

Changing returns to education in times of prosperity and crisis, Thailand 1985–1998

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Abstract

Using data from Thailand's National Labor Force Surveys, this paper describes changes in the distribution of educational attainment among young men and women, and assesses changes in the returns to schooling. The results show that the average educational attainment of the population increased between 1985 and 1998, and that the inequities in educational attainment between rural and urban areas declined. The analyses show that the impact of education on earnings fluctuates widely depending on the level of schooling completed and gender. While the value of years of schooling is generally stable over time, the impact of completing secondary or higher education depends on the time and gender. The policy implications of this research focus on the importance of adopting a diversified strategy to educational investments at the national level, rather than simply using rates of return evidence to make decisions about how to expand education.

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1. Introduction

Scholars generally agree about the importance of education in economic growth, but continue to debate the role education plays in economic development, as well as the type of education suitable for investment by government or individuals. As McMahan recounts, economic success at a national level depends on the skills of the labor force, particularly levels of educational attainment and job training (McMahan, 1999). There is a fundamental belief that human capital investment is necessary to turn technical change and physical capital investment into productivity gains (McMahan, 1999; Rosenzweig, 1995; Schultz, 1975). The World Bank publication, the East Asian Miracle, documented the relationship between human resource

policies and the high economic growth of many Asian countries (The World Bank, 1993).

Experts do disagree about the educational levels that governments should invest in, and the economic crisis in Asia raised important questions about the efficacy of educational investments (Kakwani & Pothong, 1999; The World Bank, 1999, 2000a). However, the standard approach for educational investments documented in policy documents favors primary and compulsory education (Psacharopoulos, 1994; The World Bank, 1995). Recent studies using samples of twins provide a degree of precision in the estimation of the returns to education (Ashenfelter & Krueger, 1994; Behrman & Rosenzweig, 1999). Using a cross sectional sample of twins, Rouse (1999) has shown that the rate of return to education is about 10% per year of schooling. The argument is that primary schooling offers higher social returns and the achievement of universal primary schooling is the most important educational objective. Psacharopoulos and Patrinos (in press) have

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recently shown that the return to higher education is increasing.

Moreover, studies have questioned the general findings that the rates of return are higher for lower levels of schooling. Policy makers and analysts have found countries that achieve substantial increases in secondary education attainment also have higher rates of growth overall, and other authors have pointed to the important economic rationale for maintaining systems of vocational education and training (Bennell, 1996; Bennell & Segerstrom, 1998; McMahan, 1999). Scholars have been particularly vocal about the importance of maintaining or expanding investment in vocational or higher education because governments are most often called upon to reduce investment at this level to fund increased spending at the primary level (Birdsall, 1996; Lauglo, 1996). Indeed, reports from international agencies have shown that the level of support for vocational schooling may be increasing. The World Bank lending to vocational education and training declined from 25% of all education sector lending in 1984–1985 to 3% of education sector support in 1996. Based on data from 1999, it appears as if the World Bank's education support to vocational education has increased. Johanson (2002) reports that 11% of all education funding went to vocational education and training between 1990 and 1999.

This paper examines the premium to education in 1985, 1995, and 1998, focusing on the relationship between educational attainment and earnings for 24–35-year-old workers. The study initially describes the changes in the educational composition of the Thai labor force, showing the tremendous changes in the human capital composition of this country. Secondly, we estimate the returns to schooling at each of the three years for men and women separately. Using data from two different decades helps to demonstrate empirically the returns to different types of educational credentials over time, shedding light on the trends during a period of time of substantial economic growth and change in the labor market. The addition of data collected during the economic crisis is a useful check on the long-term trends, helping to illustrate what happens to the value of education during economic stress. The resulting discussion of policy options focuses on suggestions for governments wrestling with difficult questions about educational priorities and national development.

2. Background on Thailand's economy and educational system

Thailand has undergone dramatic changes in recent years. Like its Asian neighbors, Thailand's gross domestic product (GDP) has increased at a phenomenal rate, with growth averaging more than 6% between the 1960s and 1996 (Falkus, 1995). Although economic

growth slowed during 1997 and 1998, GDP growth has been positive since the first quarter of 1999 (The World Bank, 1999). GDP figures for Thailand are comparable with those from other parts of Asia, including Indonesia and Malaysia (The World Bank, 1993, 2001).

Developments in national economic well-being are rooted in a transformation from agriculture to manufacturing and services (Medhi, 1995; Pasuk & Samart, 1993; Suphat, 1995). In 1960, 38.9% of the GDP was in agriculture. By 1990, that had declined to 12.4%, and in 1998 stood at 11.2%. Likewise, in the other high performing East Asian economies agriculture declined as a proportion of the gross domestic product. In Indonesia, for example, agriculture stood at 19.5% of GDP in 1999, in comparison to 27.3% in 1979 (The World Bank, 2001).

Economic growth and restructuring have fundamentally changed the labor force. The proportion of the labor force employed outside of agriculture has increased from 17.6% in 1960 to 33.5% in 1990. In 2001, the National Statistics Office (2002) reported that over half of the labor force was employed outside of agriculture. Additionally, the rural economy has changed substantially, and there is some evidence that rural households are combining farming and wage-earning activities in new ways (Rigg & Nattapoolwat, 2001).

Thailand's education system has changed to help meet these new economic challenges. The government required students to complete four years of compulsory schooling until 1978, and six years thereafter. Between 1960 and 1978, secondary education consisted of general and vocational streams. Vocational education had in principle two levels, a lower level consisting of two to three years, and an upper vocational stream of two or three years. General secondary education consisted of two levels up until 1978, including a three-year lower secondary degree and a two-year upper secondary degree.

