested in the relationship between disaggregated employment outcomes and inequality in developing economies have only been able to make progress towards resolving selection problems using Brazilian data (Krishna *et al*., 2011).

3. RETURNS TO EDUCATION

We treat the Mincerian returns to education as measures of inequality, not as estimates of the causal effect of education on wages. Given our interest in how the wage structure fractured across educational lines, and how those cracks widened and shifted across cohorts, we therefore condition on no other variables in our wage regressions. We control for potential work experience by estimating returns from subsamples of workers that each possess a target number of years of experience (plus or minus two years). The advantage of this approach is that, as we show, it yields perfectly decomposable measures of education-based wage inequality.[4] This reduces our regression to one of log wages on educational dummies: $\ln W = \alpha + \sum_{e=1}^{E} \beta_e D_e + \varepsilon$; where there are E education levels, and D_e is an indicator that education level e was

[3] This is a difficult decision. Comparability across countries would be better served by including public employees in all countries. However, in order to better understand how employment conditions are likely to develop given existing approaches to public employment, we prefer to limit our analysis to private employment. However, some basic results on public and private employees in the Philippines and Thailand give a sense of the differences between public and private employment. Public employees are much more educated than private sector workers: in the latest surveys 10.3 per cent of private Filipino workers and 6.8 per cent of private Thai workers had completed college education, compared with 58.2 per cent of Public employees in the Philippines and 51 per cent in Thailand. Moreover, while Mincerian regressions reveal economically similar returns to education in the private and public sectors in the Philippines, public employment in Thailand offers higher returns to secondary education than private employment, and lower returns to tertiary education. Thus, more public employment could reduce convexification in Thailand, but is less likely to do so in the Philippines.

[4] The disadvantage, of course, is that other important elements of the relationship between structural change and inequality (e.g. the relationship between services employment and gender) are not analysed in this paper.

Table 1. Returns to education by experience group

Education level	*7 years of experience*			*20 years of experience*		
India	*1993*	*2004*	*Change*	*1993*	*2004*	*Change*
Subsample size	*8851*	*5801*		*12249*	*4816*	
Middle school	6.6%	8.4%	1.8%	9.9%	7.1%	–2.8%*
Lower secondary	11.9%	4.9%	–7.1%**	19.7%	20.6%	0.9%
Upper secondary	14.5%	8.3%	–6.2%*	16.2%	15.4%	–0.8%
College	17.0%	24.3%	7.3%**	11.9%	19.0%	7.1%**
Thailand	*1995*	*2005*	*Change*	*1995*	*2005*	*Change*
Subsample size	*3843*	*4884*		*2868*	*4817*	
Lower secondary	9.0%	5.8%	–3.2%*	9.3%	7.1%	–2.2%
Upper secondary	11.7%	4.1%	–7.5%**	10.5%	10.1%	–0.4%
College	19.9%	19.7%	–0.2%	22.3%	26.5%	4.2%*
Philippines	*1991*	*2004*	*Change*	*1991*	*2004*	*Change*
Subsample size	*3922*	*5548*		*2263*	*3695*	
Lower secondary	17.3%	10.1%	–7.2%**	12.6%	7.3%	–5.3%**
College	19.5%	17.9%	–1.6%*	15.8%	16.3%	0.5%

** Change in annualized returns is statistically significant at 1 per cent level.
* Change statistically significant at 5 per cent level.

the highest level a worker completed. The coefficients are, by construction, equal to the difference in average log-wages between workers who have completed a given education level and those who have completed one less education level. Dividing these by the number of years of schooling in a level yields the annualized return to each year of schooling.

Table 1 provides annualized returns to secondary and tertiary education levels for wage-workers of two cohorts—young workers (those with 7 ± 2 years of experience), and mid-career workers (with 20 ± 2 years of experience).[5,6] It also shows which shifts in return were statistically significant. High primary school attendance and data constraints precluded reliable estimates of the returns to primary education, so the analysis focuses on the returns to secondary and tertiary education.

[5] Given that children were not asked to report earnings, seven is the minimum number of years of experience at which lower secondary returns can be reliably measured in all three countries.
[6] This paper focuses on the effects of changes in the composition of employment over time on the returns to education. We therefore compare different cohorts of workers at similar points in their careers at two points in time, rather than following synthetic cohorts. A synthetic cohorts approach would have been helpful for analysing the effects of changes on the returns to experience—an important question that we leave to future research in the interests of brevity.

Four clear trends in the returns to lower- and upper-secondary education are apparent. First, they were moderate to high (over 9 per cent) in all countries and for workers of both experience levels in the initial period. Second, they fell—all statistically significant changes in returns to secondary education were negative.[7] Third, the reduction in secondary returns is larger and more likely to be statistically significant among young workers. Fourth, in India and Thailand, mid-career workers' returns to secondary education are higher than those of young workers. All four trends are consistent with the view that the supply of secondary educated workers grew faster than the demand for them, and that the resultant downward pressure on returns has been stronger for younger workers. These trends illustrate the policy concern motivating our analysis—expanding access to secondary education has been a powerful instrument for altering the distribution of income, but is becoming less powerful in doing so. The first question this paper addresses is how this phenomenon is related to changes in the types of employment available to workers with secondary education.

Trends in college returns are more nuanced. Among mid-career workers everywhere the returns to college did not change significantly, or rose. College returns for younger workers rose substantially in India, held constant in Thailand, and fell in the Philippines. College returns within both cohorts either rose less or fell more in the Philippines than they did in India or Thailand. The second question tackled in this paper is why returns to college moved in different ways in different countries. To focus the discussion on the most policy relevant results we will tackle this question primarily with respect to the experience of young workers.

4. THE SUPPLY OF EDUCATED WORKERS

Table 2 presents the inverse cumulative distributions of education attainment among workers in our two experience brackets in the quantity sample. For example, in 1993 69.8 per cent of young Indian workers had completed at least an elementary education, 51.4 per cent had at least completed middle

[7] The misclassification of some young Thai lower-secondary graduates as not having those degrees implies that we have most probably underestimated the returns to lower secondary education in 1995, and therefore underestimated the decline in lower secondary returns over time. The key qualitative results are therefore probably reliable for young lower secondary graduates. The effect of the misclassification on estimated upper secondary returns is ambiguous, and would depend on whether the misclassified lower secondary graduates earned above- or below-average wages. The misclassification does not bias our estimates of the returns to college.

