Education and Earnings in Lao PDR: Further Results

Phanhpakit ONPHANHDALA

Terukazu SURUGA

Education and earnings in Lao PDR:

Further Results*

Phanhpakit ONPHANHDALA[1] and Terukazu SURUGA[2]

Abstract:

This paper is a study on the returns to education in Lao PDR, a country which has been largely neglected by the literature. Conducting an empirical research using LECS 3, we found the significant private-public sector wage differentials. The wage premium is particularly pronounced for workers with a tertiary level education. The private rates of returns to education rose significantly with the economic transition. Particularly, returns for young workers are considerably higher than for older workers. Moreover, average private rate of return to primary education is the highest at 34% among educational attainments. The research findings have important implications for public sector salaries and the financing of education in Lao PDR.

Key words: Returns to education, Wage differentials, Gender, Transition, Lao PDR

JEL codes: I28, J24, J31

---

[1] Graduate School of International Cooperation Studies, Kobe University, Japan.

[2] Professor of Economics, Graduate School of International Cooperation Studies, Kobe University, Japan.

Corresponding author, email address: suruga@kobe-u.ac.jp.

1. Introduction

This research work provides estimation results on the returns to education in Lao People's Democratic Republic (Lao PDR). Within the transition economies, Lao PDR is an interesting case study. After a period of major economic reforms in 1986 (the policy known as *Chintanakaan Mai* or *New Economic Mechanism*), macroeconomic stabilization is still far from being achieved. Privatization is progressing very slowly and the state continues to exert a strict control over the labor market. The state has adopted a very slow approach to economic reforms, which suggests that the incentive for human capital accumulation has been low. In fact, the public sector still represents an important part of overall economic output.

This situation provides a unique study of many hypotheses developed in the economic transition literature about the size of the increase in the returns to education, and about the determinants of such an increase. What role human capital plays in shaping economic transition in Lao PDR? How returns to education are affected by the ongoing economic transformation? More generally, does the speed of transition matter when looking at the evolution of returns to education during transition?

On the other hand, prior to the reforms, almost all non-agricultural employment was in the public sector and wages were determined by the state. In recent years, the economic transition in Lao PDR has resulted in sharp changes in the wage structure. Higher private sector wages are likely to have spillover effects on the public sector with resulting negative consequences for its fiscal position. Thus, the questions that need to be addressed are whether there are any wage differentials between the private and the public sectors and what are the implications of these differences.

In this paper, we use recently collected earnings data from Lao PDR to estimate the returns to education, particularly, the private-public sector earnings differentials. The above research questions will be answered by comparing two data sets from 1997/98 and 2002/03. In short, estimates of Mincerian earnings functions show significant differences in the returns to education for private and public sectors; for Vientiane Capital[3] and other provinces; and also for males and females.

The paper is structured as follows: Section 2 reviews the returns to education and wage differentials in transition economies. Section 3 provides information on the Lao PDR context, Section 4 describes the data and empirical model. Section 5 analyses the estimation results, and Section 6 concludes.

---

[3] Vientiane Capital is the capital city of Lao PDR, and is not located within Vientiane Province. Vientiane Province is categorized as one of the other provinces outside Vientiane Capital in this study.

2. Returns to education and wage differentials in transition economies

Under central planning, the government used to set the wages of all workers employed in the public sector. Wage equalization across individuals, regions and sectors was a constant target of the central planner. However, regardless of differences in educational levels, some specific groups and sectors, such as the army and workers employed in the mining or manufacturing sectors, used to receive a special wage premium.

How "high" were the rates of return to human capital under central planning? What are the effects of economic transition on the returns to education? Should the returns to education increase or decrease during transition? To answer these questions is not an easy task. The literature is not unanimous, which may also be because the evidence is still scare. As suggested in Svejnar (1999) two possible routes can be taken when attempting to predict the returns to education in transition economies. The first one would suggest that it should explode, as market mechanisms are supposed to wash away the egalitarian emphasis of communism. The opposite one implies that it should fall, as the "obsolete human capital" may not be very useful in the new economic environment. Various intermediate hypotheses are possible, such as the returns to general and academic education should increase, especially for young people, whereas the returns to work experience and tenure should decrease.

The evidence from centrally planned and transition economies is relatively limited. Nevertheless, it has been shown that the rates of returns to education are usually low in centrally planned economies, for example, 3.1% in 1988 in China (Xie and Hannum, 1996), and also in the early state of transition economies, for example, 4.8% in 1992/93 in Vietnam (Moock, Patrinos and Venkataraman, 1998). However, a large amount of evidence, relative to various Central and Eastern European (CEE) countries as well as countries in the Commonwealth of Independent States (CIS) both in the pre- and post-transition era, suggests that the private rate of return to a year of education in centrally planned economies is relatively low by international standards (Newell and Reilly, 1999). In general, their study provides estimates of about 2% in the pre-transition period and between 4% and 5% over the first half of the 1990s. These figures give some indication of the extent to which human capital was undervalued under central planning. Conversely, generic and, even more so, job-specific work experience exhibits a lower return than in Western countries, also when combined with high education attainments (Newell and Reilly, 1999; Svejnar, 1999). On the other hand, Brainerd (2000) found a larger increase in the returns to education in several CEE and CIS economies than that found in Newell and Reilly (1999), but mixed evidence on returns to work experience. Surprisingly, Pastore and Verashchagina (2006) found that the skill payoff was high in Belarus in 1996, at about 10% and stable. The return to work experience was also high at 5%.