After 1978, vocational education was redefined to include an upper vocational stream, offering a parallel track to the upper secondary degree that lasts three years. The system included a higher education vocational degree stream generally considered equivalent to university and lasting between two and four years. Since 1978, general secondary education has consisted of two streams, a lower and upper secondary degree lasting three years. Secondary education was gradually transformed into comprehensive secondary education, thereby incorporating more vocational and professional training at the secondary level. At the same time, the government eliminated central school leaving exams, freeing individual schools to create innovative local programs of study. However, local schools did not have the resources to fashion new programs, and in any case, parents and students generally look towards secondary school as preparation for college (Orapin, 1991; Sirilaksana, 1988).

This division between secondary and vocational education is commonplace. Germany offers the most prominent example of a “dual” secondary education system, providing students with either vocational apprenticeships or college preparatory schooling. Many countries, such as Korea, Singapore, or Indonesia, maintain separate school systems for vocational education at the secondary level (Brand, 1998; Gill & Dar, 2000; Gill, Fluitman, & Dar, 2000).

Thailand’s higher education system, divided until recently into a number of four-year colleges and approximately 30 teacher-training colleges, is almost entirely controlled by the government. In addition to college and teacher-training programs (now called Rajaphat Colleges), the government has a variety of specialized nursing and military schools considered equivalent to the university degree. Although the country has a few very prestigious private colleges, they enroll a small percentage of university students, and only emerged in the 1980s as a serious alternative to public universities. In 1989, 24.4% of university students were enrolled in private universities. In comparison, in 1983, only 12.7% were enrolled in private schools (Myers & Chalongphob, 1991b).

Thailand’s government began the post-war period with a strong commitment to education and managed to achieve universal primary education in the 1980s. In 1961, only 77.4% of primary school age children were in school. By 1990, 99% of the primary school age population was enrolled in primary school. Lower secondary school enrollments grew from 13.7% of the eligible age group in 1961 to 37% in 1980, and 49% in 1994. In 1999, the secondary school enrollment rate stood at 79%, illustrating the progress that the government made in providing lower secondary education. Enrollment rates in higher education have grown rapidly in Thailand as well. Thai enrollment in higher education stood at 1.3% of the school age population in 1970, rising to 22% in 1994.

3. Methodology

3.1. Data and sampling strategy

The data for this research came from the National Labor Force Survey (NLFS) for 1985, 1995 and 1998. Since 1985, the National Statistics Office (NSO) has collected the NLFS three times a year. This study uses data collected during the agricultural season and thereby is more likely to survey people who were at their permanent place of residence. Thailand is primarily an agricultural economy. Many of the farmers migrate to the cities in the dry season to find work (Chalongphob & Yongyuth, 1996).

The NLFS has several advantages in studying the impact of education on earnings. First, the survey represents a continuous attempt to gather cross-sectional

data since 1963. Second, the measures have remained largely unaltered, allowing analysis based on the same variables. Furthermore, the survey is a national instrument, allowing comparisons between regions and between rural and urban areas. The NLFS has several disadvantages for use in human capital research. The data do not include items that can be used for parental/household education or income controls. Moreover, the continuous education indicators have to be constructed based on secondary information provided in the codebook. The only educational measures collected in the dataset ask about the level of education they have completed (e.g., upper primary). The codebook contains explicit descriptions of the number of years of schooling that these discrete levels comprise, and using this information, the number of years of schooling can be assembled based on the level of schooling completed.

This analysis is limited to men and women who work full-time (30 or more hours a week) between the ages of 24 and 35. The sample is restricted to individuals who work as employees in either government or private sector businesses, excluding individuals classified as employers, the self-employed, or individuals whose work is restricted to household work. The study focuses on 24–35-year-old workers because the economy has changed so dramatically over the period of study, and because one expects younger workers to experience greater changes in earnings due to shifts in supply and demand (Kim, 1994; Mincer, 1974; Wu, 1995).

Table 1 provides estimates of the sample means of earnings, education, and experience measures, including the logarithm of monthly earnings (in 1994 baht) for men and women. This table shows that monthly earnings increased during the 1980s and 1990s (Chalongphob, 1993; The World Bank, 1996: pp. 20). The decrease in monthly earnings between 1995 and 1998 is also consistent with the available information. Kakwani and Pothong (1999) document a decline in earnings, which is also alluded to in the World Bank Monitor (The World Bank, 1999). This decline is also documented using the purchasing power parity (PPP) method for converting the equivalent amount of baht into US \$. Using PPP, you would need the equivalent of \$ 467 to purchase the same number of goods that the monthly earnings in baht required in 1985, and approximately \$ 405 in 1998. In contrast, for women in 1985, you would need \$ 392 in 1985 and \$ 380 in 1998 to purchase the same number of goods.