Table 2. Inverse cumulative distribution[a] of education attainment by country, cohort and year

		Young workers			*Mid-career workers*			*Double difference*
		(1)	*(2)*	*(3) = (2)–(1)*	*(4)*	*(5)*	*(6) = (5)–(4)*	*(7) = (3)–(6)*
India	*Grade*	*1993*	*2004*	*Change*	*1993*	*2004*	*Change*	
Elementary	5	69.8	84.3	14.6	38.9	52.3	13.4	1.2
Middle school	8	51.4	63.6	12.2	27.3	38.8	11.4	0.7
Lower secondary	10	30.9	34.5	3.6	15.1	20.4	5.3	–1.7
Upper secondary	12	17.2	20.0	2.8	8.0	11.5	3.5	–0.7
College/grad. school	15	9.7	11.8	2.1	4.7	6.8	2.0	0.1
Thailand[b]	*Grade*	*1995*	*2005*	*Change*	*1995*	*2005*	*Change*	
Elementary	6	99.0	99.5	0.4	59.6	92.8	33.1	–32.7
Lower secondary	9	53.3	88.5	35.2	30.9	47.2	16.4	18.8
Upper secondary	12	30.5	59.7	29.2	19.0	30.7	11.7	17.5
Diploma	14	15.3	32.1	16.8	11.2	15.0	3.8	13.0
College/grad. school	16	8.9	21.0	12.1	8.0	10.6	2.6	9.5
Philippines	*Grade*	*1991*	*2004*	*Change*	*1991*	*2004*	*Change*	
Elementary	6	93.5	95.1	1.6	83.1	85.7	2.6	–1.1
Incomplete L. secondary		75.5	84.5	9.0	60.4	71.8	11.5	–2.5
Lower secondary	10	57.3	68.4	11.1	46.7	57.8	11.1	0.0
Incomplete college		30.7	38.4	7.7	25.1	28.5	3.4	4.3
College/grad. school	14	16.7	21.9	5.1	13.2	14.7	1.5	3.7

[a] Data are drawn from the quantity sample, including all employed workers. Columns (1), (2), (4) and (5) provide the percentage of workers who have completed *at least* the specified level of education.

[b] The Thai schooling stream splits at upper secondary school, with students having the option of taking vocational or traditional US degrees, followed by either a one- to two-year diploma, three- to four-year college degree, or both. For purposes of this paper, we pool vocational and traditional US graduates. In calculating the cumulative distributions for this table (but not for estimating returns) we treat diplomas as incomplete college degrees.

school, and so forth. The use of cumulative distributions permits us to compare education attainment across time and cohorts in terms of first-order dominance.

Education attainment at all levels rose in all countries among young workers (entries in column (3) are all positive) and among mid-career workers (same for column (6)). Analogous comparisons between cohorts (not included in the table, for simplicity) similarly reveal higher educational attainment at all levels of the education system among younger workers than among older workers. These expansions in the supply of educated workers suggest that the rising returns to college education for mid-career workers everywhere and for young workers in India and Thailand were driven by rising demand for skilled workers. Conversely, the decline in returns to secondary education everywhere, and in the returns to college for young Filipino workers, might be attributable to the supply expansion.

Subsequent sections of the paper will locate the sectoral sources of rising skill demand in our three countries, and describe how this growing supply of educated workers was absorbed into employment. In order to do so, it will be helpful to have a clearer sense of the skill supplies available in each country, and the pressures and bottlenecks within their educational systems.

Notwithstanding cross-country differences in the definition of schooling levels and the manner in which education completion is recorded in surveys, table 2 reveals that a general hierarchy exists in elementary and lower secondary attainment in the latest surveyed in each country: Filipinos are most likely to have completed these levels, followed by Thais and then by Indians.

Going further, we take differences in the temporal shift in cumulative educational attainment between young and mid-career workers as a rough indicator of educational acceleration (column (7)). While this acceleration at a given education level is limited when educational attainment figures approach 100 per cent, at low attainment rates they can be taken to reflect a combination of supply and demand for education. For example, in Thailand, where the government, sensing bottlenecks in the supply of skilled workers (Booth, 1999) pushed hard and successfully to increase educational attainment, the fraction of workers with at least an elementary education rose 33.1 points among older workers. It rose by only 0.4 points among younger workers who had already achieved nearly universal elementary education by 1995. Thus the large negative entry in column (7) for Thai elementary education indicates a substantial saturation of elementary school completion rates. Secondary and tertiary attainment in Thailand, on the other hand, coming off low initial levels, accelerated substantially. This may have been

facilitated by changes in the 1997 constitution which introduced the right to 12 years of free, quality basic education, and the 1999 Education Act, which extended mandatory schooling levels from six to nine years.

In contrast, education attainment in the Philippines only accelerated at tertiary levels but decelerated at the secondary level. This deceleration is observed despite a constitutional (1987) commitment to provide quality affordable education at all levels to all persons, a (1988) guarantee of free public secondary education, and a fairly high share of the population that has not completed 10th grade. Further suggesting that this is not a saturation effect, both the growth of college attainment (columns (3) and (6)) and its acceleration (column (7)) were lower in the Philippines than in Thailand.

Attainment in India accelerated at lower educational levels, but decelerated at the secondary level—also long before saturation could have been achieved. This appears to reflect low initial elementary completion rates and significant bottlenecks in secondary and tertiary education expansion (evidenced, for example, by India's notorious problems with student-teacher ratios and quality shortfalls in public schools—PROBE, 1999 – and the large 'donations' required to secure entry into many colleges).

Thus, the overall impression is that while Thailand had significant success in eliminating bottlenecks to educational expansion; India struggled to prepare its elementary graduates for further education or to accommodate them in secondary and tertiary institutions; and the drive towards greater educational attainment in the Philippines waned somewhat.

One final point: the fact that college attainment accelerated in Thailand and the Philippines while decelerating in India probably accounts for the relative buoyancy of college returns in India compared with the other two countries. What remain unclear, and will be taken up in subsequent sections, are (i) where this accelerating supply of college graduates found employment, and (ii) why college returns in Thailand were more buoyant than those in the Philippines, even as Thailand's tertiary attainment rate grew faster and accelerated more than that in the Philippines.