3.2. Analyses

Regression analyses were used to fit earnings functions for men and women in 1985, 1995, and 1998. All regression models are fitted by methods that generate White’s standard errors, which account for potential failures of the assumption of residual heteroscedasticity. Earnings functions for young men and women are

Table 1

Descriptive statistics for samples by gender in 1985, 1995, and 1998 (sample limited to men and women, ages 24–35, working for wages)

	Men			Women		
	1985	1995	1998	1985	1995	1998
<i>Earnings</i>						
Monthly earnings	4652.89	6021.76	5359.97	3913.35	5592.48	5035.69
Log monthly earnings	8.26	8.52	8.43	8.07	8.42	8.34
<i>Area of residence</i>						
Rural	0.15	0.25	0.25	0.12	0.22	0.23
Urban	0.85	0.75	0.75	0.88	0.78	0.77
<i>Region of residence</i>						
North	0.16	0.19	0.19	0.12	0.19	0.19
South	0.12	0.18	0.18	0.10	0.15	0.16
Northeast	0.14	0.20	0.19	0.13	0.21	0.19
Center	0.23	0.35	0.37	0.27	0.36	0.37
Bangkok	0.32	0.08	0.08	0.35	0.09	0.09
<i>Control measures</i>						
Experience	14.73	14.38	13.85	13.47	13.19	12.81
Experience squared	252.27	237.22	222.62	219.72	210.63	200.01
Private sector employment (%)	0.63	0.71	0.69	0.64	0.68	0.70
Public sector employment (%)	0.37	0.29	0.31	0.36	0.32	0.30
Years of education	8.49	9.09	9.66	9.15	10.11	10.45
No schooling (%)	0.01	0.01	0.01	0.03	0.02	0.02
Some lower primary (%)	0.01	0.01	0.01	0.02	0.01	0.01
Lower primary (%)	0.37	0.18	0.11	0.36	0.18	0.12
Some upper primary (%)	0.01	0.01	0.01	0.01	0.00	0.00
Upper primary (%)	0.08	0.23	0.25	0.05	0.17	0.21
Some lower secondary (%)	0.01	0.01	0.00	0.00	0.00	0.00
Lower secondary (%)	0.14	0.16	0.17	0.06	0.09	0.12
Some upper secondary (%)	0.00	0.00	0.00	0.00	0.00	0.00
Some upper vocational (%)	0.01	0.00	0.00	0.01	0.00	0.00
Upper secondary (%)	0.04	0.09	0.12	0.03	0.06	0.07
Upper vocational (%)	0.09	0.09	0.08	0.10	0.08	0.06
Post-secondary vocational (%)	0.05	0.08	0.09	0.05	0.10	0.09
Post-secondary academic (%)	0.05	0.01	0.02	0.08	0.02	0.02
College (%)	0.12	0.12	0.13	0.19	0.25	0.26
Graduate degree (%)	0.01	0.01	0.01	0.01	0.01	0.01
Sample size	2717	7655	6493	2159	6644	6109

estimated by regressing the log of monthly earnings, rural or urban residence,¹ regional residence, work experience (and its square), and public/private employment. Sampling weights are included in the estimation of all models. This analysis uses potential work experience (age—6 years of education) to represent individual

labor market experience. Variables are described in Appendix A. Earnings measures are expressed in constant 1994 baht.

The first set of analyses use a continuous measure to represent the impact of years of schooling on earnings of labor market participants. The following equation summarizes the earnings function:

$$\begin{aligned} \ln(\text{earn}) = & \beta_0 + \gamma_1(\text{EXP})_i + \gamma_2(\text{EXPSQ})_i \\ & + \beta_1(\text{EDYRS})_i + \beta_2(\text{RURAL})_i \\ & + \beta_3(\text{NORTH})_i + \beta_4(\text{NEAST})_i \\ & + \beta_5(\text{SOUTH})_i + \beta_6(\text{CENTER})_i \\ & + \beta_7(\text{PUBLIC})_i + \varepsilon_i \end{aligned} \quad (1)$$

¹ The government classifies households into one of three types (municipal, sanitary district, or rural). There is no consensus about how to treat residents of sanitary districts. I follow Medhi (1993) in treating sanitary districts as urban areas. For the rest of the paper, I use the term “area” to refer to this division of households into urban, sanitary district, and rural.

Table 2

Average years of educational attainment by background characteristics (sample limited to men and women, ages 24–35, working for wages)

	Male			Female		
	1985	1995	1998	1985	1995	1998
Sample	8.49	9.09	9.66	9.15	10.11	10.45
<i>Area of residence</i>						
Sanitary	7.91	8.88	9.37	8.18	9.74	10.00
Rural	6.70	7.36	8.17	7.33	7.83	8.53
Urban	8.80	9.68	10.16	9.40	10.77	11.04
<i>Region of residence</i>						
Bangkok	9.04	10.30	10.50	9.38	10.89	10.67
Center	7.43	8.60	9.20	8.12	9.21	9.59
South	8.94	9.16	9.83	10.55	10.87	10.99
Northeast	9.28	9.86	10.25	10.33	11.20	11.76
North	7.74	8.68	9.43	8.45	9.72	10.30
Sample size	2717	7655	6493	2161	6645	6109

Note: Data from National Labor Force Survey (selected years), author calculations.

For each year, the hypothesized model represents the total impact of years of educational attainment on the log of monthly earnings. When interpreting the effects of dichotomous predictors, specifically the effects of regional, public employment, and rural residence the anti-logged regression coefficients minus one ($e^\beta - 1$) are used to summarize the percentage difference in monthly earnings between people for whom the dummy was coded zero and coded one.

The second model substitutes a set of educational dummy variables for the years of education variable.

$$\begin{aligned} \ln(\text{earn}) = & \beta_0 + \gamma_1(\text{EXP})_i + \gamma_2(\text{EXPSQ})_i \\ & + \beta_1(\text{NOSCH})_i + \beta_2(\text{S-LP})_i + \beta_3(\text{LP})_i \\ & + \beta_4(\text{S-UP})_i + \beta_5(\text{UP})_i + \beta_6(\text{S-LS})_i \\ & + \beta_7(\text{S-US})_i + \beta_8(\text{US})_i + \beta_9(\text{S-UV})_i \\ & + \beta_{10}(\text{UV})_i + \beta_{11}(\text{PS-V})_i + \beta_{12}(\text{PS-A})_i \\ & + \beta_{13}(\text{COLL})_i + \beta_{14}(\text{MO-COLL})_i \\ & + \beta_{15}(\text{RURAL})_i + \beta_{16}(\text{NORTH})_i \\ & + \beta_{17}(\text{NEAST})_i + \beta_{18}(\text{SOUTH})_i \\ & + \beta_{19}(\text{CENTER})_i + \beta_{20}(\text{PUBLIC})_i + \varepsilon_i \quad (2) \end{aligned}$$

The returns to education are expressed as returns to completion of a particular education credential, using the anti-logged regression coefficients minus one ($e^\beta - 1$) to summarize the percentage difference in monthly earnings between people for whom completion of the particular education dummy is coded one and those who finished lower secondary schooling. For example, individuals who completed upper secondary education are compared with those who stopped at lower secondary schooling, and the coefficient represents the predicted difference in log earnings due to earning an upper secondary degree above and beyond lower secondary.

4. Educational attainment

The education level of the labor force changed substantially between 1985 and 1998, as shown by the data on young men and women from the National Labor Force Survey. Table 2 summarizes the mean years of educational attainment for the sample in each given year by background characteristics, for men and women.

The average level of education increased for both men and women between 1985 and 1995. Interestingly, women had higher levels of educational attainment in all three years. This reflects the government commitment to basic education for women. In fact, the Thai government consistently supported education for women as far back as the 1930s (Watson, 1980).

Table 1 shows the percentage of young men and women by the highest level of education completed in 1985, 1995, and 1998. Like Table 2, Table 1 shows a general increase among the sample of 24–35-year-olds in the amount of education completed, particularly at the upper primary and lower or upper secondary levels. This reflects the recent changes in the Thai educational system, particularly the increase in 1978 from four to six years in the compulsory level of education.²

Increases were most significant in the supply of workers with upper primary education and lower or upper secondary degrees. The percentage of the *male* sample with an upper primary education increased

² Some of those born before 1966 from either sample could have received seven years of compulsory schooling before the law was instituted in 1978, if they were educated in a *tambol* (sub-district) that had reconfigured the primary education system to require seven years of schooling.

from 8% in 1985 to 23% in 1995, and increased to 25% in 1998. In addition, the percentage of workers with secondary education (lower or upper) increased from 18% to 25% of the male labor force, and in 1998, reached 29% of the sample. The changes for women mimic those for men for the most part, except for the fact that women are much more likely to have completed higher education.

It is interesting to compare the Thai situation with those from other Asian countries. While Thailand, Indonesia and Malaysia all have comparable gross enrollment rates for primary schooling (at or above 100%), Thailand and Indonesia have much lower secondary education completion rates. In Indonesia, the secondary education completion rate in 1997 was 17.2%.

The increases in average attainment, particularly at the basic and secondary levels, are largely the result of developments in educational policy. Thailand's education ministry moved from serving lower primary and university education to an emphasis on basic and secondary education. As described earlier, the government increased the required number of years of education from four to six years in 1978. Changes in secondary education are more difficult to explain, but are probably the result of shifting governmental priorities as well. While the government decreed as early as the First National Development Plan that secondary education was going to be a priority, and reaffirmed this commitment with the Third Plan, only in the early 1990s did the government address the very low enrollments in secondary education.

The data on educational attainment by area of residence show increases in the average educational attainment for rural residents (See Table 2). While urban residents were more highly educated in all years, the rural residents experienced greater increases in the percentage of the population with primary or secondary degrees. This is a positive finding because it shows that the government has made progress towards providing rural and urban people equal opportunities for education. As Morley demonstrated a number of years ago for Brazil, one of the reasons that Brazil experienced substantial increases in overall inequality was large differences in the patterns of economic growth and employment between the largely rural northeast and the more industrial southeast (Morley, 1982). In 2000, the percentage of the Thai rural population in poverty was 15%, in comparison to 10.2% in urban areas (The Asian Development Bank, 2003). It is worth noting, however, that the proportion of male urban residents with a college degree increased more rapidly than rural residents with college, continuing a long term trend in higher rates of college enrollment for those from urban areas (Myers & Chalongphob, 1991a).

5. Results

The fitted models presented for women and men show that, controlling for experience and its square, area of residence, region, and public/private sector employment, educational attainment does have a role in predicting earnings. Table 3 provides the regression output from the predicted log of monthly earnings using model 1.

Table 3 provides evidence that the return to a year of schooling in Thailand is relatively stable, both over time and across genders. For both men and women, completing an additional year of schooling provides an additional 11–12% of monthly log earnings. The impact of an additional year of schooling for rural residents is smaller than for urban residents, controlling for their region of residence. However, the difference between urban and rural residences decreases over time. In 1985, for example, rural earnings were about 15–17% lower than urban residents (for both men and women). In 1995 and 1998, in contrast, the difference between urban and rural earnings had declined to approximately 7–9%.

The model also included region of residence. Therefore, the coefficients on regional variables represent the impact of residence in a specific region controlling for rural or urban residence. Region of residence (north, south, northeast, or center; Bangkok is the excluded category) is also negatively related to monthly earnings for both men and women in all years. Residents in the north, northeast, and south earned less than people from Bangkok, and this difference increased between 1985–1995 and 1995–1998. These findings support the research conducted by Medhi and others using the socio-economic surveys, which show that per-capita household income grew quickest in Bangkok and more slowly in the northeast and north between the late 1980s and early 1990s (Medhi, 1993; The World Bank, 1996).