5. METHODOLOGY

We present two sets of decompositions in this section. The first is an education shift-share analysis common in the literature (Berman *et al.*, 1994). Figure 2 suggests why the exercise might be useful. It shows, in all three countries, that in terms of first-order dominance, agricultural workers are the least educated, followed by industrial workers, while the unemployed and

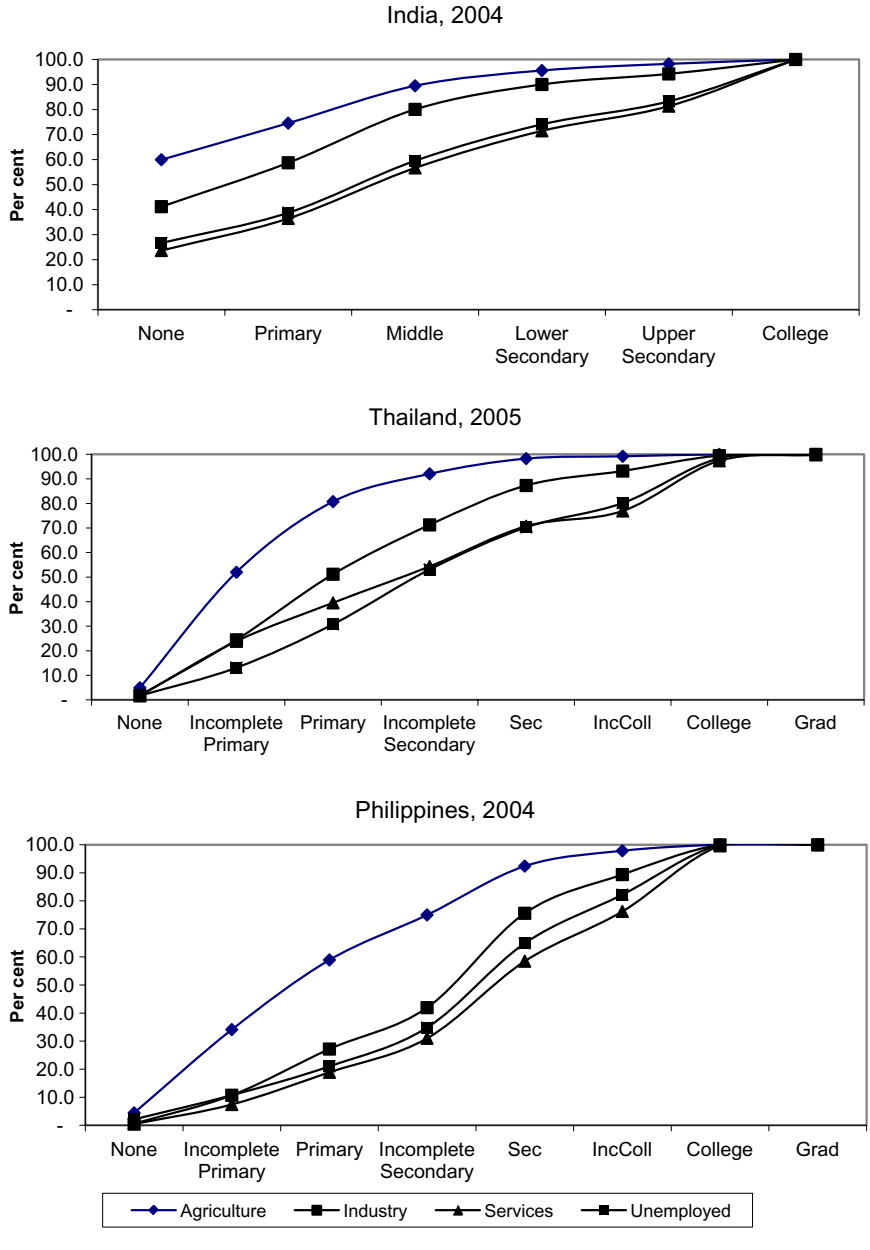

Figure 2. Cumulative distribution of education by sector.

service sector workers are the most educated. Thus, it is possible, prima facie, that employment shifts out of agriculture account for rising education levels.

To examine this further, let e index the education level and $s = 1, \ldots, S$ index sectors, which could include unemployment. Let N represent the size of the labor force, and N_e, N_s and $N_{e,s}$ respectively represent the sets of workers that have at least education level e, that work in sector s, and that have education level e and work in sector s. Denote sector s's employment share by $\alpha_s = N_s/N$, the fraction of workers in sector s that is educated at least to level e by $\lambda_{e,s} = N_{e,s}/N_s$, and the fraction of all workers that is e-educated by $\lambda_e = N_e/N$. We can decompose the workforce's e-education intensity as follows: $\lambda_e \equiv \sum_s \alpha_s \lambda_{e,s} \equiv \sum_s \Omega_{e,s}$, where $\Omega_{e,s} \equiv N_{e,s}/N \equiv \alpha_s \lambda_{e,s}$ is sector s's contribution to national e-education intensity. A sector's contribution is high if it hires a large share of the workforce or if many of its workers are educated to level e. Time differencing yields a decomposition of the net increase in education intensity:

$$\Delta\lambda_e \equiv \sum_s \Delta(\alpha_s \lambda_{e,s}) \equiv \sum_s \Delta\Omega_{e,s} \equiv \sum_s \lambda_{e,s}\Delta\alpha_s + \alpha_s \Delta\lambda_{e,s} \equiv A_e + \Lambda_e \tag{1}$$

The identity says that the net influx of e-educated workers is absorbed by a *between-sector* shift in employment composition towards education-intensive sectors (A_e), and by increasing education intensity *within sectors* (Λ_e). If A_e is large relative to $\Delta\lambda_e$ we will conclude that educational intensification, viewed through the prism of an S-sector decomposition, is closely associated with shifting employment structure. If Λ_e is large, the opposite would be true, and many authors have found this to be the case (Berman *et al.*, 1994; Autor *et al.*, 1998; Kijima, 2006). The net inflow of e-educated workers absorbed by sector s is $\Delta\Omega_{e,s}$, and $\Delta\Omega_{e,s}/\Delta\lambda_e$ is the share of the net inflow it absorbs.

Our second set of decompositions link the Mincerian returns to education, and their changes, to the distribution of employment and wages, within and across industries. We restrict attention to workers of a particular experience level, denote average log wages of workers with exactly education level e by $\bar{w}_e$, and suppress (for notational convenience only) terms to scale by the number of years of schooling in a level. Then, if $P(s|e)$ is the probability that a worker is in sector s conditional on having exactly education level e, and $\bar{w}_{e,s}$ is the average log wage paid to workers in sector s with education level e, $\bar{w}_e \equiv \sum_{s=1}^{S} P(s \mid e)\bar{w}_{e,s}$. The Mincerian return to the eth level of education, $\beta_e \equiv \bar{w}_e - \bar{w}_{e-1}$, can then be decomposed as

$$\begin{aligned}\beta_e &\equiv \sum_{s=1}^{S} P(s \mid e)(\bar{w}_{e,s} - \bar{w}_{e-1,s}) + \sum_{s=1}^{S} (\bar{w}_{e-1,s} - \bar{w}_{e-1})[P(s \mid e) - P(s \mid e-1)] \\ &\equiv \sum_{s=1}^{S} P(s \mid e)\beta_{e,s} + \sum_{s=1}^{S} \varpi_{e-1,s}\gamma_{e,s} = \sum_{s=1}^{S} C_{e,s}\end{aligned} \tag{2}$$

The first summation is a weighted average of the returns within sectors ($\beta_{e,s} \equiv \bar{w}_{e,s} - \bar{w}_{e-1,s}$), where sectors' weights are the fractions of the e-educated they employ ($P(s|e)$). We call this the *price effect* of education. The second summation captures the *allocative effect* of schooling on wages. Allocation effects add to the returns to education level e whenever continuing from education level $e-1$ to level e increases the probability of workers obtaining employment in particular sectors (i.e., $\gamma_{e,s} \equiv P(s|e) - P(s|e-1) > 0$) that pay above average base wages (i.e., $\varpi_{e-1,s} \equiv \bar{w}_{e-1,s} - \bar{w}_{e-1} > 0$). A sector's contribution to the returns to education level e, $C_{e,s}$ is the sum of its contribution to the price and allocative effects.

For the sake of intuition, consider two polar cases. First, if workers within education classes were perfectly homogenous in terms of productivity, and labor markets were neoclassical (wages are flexible, and marginal labor productivity is equalized across sectors), we would have zero allocative effects ($\varpi_{e-1,s} = 0, \forall_S$) and equal returns to education in all sectors of the economy ($\beta_{e,s} = \beta_e, \forall_S$). In this case, education would pay a return simply because it lifts marginal labor productivity in any sector in which it is employed (i.e. price effects). Second, in a world of pure job competition (like the stylized model of Thurow, 1975), wherein education had no effect on productivity within sectors ($\beta_{e,s} = 0, \forall_S$), but was used to allocate workers to sectors offering differing but fixed wages, the entire return to education would arise due to allocative effects.

Time-differencing (2) yields

$$\Delta\beta_e \equiv \sum_{s=1}^{S} \Delta C_{e,s} \tag{3}$$

This decomposes shifts in the return to education as a sum of the contributions of sectors, where a sector's contribution to shifting the return to education level e is simply the change in its static contribution to the return to education level e.

Implementing decompositions (1)–(3) requires that their basic elements be measured conditional on experience. To ensure that we decompose the education returns measured in table 1, we restrict ourselves to the same subsamples from which they are estimated, and use tabulations of wages and

employment across sectors and education classes to obtain the elements of identity (2). We then calculate $\Delta C_{e,s}$ from these elements.

6. RETURNS TO EDUCATION AND EMPLOYMENT STRUCTURE

Our primary classification scheme splits the employed labor force into eight sectors: agriculture, mining & quarrying, construction, utilities, relatively low-skill manufacturing ('L Manufacturing' in the tables), high-skill (H) manufacturing, relatively low-skill (L) services and high-skill (H) services. Subsectors were assigned to these skill categories based upon the fraction of their workforce that had completed lower-secondary education in the initial year of our analysis (see the Appendix for components of our eight sectors).[8] We use lower cut-offs for manufacturing than services because education levels are much higher in services (figure 2). The cut-offs also vary by country. For example, Thailand has a much more education intensive manufacturing mix than India. Accordingly, transportation equipment is a relatively low-skill manufacturing activity in Thailand but a relatively high-skill activity in India. Maintaining a common classification would have left India with practically no high-skill manufacturing, reducing by construction the scope for observing any effects of manufacturing upgrading on returns to education in India. The composition of service activity is more constant across countries, as one might expect of mostly non-traded activities, than the composition of manufacturing is. Accordingly, the mapping of subsectors to low- and high-skill services is essentially the same across countries.

6.1 Structural changes

To provide the empirical context for our findings, we begin with a description of sectoral employment shares over time (table 3). These are drawn from the quantity sample. All three countries saw large reductions in the agricultural employment share. This was accommodated in different ways in each country.

India saw a massive employment boom in construction, and gains in low-skill manufacturing and low-skill services. Indian unemployment also rose. Thus, notwithstanding the obvious contributions of its high-skill services and manufacturing sectors to output and formal sector employment

[8] The cut-off fractions for manufacturing subsectors are 40 per cent in India, 45 per cent in Thailand, and 55 per cent in the Philippines.

Table 3. Employment shares over time

	India			*Thailand*			*The Philippines*		
	1993	*2004*	*Change*	*1995*	*2005*	*Change*	*1991*	*2004*	*Change*
Agriculture	0.587	0.502	**–0.085**	0.503	0.406	**–0.097**	0.399	0.315	**–0.084**
L Manufacturing	0.093	0.104	**0.011**	0.106	0.131	**0.024**	0.078	0.060	**–0.018**
H Manufacturing	0.012	0.015	0.003	0.029	0.035	0.006	0.020	0.027	0.007
Mining	0.008	0.009	0.001	0.001	0.001	0.000	0.006	0.003	–0.004
Utilities	0.004	0.003	–0.001	0.005	0.003	–0.002	0.004	0.004	–0.001
Construction	0.036	0.063	**0.027**	0.058	0.053	–0.005	0.043	0.048	0.005
L Services	0.151	0.175	**0.024**	0.199	0.243	**0.045**	0.259	0.319	**0.059**
H Services	0.070	0.076	0.006	0.087	0.114	**0.026**	0.100	0.113	**0.013**
Unemployment	0.038	0.052	**0.014**	0.011	0.014	0.003	0.090	0.112	**0.022**
Aggregate/actual shift	*1.000*	*1.000*	*0.000*	*1.000*	*1.000*	*0.000*	*1.000*	*1.000*	*0.000*

Bold sectors' employment shares shifted by more than one percentage point. Data are drawn from the quantity sample.