This finding on regional inequality is supported by data from other countries—such as Brazil—undergoing extensive economic development. Under rapid economic growth, largely rural regions with high proportions of the population working in agriculture see smaller increases in regional production and productivity, and therefore earnings suffer in comparison to those in other regions (Morley, 1982).

The results for the public sector variable show that, other things equal, public sector employment paid more in 1985 than private sector employment for women and men. This is consistent with results from an earlier study in Thailand (Vuthiphong, 1984). However, in 1995 and 1998, private sector employment paid more than public employment, and this difference grows when comparing the data in 1995 and 1998.

Table 3

Regression of the log of monthly earnings on years of education for Thai men and women in 1985, 1995, and 1998 using the National Labor Force Survey (weighted)

	Men			Women		
	1985	1995	1998	1985	1995	1998
Years of education	0.111 (0.005)*	0.103 (0.008)*	0.103 (0.004)*	0.108 (0.008)*	0.103 (0.004)*	0.107 (0.004)*
Experience	0.075 (0.010)*	0.017 -0.013	0.027 (0.007)*	0.054 (0.012)*	0.013 -0.008	0.021 (0.006)*
Experience squared	-0.001 (0.000)*	0 0	0 0	-0.001 (0.000)*	0 0	0 0
Rural	-0.161 (0.031)*	-0.076 (0.017)*	-0.091 (0.015)*	-0.14 (0.033)*	-0.089 (0.018)*	-0.073 (0.017)*
North	-0.256 (0.036)*	-0.418 (0.062)*	-0.378 (0.028)*	-0.198 (0.049)*	-0.434 (0.040)*	-0.392 (0.030)*
South	-0.172 (0.050)*	-0.287 (0.062)*	-0.232 (0.030)*	-0.202 (0.038)*	-0.308 (0.039)*	-0.322 (0.030)*
Northeast	-0.267 (0.043)*	-0.376 (0.063)*	-0.364 (0.028)*	-0.265 (0.040)*	-0.401 (0.039)*	-0.372 (0.029)*
Center	-0.153 (0.036)*	-0.205 (0.060)*	-0.161 (0.024)*	-0.096 (0.034)*	-0.14 (0.033)*	-0.138 (0.024)*
Public	0.033 -0.032	-0.029 -0.037	-0.107 (0.020)*	0.139 (0.055)**	0.036 -0.032	-0.084 (0.025)*
Constant	6.654 (0.100)*	7.607 (0.150)*	7.367 (0.076)*	6.67 (0.141)*	7.466 (0.085)*	7.268 (0.079)*
Observations	2717	7655	6493	2159	6644	6109
R-squared	0.42	0.45	0.47	0.59	0.57	0.54

Robust standard errors in parentheses.

* Significant at 1%.

** Significant at 5%.

5.1. Changes in earnings premiums over time

Within model 2, the returns to education are expressed as returns to completion of a particular education credential. The coefficient on any education variable represents the percentage difference in monthly earnings between people for whom completion of the particular education dummy is coded one and those whose schooling stopped with completion of lower secondary schooling. For example, individuals who completed upper secondary education are compared with those who stopped at lower secondary schooling, and the coefficient represents the predicted difference in log earnings due to earning an upper secondary degree above and beyond lower secondary.

The analysis uses a set of education dummy variables to compute private rates of return that help us to investigate the differences in returns to specific educational credentials over time. The education coefficients produced from the regression analysis produce an estimate of the return to education if the assumption is made that costs are limited to forgone earnings. Tables 4 and 5 display the regression findings for the model separately for men and women, showing the

output for all education credentials, with lower secondary education as the omitted variable.

For almost all education coefficients, the point estimates are statistically significant at the 0.05 level, indicating that the coefficients on particular education variables are different from the estimates for the omitted educational credential. The coefficients for upper primary, upper secondary, and post-secondary are compared to lower secondary credentials. Each is dealt with in turn in the following paragraphs. Table 6 displays the predicted percentage difference for all educational credentials for men and women.

Individuals with upper primary schooling have lower earnings than lower secondary completers in all three years, and for both genders. While the difference between upper primary and lower secondary completers decreased for women over the three years, the differences for men stayed about the same. These changes in the private return to upper primary schooling occurred at a time when the proportion of completers with an upper primary degree increased considerably (Table 1).

Individuals with upper secondary academic schooling have higher earnings than lower secondary com-

Table 4
Regression of the log of monthly earnings on educational credentials for young Thai women in 1985, 1995, and 1998 using the National Labor Force Survey (weighted)