(Kochhar *et al*., 2006), non-agricultural employment growth in India has been in low-skill sectors. Separate analyses (Mehta and Mukhopadhyaya, 2007) suggest that India's manufacturing employment growth at this time was focused in sectors that provide products demanded by a nascent middle class, new firms and new urban nuclear families (inputs to the construction sector, ceramic and glass goods, textiles and garments).

Thailand also saw growth in low-skill manufacturing employment, which we emphasize is comprised of higher-skill industries than Indian low-skill manufacturing, and was also more export oriented. Moreover, employment rose faster in both the high- and low-skilled services sectors than it did in India. Construction employment contracted slightly in the wake of the East Asian Financial Crisis. Thus, the Thai economy was further along its structural transformation path than the Indian economy, whose productive resources were still more directed towards internal consumption.

The Philippines saw a sharply declining share of employment in low-skill manufacturing, only partially offset by a slight increase in high-skill manufacturing jobs. With pressure on the land high, the continuing exodus from agriculture (already more advanced than in India or Thailand) resulted in rapid growth in services employment. Most of this employment growth was in low-skill services.

6.2 Decomposition results

This diversity in patterns of structural change notwithstanding, five findings regarding the utilization and remuneration of educated workers are common to each country. First, viewed through identity (1) at several degrees of disaggregation, changes in the composition of employment were far too small to absorb the rising numbers of educated workers. Table 4 provides the share of the net influx of educated workers absorbed by changing sectoral employment shares ($A_e/\Delta\lambda_e$). Regardless of the education level and country, this number is substantially less than one. Thus, education levels increased within industries. Intuitively, this suggests that any increases in returns to education would have to be driven by rising demand for skill within industries.

Second, services played a disproportionately large role in absorbing the net inflow of educated workers at all levels. Table 5 provides the share of the net influx of educated workers absorbed by each sector ($\Delta\Omega_{e,s}/\Delta\lambda_e$). Several patterns in these figures reinforce the impression that services are central to the employment of educated workers. Services absorbed between 46 per cent and 75 per cent of the influx for all education levels and in all countries (row 12).

Table 4. Between-sector absorption of educated workers, per identity (1)

Classification scheme	*Share of net influx absorbed by between sector changes*			
India	*Middle school*	*Lower secondary*	*Upper secondary*	*College*
3 + 1 sectors[a]	0.231	0.388	0.342	0.303
5 + 1 sectors[b]	0.206	0.334	0.288	0.251
8 + 1 sectors[c]	0.198	0.327	0.275	0.240
25 + 1 sectors[d]	0.236	0.410	0.396	0.378
68 sectors[e]	0.183	0.312	0.282	0.271
Thailand		*Lower secondary*	*Upper secondary*	*College*
3 + 1 sectors[a]		0.187	0.202	0.198
5 + 1 sectors[b]		0.208	0.224	0.229
8 + 1 sectors[c]		0.202	0.218	0.227
23 + 1 sectors[d]		0.202	0.213	0.196
Philippines		*Lower secondary*		*College*
3 + 1 sectors[a]		0.293		0.684
5 + 1 sectors[b]		0.264		0.548
8 + 1 sectors[c]		0.287		0.579
23 + 1 sectors[d]		0.282		0.429

Data are drawn from the quantity sample.

[a] Agriculture, industry, services, plus the unemployed.

[b] Agriculture, manufacturing, non-manufacturing industry, high-skill services, low-skill services, plus the unemployed.

[c] The standard eight sectors, plus the unemployed.

[d] The standard eight sectors with services disaggregated into 15 subsectors (17 in India), plus the unemployed.

[e] Two-digit 1987 National Industrial Classification. Some sectors aggregated together for clean concordance.

Table 5. Share of net inflow of educated workers absorbed in each sector, per identity (1)

	Share of net inflow absorbed: ΔΩe, s/Δλe							
	India			*Thailand*			*The Philippines*	
	Lower secondary	*Upper secondary*	*College*	*Lower secondary*	*Upper secondary*	*College*	*Lower secondary*	*College*
(1) Agriculture	0.232	0.184	0.137	0.232	0.170	0.050	0.056	0.025
(2) L Manufacturing	0.108	0.077	0.079	0.203	0.183	0.101	−0.024	−0.048
(3) H Manufacturing	0.018	0.035	0.042	0.052	0.061	0.042	0.060	0.077
(4) Mining	0.004	0.004	0.001	0.000	0.001	0.001	−0.008	−0.003
(5) Utilities	−0.007	−0.002	0.000	−0.007	−0.005	0.006	0.002	0.004
(6) Construction	0.080	0.047	0.027	0.027	0.018	0.009	0.050	0.002
(7) L Services	**0.302**	0.270	0.222	**0.301**	**0.303**	0.282	**0.596**	**0.526**
(8) H Services	0.165	**0.281**	**0.362**	0.159	0.235	**0.468**	0.111	0.228
(9) Unemployment	0.099	0.103	0.130	0.035	0.034	0.040	0.157	0.188
(10) Aggregate/actual shift	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*	*1.000*
(11) Total Increase in share of workers with at least this education level	0.049	0.035	0.025	0.180	0.127	0.055	0.122	0.027
(12) Share of inflow absorbed by the combined (H and L) services sector[a]	0.467	0.551	0.584	0.460	0.538	0.750	0.707	0.754
(13) Importance of Services relative to manufacturing[b]	3.7	4.9	4.8	1.8	2.2	5.2	19.6	26.0
(14) Total services employment share in initial year[c]		0.221			0.286		0.359	

Bold sectors absorbed most of the net influx of workers with at least the specified education level. Data are drawn from the quantity sample.

[a] Calculated from entries in numbered rows as (7 + 8).

[b] Calculated from entries in numbered rows as (7 + 8)/(2 + 3).

[c] Calculated from table 3.

Moreover, this share rises with the education level. Indeed, services were between 2 and 26 times more important than manufacturing as a destination for the educated (row 13). It is also clear that this is more than a matter of size—the shares of the net inflow of educated workers absorbed by services (row 12) were around twice the size of the services sector's initial employment share (row 14).