	1985	1995	1998
Experience	0.064 (0.012)*	0.038 (0.008)*	0.055 (0.007)*
Experience squared	-0.001 (0.000)*	-0.001 (0.000)*	-0.002 (0.000)*
Rural	-0.137 (0.033)*	-0.094 (0.018)*	-0.074 (0.016)*
North	-0.221 (0.049)*	-0.423 (0.039)*	-0.393 (0.029)*
South	-0.2 (0.036)*	-0.273 (0.038)*	-0.304 (0.029)*
Northeast	-0.263 (0.037)*	-0.37 (0.039)*	-0.37 (0.029)*
Center	-0.085 (0.033)*	-0.113 (0.033)*	-0.124 (0.024)*
Public	0.097 (0.046)**	-0.008 (0.031)	-0.117 (0.025)*
No schooling	-0.765 (0.163)*	-0.49 (0.081)*	-0.38 (0.069)*
Some lower primary	-0.776 (0.084)*	-0.486 (0.066)*	-0.31 (0.060)*
Lower primary	-0.615 (0.059)*	-0.36 (0.051)*	-0.252 (0.040)*
Some upper primary	-0.544 (0.179)*	-0.438 (0.105)*	-0.284 (0.092)*
Upper primary	-0.361 (0.078)*	-0.275 (0.042)*	-0.259 (0.029)*
Some lower secondary	-0.013 (0.194)	-0.482 (0.168)*	-0.166 (0.12)
Lower secondary	Omitted	Omitted	Omitted
Some upper secondary	0.717 (0.103)*	0.059 (0.07)	-0.027 (0.128)
Some upper vocational	0.367 (0.075)*	0.14 (0.175)	0.181 (0.15)
Upper secondary	0.064 (0.088)	0.186 (0.049)*	0.2 (0.039)*
Upper vocational	0.314 (0.064)*	0.448 (0.054)*	0.349 (0.035)*
Post-secondary vocational	0.529 (0.070)*	0.507 (0.059)*	0.573 (0.046)*
Post-secondary academic	0.547 (0.067)*	0.427 (0.066)*	0.566 (0.061)*
College	0.774 (0.063)*	0.885 (0.048)*	0.893 (0.038)*
Graduate degree	0.839 (0.104)*	1.385 (0.200)*	1.441 (0.110)*
Constant	7.627 (0.100)*	8.195 (0.077)*	8.013 (0.059)*
Observations	2159	6644	6109

Table 4 (continued)

	1985	1995	1998
R-squared	0.6	0.59	0.56

Robust standard errors in parentheses.

* Significant at 1% level.

** Significant at 5% level.

pleters in all three years, for both genders. The return to upper secondary academic (over lower secondary) for men was 38% in 1985, but declined to 24% in 1995 and 33% in 1998. For women, the returns were also higher than for lower secondary, 7% in 1985, 20% in 1995, and 22% in 1998. The differences in the returns to upper secondary academic schooling occurred at a time when the proportion of both men and women in the labor force survey with an upper secondary academic degree increased substantially (See Table 2). Therefore, while the proportion of men and women with an upper secondary academic certificate increased, the payoff decreased for men between 1985 and 1995 and increased again between 1995 and 1998. In contrast, for women, an increase in the supply of workers with an upper secondary certificate was accompanied by an increase in the private returns in both years.

While changes in the demand for workers with an upper secondary education certificate might explain the decline in private returns from 1985 and 1995 for men, the opposite is true for women. It is possible that occupations that paid more and require some secondary education (such as those in manufacturing) grew more quickly for women than men. Data from studies of the economic structure of Thailand do indicate that the share of jobs women have in areas such as manufacturing grew more quickly than those for men in the 1980s, especially for women in rural areas (Kurian, 1999; Phaniramai, 1996).

One of the key questions in studies of earnings is the difference between academic and vocational completers. The findings from the vocational coefficients in this study are dealt with in greater detail in a related publication (Hawley, 2003a). However, since the statistical models used in this study differ to an extent, it is worth reviewing some of the key findings. The coefficients on upper secondary vocational schooling show that men and women had higher earnings than those with a lower secondary certificate. However, while the payoff to an upper secondary vocational certificate decreased between 1985 and 1995 for men, women experienced an increase in the private return to upper secondary vocational schooling over the same time period.

In contrast to upper secondary academic schooling, we see relatively small increases in the proportion of the male labor force with an upper secondary vocational certificate, but a broad decrease in the pro-

Table 5
Regression of the log of monthly earnings on educational credentials for young Thai men in 1985, 1995, and 1998 using the National Labor Force Survey (weighted)

	1985	1995	1998
Experience	0.078 (0.011)*	0.037 (0.014)*	0.056 (0.008)*
Experience squared	−0.001 (0.000)*	−0.001 0	−0.001 (0.000)*
Rural	−0.156 (0.031)*	−0.083 (0.017)*	−0.102 (0.015)*
North	−0.256 (0.036)*	−0.395 (0.057)*	−0.368 (0.028)*
South	−0.161 (0.048)*	−0.254 (0.057)*	−0.219 (0.029)*
Northeast	−0.264 (0.043)*	−0.357 (0.057)*	−0.368 (0.028)*
Center	−0.154 (0.036)*	−0.181 (0.055)*	−0.148 (0.024)*
Public	0.045 −0.032	−0.039 −0.036	−0.101 (0.020)*
No schooling	−0.875 (0.124)*	−0.714 (0.076)*	−0.681 (0.079)*
Some lower primary	−0.842 (0.095)*	−0.445 (0.076)*	−0.33 (0.077)*
Lower primary	−0.462 (0.052)*	−0.308 (0.042)*	−0.247 (0.038)*
Some upper primary	−0.226 −0.134	−0.323 (0.061)*	−0.173 −0.102
Upper primary	−0.213 (0.060)*	−0.246 (0.040)*	−0.219 (0.024)*
Some lower secondary	−0.093 −0.114	−0.068 −0.062	−0.058 −0.201
Lower secondary	Omitted	Omitted	Omitted
Some upper secondary	0.004 −0.089	−0.326 (0.096)*	0.045 −0.177
Some upper vocational	0.529 (0.075)*	−0.107 −0.22	0.496 (0.093)*
Upper secondary	0.321 (0.067)*	0.215 (0.043)*	0.286 (0.030)*
Upper vocational	0.517 (0.051)*	0.416 (0.065)*	0.362 (0.035)*
Post-secondary vocational	0.657 (0.054)*	0.575 (0.053)*	0.609 (0.041)*
Post-secondary academic	0.592 (0.057)*	0.465 (0.134)*	0.581 (0.071)*
College	0.859 (0.053)*	0.935 (0.086)*	0.894 (0.038)*
Graduate degree	1.225 (0.171)*	1.305 (0.106)*	1.282 (0.124)*
Constant	7.541 (0.089)*	8.344 (0.111)*	8.067 (0.061)*
Observations	2717	7655	6493
R-squared	0.43	0.47	0.48

Robust standard errors in parentheses.

* Significant at 1% level.

portion of women with an upper secondary vocational certificate. The proportion in the labor force of males with an upper secondary vocational certificate stayed almost unchanged, and stood at 8–9% in all three years. In contrast, the proportion of women in the labor force with an upper secondary vocational certificate declined from 10% in 1985 to 6% in 1998.

The drop in private returns for men with upper secondary vocational certificates might be the result of a decline in the availability of jobs that required a technical certificate. For women, on the other hand, the increase in private returns could be due to a decrease in the proportion of women with vocational degrees. Interestingly, a recent study by Hawley (2003b) shows that men are less likely than women to complete vocational education and end up employed in a related occupational area. However, men who subsequently worked in an occupation related to their field of study earned less than vocational graduates who did not. In contrast, for women, completion of vocational schooling and employment in a related occupational area leads to 16% increase in monthly earnings.

The private return to college is consistently high for both men and women. While it appears that the male college graduates in the labor force during the economic decline (1998) experienced a slight drop in earnings differentials, for women, the difference between lower secondary and college earnings increased between 1995 and 1998.

Students in Thailand can opt to enroll in a variety of post-secondary courses including vocational credentials, nursing certificates, and two year teacher college degrees, in addition to completing a regular course leading to a four-year degree. There are a wide variety of courses of study, many of which are taken in the private sector, or in conjunction with employment as on the job training. Results for the post-secondary credentials offer a different view of the private returns to schooling for men and women in Thailand. The returns to post-secondary vocational and academic schooling are higher than the returns to secondary levels of education. Moreover, the returns to post-secondary vocational education are higher than those for post-secondary academic schooling in most years.³ Women,

³ The post-secondary vocational measure is composed of individuals who have completed a course called “higher vocational”, a technical college diploma labeled as “associates degree”, or a nursing degree after completing 11 years of education. Those classified as post-secondary academic completers completed one to three years of college, but did not graduate, or an associate degree in a field other than a vocational subject, or training as a teacher that took up to three years after graduating from high school.

Table 6
 Predicted percentage difference in log monthly earnings for young men and women in Thailand (1985, 1995, 1998)

	Men (%)			Women (%)		
	1985	1995	1998	1985	1995	1998
No schooling	-58	-51	-49	-53	-39	-32
Some lower primary	-57	-36	-28	-54	-38	-27
Lower primary	-37	-27	-22	-46	-30	-22
Some upper primary	-20	-28	-16	-42	-35	-25
Upper primary	-19	-22	-20	-30	-24	-23
Some lower secondary	-9	-7	-6	-1	-38	-15
Lower secondary	Omitted	Omitted	Omitted	Omitted	Omitted	Omitted
Some upper secondary	0	-28	5	105	6	-3
Some upper vocational	70	-10	64	44	15	20
Upper secondary	38	24	33	7	20	22
Upper vocational	68	52	44	37	57	42
Post-secondary vocational	93	78	84	70	66	77
Post-secondary academic	81	59	79	73	53	76
College	136	155	144	117	142	144
Graduate degree	240	269	260	131	299	322

in particular, consistently experienced increases in the earnings differential for both vocational and academic post-secondary schooling.

These differences in the returns by gender and over time illustrate the difficulty in determining a fixed relationship between educational attainment and earnings. Earnings depend on background characteristics, such as whether or not you live in a rural or urban area, as well as time varying characteristics, such as changes in the supply of workers with a particular credential.

Changes in the supply of workers do not always explain all the differences in the private returns, since women experienced an increase in the payoff for upper academic secondary while the proportion of women with that certificate grew over the three survey years. One possible explanation for women's increasing private returns is an increase in the proportion of women working in more highly skilled jobs. The data from the National Labor Force Survey used for this study show an increase in the percentage of women in professional occupations from 22% in 1985 to 29% in 1998, and an increase in the proportion of women in executive positions from 5% in 1985 to 11% in 1998.

6. Conclusions

Between 1985 and 1998, Thailand experienced significant changes in the educational composition of the young male and female labor force. Overall, the mean years of education completed by men increased from 8.5 in 1985 to 9.66 in 1998. For women, the average educational attainment increased from 9.1 to 10.45 years of

schooling. Increases in the overall level of education were due primarily to growth in the proportion of workers with upper primary education and secondary degrees. There were also substantial increases in the proportion of the labor force with college and post-secondary vocational qualifications, depending on gender.

Rural residents had on average lower educational attainment than people from urban or sanitary districts in all three years. However, between 1985 and 1995, the inequities in the educational attainment between rural and urban areas declined. Similarly, the differences in mean years of education between Bangkok and the mostly rural regions (north, northeast, south, and center) also narrowed substantially between 1985 and 1995.

Based on the general increase in the supply of educated men in the labor market, we should expect the payoff to education to have declined, unless other changes occurred in the labor market that would cause wages to increase. In fact, average earnings for men increased between 1985 and 1995, and although they declined between 1995 and 1998, they did not drop to their earlier level. However, the effect of education on earnings differed somewhat between 1985 and 1995. People with higher levels of education appear to have gained more, judging from a comparison of the predicted earnings by level of education in each of the years.