Third, the decomposition of returns into price and allocative effects, per identity (2), is consistent with the view that education inflation—an increased importance of higher levels of education for access to good jobs—has influenced the returns to education. Table 6 presents the share of the return to each level of education that is accounted for by allocative effects $\left(\sum_{s=1}^{S} \varpi_{e-1,s}\gamma_{e,s} \Big/ \beta_e\right)$ under our eight-sector classification. The level of education whose return is most closely tied to access to high paying jobs (i.e. the one whose returns derive most from allocative effects) either increased over time or remained constant for every country and cohort. And, when it did not increase, the fraction of the return to that level of schooling accounted for by allocative effects increased.

Fourth, again applying identity (2), high-skill services contributed more to the returns to college education ($C_{e,s}$, with $e = c =$ college) than any other sector for all cohorts and countries. Indeed, the sector accounts for 66–69 per cent of the returns to college in India, 37–49 per cent in Thailand, and 40–48 per cent in the Philippines (table 7, panel A), even though it employs only 7–11 per cent of the workforce (table 3). This is in line with the sector's very high shares of employment among college graduates (table 7, panel B).

Finally, table 8 provides the contributions of each sector to shifting schooling returns ($\Delta C_{e,s}$), per identity (3). For the remainder of the paper, only contributions of over one percentage point are considered large and discussed. Table 8, row 10, shows that the services sector reduced the returns to secondary education levels (all large contributions are negative for secondary education levels) while increasing or at least not significantly reducing the returns to college.

One might ask whether high-skill services contributed so much to rising returns to college education because relative demand for college graduates increased in that sector. As we have noted in the introduction to this paper, rigorous estimation of the shift in relative demand for college graduates requires assumptions about the substitutability of workers of different cohorts (Card and Lemieux, 2001), occupations (Mehta and Mohr, 2012) and types—some of which are unobservable. Nonetheless, increases in the relative utilization and the relative wages of college graduates (relative to non-college graduates) across cohorts at least suggest rising relative demand.

Table 6. Share of the returns to education accounted for by allocative effects (Identity 2)

		Young workers				*Mid-career workers*			
India		*Middle school*	*Lower secondary*	*Upper secondary*	*College*	*Middle*	*Lower secondary*	*Upper secondary*	*College*
	1993	19.1%	8.2%	**30.2%**	14.5%	33.3%	**40.7%**	20.3%	6.1%
	2004	12.2%	33.9%	**38.7%**	12.3%	26.4%	24.9%	**41.8%**	9.7%
Thailand		*Lower secondary*	*Upper secondary*	*College*		*Lower secondary*	*Upper secondary*	*College*	
	1995	**16.6%**	0.6%	6.5%		**15.6%**	9.9%	7.2%	
	2005	**20.9%**	11.4%	13.8%		**22.7%**	10.0%	2.9%	
Philippines		*Lower secondary*	*College*			*Lower secondary*	*College*		
	1991	**28.6%**	23.1%			**15.5%**	12.3%		
	2004	7.1%	**19.4%**			**39.8%**	11.1%		

Numbers in **bold** highlight the education level in each cohort and year for which allocative effects account for the largest share of returns. Data are drawn from the wage sample.

Table 7. High-skill services and college returns

	India		*Thailand*		*The Philippines*	
Years of experience	*7*	*20*	*7*	*20*	*7*	*20*
A. Contribution to returns in the subsequent year from Identity (2): $C_{e,s}$[a]						
(1) Agriculture	0.020	0.015	0.003	0.003	0.009	0.012
(2) Low-skill manufacturing	0.021	0.008	0.036	0.033	0.002	0.012
(3) High-skill manufacturing	0.016	0.013	0.022	0.019	0.008	0.009
(4) Mining	0.001	0.003	0.000	0.001	0.000	0.001
(5) Utilities	0.003	0.005	0.001	0.007	0.002	0.008
(6) Construction	0.005	0.007	0.009	0.011	0.000	0.000
(7) Low-skill services	0.019	0.008	0.052	0.062	0.071	0.057
(8) High-skill services	**0.160**	**0.131**	**0.074**	**0.129**	**0.086**	**0.065**
(9) *Aggregate*	*0.243*	*0.190*	*0.197*	*0.265*	*0.179*	*0.163*
Share of returns contributed by high-skill services	*0.660*	*0.688*	*0.374*	*0.487*	*0.480*	*0.396*
B. Share of college graduates employed in high-skill services: $P(s\|c)$						
Initial year	0.685	0.755	0.340	0.531	0.398	0.422
Subsequent year	0.634	0.691	0.372	0.450	0.411	0.367
C. Share of high-skill services workers with college degrees: $P(c\|s)$						
Initial year	0.579	0.362	0.447	0.282	0.647	0.502
Subsequent year	0.620	0.426	0.630	0.448	0.731	0.416
% Change in relative utilization of college graduates[b]	0.170	0.269	0.747	0.727	0.392	–0.347
D. College wage premium in high-skill services						
Initial year	0.146	0.127	0.174	0.191	0.112	0.140
Subsequent year	0.229	0.181	0.137	0.280	0.139	0.134
Change	0.083	0.054	–0.037	0.089	0.027	–0.006

Data are drawn from the wage sample.

[a] The sector with the greatest contribution is indicated in **bold**.

[b] The % change in relative utilization is the change in $\ln[P(c|s)/(1 - P(c|s))]$.

Table 8. Sectoral contributions to shifting schooling returns, per identity (3)

Country	*India*				*Thailand*				*The Philippines*		
	7 years			*20 years*	*7 years*			*20 years*	*7 years*		*20 years*
Experience	*Lower secondary*	*Upper secondary*	*College*	*College*	*Lower secondary*	*Upper secondary*	*College*	*College*	*Lower secondary*	*College*	*College*
(1) Agriculture	**–0.010**	0.002	0.003	0.007	0.003	–0.002	0.001	0.001	0.009	–0.002	0.001
(2) L Manufacturing	**–0.021**	**–0.029**	0.007	–0.001	**–0.012**	**–0.010**	**0.016**	**–0.019**	**–0.023**	–0.001	0.006
(3) H Manufacturing	0.000	–0.004	0.007	**0.014**	–0.009	**–0.012**	**–0.033**	**0.013**	–0.008	0.002	0.005
(4) Mining	0.000	0.002	–0.001	0.005	0.001	0.000	–0.001	0.001	0.001	–0.001	0.000
(5) Utilities	–0.004	0.000	0.001	0.005	0.000	0.000	0.001	0.006	0.000	0.001	0.000
(6) Construction	–0.003	–0.001	0.003	0.007	0.001	–0.007	0.003	0.009	**–0.012**	**–0.011**	–0.006
(7) L Services	0.007	**–0.010**	0.003	–0.001	**–0.016**	**–0.033**	0.006	**0.016**	**–0.035**	**–0.010**	0.005
(8) H Services	**–0.040**	**–0.022**	**0.050**	**0.034**	0.000	**–0.011**	0.005	**0.014**	–0.003	0.006	–0.007
(9) *Aggregate/actual shift*	*–0.071*	*–0.062*	*0.073*	*0.071*	*–0.032*	*–0.075*	*–0.003*	*0.041*	*–0.072*	*–0.016*	*0.005*
(10) Total contribution of services[a]	**–0.033**	**–0.032**	**0.053**	**0.033**	**–0.016**	**–0.044**	**0.011**	**0.030**	**–0.038**	–0.004	–0.002

Notes: Contributions are the changes in return accounted for by shifts in a sectors size, education profile and the wages it pays to workers of different education levels. Sectors shifting returns by more than one percentage point appear in **bold**. Data are drawn from the wage sample.

[a] Sum of rows (7) and (8).

In this vein, we note that the utilization of college graduates by the high-skilled services sector increased sharply for five out of six country–cohort pairs (table 7, panel C), and the relative price of a college graduate rose for four of these five (table 7, panel D). Even among young Thais, whose college premium within high-skill services fell (panel D), the relative utilization of college graduates grew much faster (panel C), again suggesting growing demand for skilled workers.[9] Among mid-career Filipinos, however, the utilization and relative pay of college graduates in high-skill services fell. Thus, the data suggest substantial increases in demand for skills within the high-skill services sector in India and Thailand, but a more mixed picture for the Philippines. We also note that the growing share of high-skill services workers with college degrees (panel C), coupled with the slow growth of overall high-skill services employment (table 3), implies that the share of secondary school graduates working in high-skill services declined in all cohorts (table not shown, for brevity).

These commonalities suggest some basic stylized facts about the employment opportunities that are becoming available to educated workers in these transforming developing economies. The new opportunities are mainly in services, and there is a growing specialization of education to services employment that is more evident at higher education levels. However, the services sectors contribute significantly to reducing the returns to secondary education even as they absorb a disproportionately large share of the net inflow of secondary graduates. As the supplies of secondary educated workers grow and patterns of labor demand in high-skill services come to favour college graduates, education becomes more important in securing access to jobs in better-paying sectors, the levels of education required to secure this access rise, or both.

We now account for the fact that the returns to college were very buoyant in India, moderately buoyant in Thailand, and became depressed in the Philippines. Table 8 reveals that these differences are mainly driven by differences in the roles played by the services sectors. First, high-skill services helped to lift college returns significantly in India, moderately in Thailand, and barely at all in the Philippines. This is consistent with the more limited increases in demand for skilled workers within the sector in the Philippines inferred previously from table 7. Second, in contrast with the experience in India and Thailand, the low-skill services sector in the Philippines pulled

[9] In a neoclassical Cobb–Douglas production function framework with two inputs (college and non-college graduates) relative demand for college graduates increases if and only if the per cent increase in relative utilization of college graduates exceeds the per cent decrease in the relative wages of college graduates.

down the returns to college (table 8). This occurred even as the sector absorbed 53 per cent of the net inflow of college graduates in the Philippines, as compared with 22 per cent and 28 per cent in India and Thailand (table 5).[10] Part of the reason for the shift into menial services in the Philippines is the contraction of its low-skilled manufacturing sector, which, unlike any other large sector, actually released more secondary- and college-educated workers that had to be absorbed in other sectors ($\Delta\Omega_{e,s} < 0$, table 5). Confirming the importance of this shift into more menial services, we show in an earlier analysis of the same data (Asian Development Bank, 2007a) that when the sample is restricted to service workers and identity (1) is applied, changes in the employment shares of the services subsectors would have actually reduced the secondary-education intensity of the services sector (i.e. A_e was negative). In addition to these roles played by services, the construction sector also played a role in reducing college premiums in the Philippines (table 8).[11]

7. DISCUSSION

We have asked, in three populous developing economies, whether the observed growth in services employment is linked to the falling returns to secondary education relative to college education. Using a decomposition approach that is agnostic with respect to models of wage determination, we have documented a clear numerical relationship between these two trends.

In particular, we have shown the following. As education attainment rose and employment shifted out of agriculture, jobs in the higher-skilled services and manufacturing subsectors did not grow fast enough to absorb the resulting influx of educated workers. High-skilled services became more selective, raising the share of their employees with college degrees. This increased the inflow of workers with secondary education into lower-skilled services jobs, and this shift was accompanied by a reduction in the premium they earned on

[10] A more detailed version of identity (3), $\Delta C_{e,s} \equiv \overline{\beta}_{e,s}\Delta P(s\,|\,e) + P(s\,|\,e)\Delta\beta_{e,s} + \overline{\varpi}_{c-1}\Delta\gamma_{e,s} + \Delta C_{e,s} \equiv \overline{\beta}_{e,s}\Delta P(s\,|\,e) + P(s\,|\,e)\Delta\beta_{e,s} + \overline{\varpi}_{c-1}\Delta\gamma_{e,s} + \gamma_{e,s}\Delta\varpi_{e-1,s}$, which we exclude from the main analysis in this paper to avoid an excess of weighty details, shows that low-skilled services contributed to reducing college returns in the Philippines mainly because the returns to college education within this sector fell sharply (i.e. $P(s|c)\Delta\beta$ was a large negative number).

[11] The same detailed decomposition described in the previous footnote shows that this role of construction arises primarily because of a combination of falling returns to college education within the construction sector, and a reduction in the sector's employment share among college graduates.

their schooling. The services sector therefore contributed significantly to falling returns to secondary education and to the greater bouyancy of the returns to college. Differences across countries in rates of education supply expansion and rates of skill demand growth in the high-skilled service sector account for differences across countries in the trends in the returns to college education. We re-emphasize that these are stylized facts, not descriptions of causal mechanisms. Establishing causality in labor markets requires assumptions about wage determination. Our numerical decomposition results do not.