When considering the impact of education as a set of dichotomous variables, the findings supports the general conclusion based on human capital theory that the higher level of education the greater the private returns to schooling. This conclusion is in line with stu-

dies from Africa, as well as from other studies in Thailand (Bennell, 1995; Siphambe, 2000). While the specific magnitude of individual coefficients for each level of schooling do change from year to year and for each gender, the private returns to education reflect an increase in the return to education overall, rather than the benefit of one level over another. It is in fact quite difficult to compare the economic return to specific forms of schooling, such as vocational and academic secondary schooling, because the dataset does not contain information that could be used to compare the characteristics of the schooling experience, such as curriculum or teacher characteristics. In addition, we know very little about the background characteristics of individual cases, and therefore cannot create statistical models that take into account aptitude, parental background, or other measures.

These conclusions about the impact of education on earnings must further be qualified because the sample used for this study incorporates only those who work in the formal sector, particularly those who earn wages. By necessity, therefore, it excludes the majority of men and women aged 24–35 who work as farmers. The conclusions about the impact of education on earnings can be generalized to the population of wage earning men or women, but not to those who do not work for wages.

The private returns to secondary educational credentials fluctuate over time, suggesting that rather than advocating policies favoring one form of secondary or higher education over another, governments would do better to advocate for increased investment in general and vocational schooling. The returns to both vocational post-secondary and vocational upper secondary schooling depend substantially on the year and the gender. This is particularly important to recall because the emphasis on vocational education at the secondary level has been called into question by development banks as well as host country governments (Adams, 2002; Johanson, 2002).

Moreover, this study raises important questions about the importance of investments in secondary and higher education in addition to primary schooling. As Psacharopoulos and Patrinos (in press) emphasized, the return to higher education has been increasing over time. While the Thai government has invested substantial resources in recent years in expanding general secondary education, the new education law enacted in the late 1990s refocuses the energy on improving educational quality (Fry, 1999). Through this period, the private sector has made increased investment in vocational schooling to meet increased demand

(Cresswell, 1999; Johanson & Wanasiri, 2000). This is theoretically desirable because vocational schooling has much higher per student costs, but presents complex equity concerns and opens up larger questions about the appropriateness of focusing on either academic or vocational training when employers are specifically requesting entry level workers with both kinds of skills (The World Bank, 2000b).

The decision on the part of a host country to expand investment in either vocational or academic schooling must be made on the basis of larger concerns with the skill levels of the population and on the basis of the best knowledge available about the direction of economic change. In some countries, this decision will lead to increased investment in academic schooling, as has in fact happened in Thailand in the 1990s, and in others, it will result in a recommitment to vocational education (Gill et al., 2000).

In addition, this paper demonstrates that the difference between rural and urban residents narrowed in two key areas, educational attainment and earnings. It is important to note that the statistical models include regional variables as well as controls for rural residence, therefore, the findings about the decrease in the difference between rural and urban earnings or education controls for region of residence. This shift in the distribution of educational attainment or earnings occurred at the same time as economic development has been consistently concentrated in and around Bangkok. This finding provides important, but limited, evidence about the trends in development and the distribution of the benefits of development to both urban and rural areas. While researchers have long documented the concentration of industrial and economic development in urban areas, the evidence about the narrowing gap in educational attainment provides some evidence that the government was able to expand primary and secondary education to the rural areas. This provides some important guidance about the success in compulsory education policies that may point to long-term trends like those documented in China (Hannum, 1999).

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Appendix A. Data and variable descriptions

Variables and acronyms	Definition	Source variable in the NLFS
Log of monthly earnings (ln(earn))	Natural logarithm of monthly earnings	Monthly earnings computed based on salary information, combined with data on other earnings.
Experience (EXP)	Potential work experience (age—years of schooling 6)	AGE
Experience-squared (EXPSQ)	Square of experience	Years of education
Rural (RURAL)	Residence in an area defined as “rural” in the survey	AREA
Urban (excluded)	Residence in an area defined as “urban” or “sanitary district”	AREA
North (NORTH)	1 = yes, 0 = no	REG
South (SOUTH)		REG
Northeast (NEAST)		REG
Center (CENTER)		REG
Bangkok (excluded)		REG
Public (PUBLIC)	1 = employed in either public or state owned sectors; 0 = private sector	Public
Years of education (EDYRS)	Number of years of schooling completed	Based on information in the codebooks for each year about the number of years it takes to complete particular types of education.
No schooling (NOSCH)	1 = yes, 0 = no	01, 10
Some lower primary (S_LP)	1 = yes, 0 = no	11, 12, 13
Lower primary (LP)	1 = yes, 0 = no	14
Some upper primary (S_UP)	1 = yes, 0 = no	15, 41
Upper primary (UP)	1 = yes, 0 = no	16, 17
Some lower secondary (S_LS)	1 = yes, 0 = no	20–22
Lower secondary (LS)	1 = yes, 0 = no	23
Some upper secondary (S_US)	1 = yes, 0 = no	24, 25
Upper secondary (US)	1 = yes, 0 = no	54, 55
Some upper vocational (S_UV)	1 = yes, 0 = no	26
Upper vocational (UV)	1 = yes, 0 = no	56
Post-secondary vocational (PS_V)	1 = yes, 0 = no	61, 62
Post-secondary academic (PS_A)	1 = yes, 0 = no	31–33, 39, 73–77
College (COLL)	1 = yes, 0 = no	34, 36, 63, 78
More than college (MO_COLL)	1 = yes, 0 = no	35, 37, 38

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