These findings have implications for at least three literatures. First, counter to the simplest Heckscher-Ohlin logic, many unskilled-labor abundant developing countries have seen inequality and returns to college education rise upon shifting to a more liberal economic regime (Goldberg and Pavcnik, 2007). Skills-biased technical change (SBTC), typically trade-induced, is a common explanation for this. Good studies of SBTC seek confirmation from firm- or plant-level data that units that increased the use and relative pay of educated workers also underwent some technological shift that would merit the term SBTC (Pavcnik, 2003). Every such study from a developing country that we have found uses data from manufacturing plants. In fact, our data show that most of the action increasing college returns occurred in services, and that services absorbed far more of the increase in human capital made available in these countries than manufacturing. Services sectors, and the withdrawal of constraints on their operation, therefore need to be brought under the microscope to make sense of emerging trends in wage inequality. This is especially true for understanding inequality articulated across educational lines.

Second, our results also bear on the debate over why the measured relationship between aggregate education attainment and growth is noisy. Some authors cite measurement error (Krueger and Lindahl, 2001) or a failure to consider demographic shifts (Lutz *et al*., 2008), while other authors have shown that the macro-returns to education differ across countries (Becchetti and Trovato, 2007). However, there has been insufficient work explaining *why* returns might differ across countries. Work documenting cross-country variation in education quality has certainly been convincing (Hanushek and Woessmann, 2007), but this is not the only possibility. Pritchett (2001) and Easterly (2001) argue that the institutions determining the environment in which education is utilized will influence the macro-return to schooling, and that the supply of educated workers may rise faster than demand. Both writers clearly suspect that the returns to education will be specific to the types of work available. Our results, especially a comparison of the results from the Philippines and Thailand, suggest that the view has merit.

Third, a literature from the USA and Europe (Autor *et al*., 2003, 2006; Goos and Manning, 2007; Autor and Dorn, 2009) shows that routinizable

jobs in the middle of the skill distribution are disappearing, and are being replaced with low- and high-skill jobs. This 'hollowing out' echoes the view of Braverman (1974) that the modernization of production processes through mechanization and the division of labor leads to a polarization in skill requirements. Our results, especially those from the Philippines, suggest that this phenomenon may be relevant in developing countries as well.

We argue that all of this may have serious policy and political implications. Iversen and Wren (1998) make the case that the growth of the service economy leaves governments in advanced countries with a trilemma between fiscal stability, private employment growth and income inequality. This is because, following Baumol *et al*. (1985), the growth rate of productivity of many services is lower than that of the manufacturing sector, leaving less room for wage increases. This leads to a trade-off between wages and employment. As a consequence, private employment can only be increased if wages are lowered, which in turn would exacerbate inequality. Public sector programmes to overcome this trade-off come at a significant fiscal cost, and so countries must choose between equality, private employment growth and fiscal restraint.

Recent analysis of inequality trends in Asia (Asian Development Bank, 2012) can be combined with macroeconomic data to discuss our three countries' approaches to the resulting trilemma. Having prioritized fiscal stability and tied wages partly to conditions in global labor markets through institutionalized international migration, the Philippines has experienced lower inequality growth than many other countries in the region, but continued high unemployment. Our analysis suggests that policies to stimulate employment growth in industrial and high-end services will need to go beyond an expansion of education. India, on the other hand, through schemes such as its National Rural Employment Guarantee Act and other expansions of social protection programmes, has clearly prioritized employment and equality over fiscal restraint. India's Gini coefficients have risen over the past two decades, suggesting that its efforts to combat inequality have been limited by wide and well-documented variations in the quality and effectiveness of these programmes. Finally, while it is difficult to confidently characterize the Thai approach to the trilemma because measured Thai unemployment rates are very low (a subject of some debate). the current Thai government is aggressively targeting inequality by raising minimum wages, supporting rice prices and expanding retirement programmes. While the government has been somewhat careful to contain the fiscal cost of these changes, all of them could reduce private employment—especially in the formal and tradable sectors. Unsurprisingly, class conflict has become a key feature of Thai politics. The trilemma of the services economy appears to be moving South.

APPENDIX

Eight-sector classification

	India	*Philippines*	*Thailand*
Agriculture (including Fishing, Hunting and Forestry)			
Mining & quarrying			
Utilities = Electricity, gas, water supply			
Construction			
Low-skill manufacturing	• Food products • Beverages, tobacco & related • Textiles • Textile products • Wood & wood products • Leather & leather products • Basic chemicals and chemical products • Non-metallic mineral products • Base metals and alloys • Metal products & parts, except machinery & transport equipment • Other manufacturing industries	• Food, beverages & tobacco • Non-metallic mineral products • Textiles, apparel & leather • Wood & wood products, including furniture & fixtures • Other manufacturing industries	• Food products • Tobacco • Textiles • Footwear • Apparel • Non-wearing textile products • Wood & cork products • Furniture & fixtures • Leather & fur products not for wearing • Rubber products • Petroleum products • Other non-metallic mineral products • Metal products, excluding machines • Transport equipment • Miscellaneous
High-skill manufacturing	• Paper, paper products, printing, publishing • Rubber, plastics, petroleum and coal products • Machinery, machine tools and parts • Electrical and electronic apparatus, machinery, appliances etc. • Transport equipment & parts	• Paper, paper products, printing, publishing • Chemicals & chemical products, petroleum, coal, rubber & plastic • Basic metals • Fabricated metal products, machinery & equipment	• Paper & paper products, printing, publishing • Chemicals & chemical products • Basic metals • Machinery • Electrical machinery • Medical & scientific equipment • Photographic/optical products • Watches & clocks
Low-skill services	• Retail • Transportation • Household and personal services • Hotels & restaurants • Social work & other community services • Wholesale trade • Recreational & cultural services	• Wholesale trade • Retail trade • Transportation • Recreational & cultural services • Personal and household services • Hotel & restaurants • Sanitary & similar services	• Retail trade • Transportation • Personal and household services • Hotels and restaurants • Wholesale trade • Recreational and cultural and cultural services • Warehousing • Sanitary and similar activities

APPENDIX Continued

	India	*Philippines*	*Thailand*
High-skill services	• Warehousing • Sanitary & similar services • Repair • Public administration & defence • Education, scientific & research • Health & medical • Communications • Financial intermediation • Real estate • Business services • Insurance • Extra-territorial Org & bodies	• Communications • Banking • Non-bank financial intermediation • Insurance • Real estate • Business services • Public administration & defence • Education • Health, social & community services • Extraterritorial organizations	• Public administration and defense • Education, scientific and research • Health and medical services • Social work, and other social and community services • Communication • Financial intermediation • Real estate • Business activities including renting • Insurance

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