Moreover, Trostel, Walker and Woolley (2002) found that transition countries, over the period from 1985 to 1995, had rates of returns to education that differed remarkably from one another. Two groups of countries can

be disentangled: on the one hand, Bulgaria, Czechoslovakia, the Czech and the Slovak republic and Russia exhibit a coefficient for years of schooling ranging between 3.1 and 5.2; on the other hand, Hungary, Latvia, Poland and Slovenia exhibit a coefficient for years of schooling ranging between 6.7 and 8.0. The relevant coefficient in the pooled regression including all the countries in the sample equals 4.8.

In terms of wage differentials, increasing wage differentials may make it difficult for the public sector to retain and attract workers (Katz and Krueger, 1991). Lower public sector wages may increase the incidence of moonlighting and adversely affect public efficiency. The issue of private-public wage differentials has been intensively explored for developed countries (for example, Smith, 1976; Shapiro and Stelcner, 1989; Dustmann and van Soest, 1998). However, fewer studies exist for developing countries (Van der Gaag, Stelcner and Vijverberg, 1989; Adamchik and Bedi, 2000).

For all educational groups, Dustmann and van Soest (1998) found that potential wages are on average higher in the private sector than in the public sector in Germany, but this advantage fell according to age and education level. On the other hand, Adamchik and Bedi (2000) found a private sector earnings advantage in Poland, which was particularly pronounced at the university level. These findings may suggest that the public sector needs to pay in order to keep up. While wider wage gaps create problems, attempts to keep up are fraught with negative consequences. Paying higher wages will increase the wage bill and strain the fiscal position of the public sector.

3. Education and earnings distribution in Lao PDR

3.1. Recent Economic Developments

Since the major economic reforms, the economy of Lao PDR has expanded remarkably with an annual real growth rate of 6.2% from 1990 to 2003. Also, the Lao economy was undergoing a notable degree of structural change. The share of the agricultural sector in GDP decreased by 12.6% from 61.2 in 1990 to 48.6 in 2003, the share of the industrial sector increased sharply by 11.4% from 14.5 in 1990 to 25.9 in 2003, and the share of the service sector was almost unchanged at 26%. However, even in 2003, the agricultural sector still accounted for 82% of the employed population. The result is low productivity and low incomes. It is worth noting that the data for the proportion of the employed in agriculture is somewhat misleading since many workers have secondary jobs in off-farm activities such as household businesses.

3.2. Education and government expenditure

The education system in Lao PDR is categorized by 5 years of primary education, 3 years of lower secondary and another 3 years of upper secondary education. A vocational education program is generally 2 years, and a technical education program is generally 3 years; both lead to a diploma. Higher education

(university) lasts 4 to 6 years, depending on the program. A post-graduate system did not exist until recent years. According to Lao Expenditure and Consumption Survey in 2002/03 (LECS 3), in all regions, the average number of years of schooling is below 8 which means that most students do not complete lower secondary education. Although most villages have their own primary school, a large number of primary school does not offer five years of schooling, and only 8 percent of villages have a lower secondary school (Table 1). Insufficient educational resources are a difficult obstacle, particularly for villagers in remote rural areas. Males tend to have both a higher literacy rate and longer schooling years than females in all regions.

Table 1: Educational services and education by regions and sex in 2002/03

	Primary school*	Lower secondary school*	Schooling Years		Literacy rate 15+	
			Male	Female	Male	Female
Vientiane Capital	88	26	8	7	97	91
North	81	7	5	4	80	55
Center	81	11	6	6	89	71
South	71	7	5	4	88	65
All	79	8	5	5	86	65

Source: LECS 3 in 2002/03. (* Rate of primary and lower secondary school in village)

According to ADB key indicators 2005, only about 1 percent of the budget was spent on the education sector in the early 1990s. From 1997 to 2001, the expenditure on education increased drastically to an average of 8 percent. According to the Lao PDR public expenditure review (2002), about one half of the government expenditure on the education sector was concentrated on primary education during the 1990s. Another one fourth was spent on secondary education. This trend did not change very much over the ten years.   In general, most countries spend more per tertiary (post-secondary) student than per primary, but the gap is much larger in developing countries (Glewwe and Kremer, 2005). A study of the health and education needs of ethnic minorities in Lao PDR showed that education spending disproportionately benefits urban students. Estimates are that a university student receives a subsidy that is 20 times larger than the subsidy for a primary student. Likewise the increase in government capital expenditures probably tends to be biased towards wealthier households.

3.3. Employment and wages

Little quantitative data is currently available on wages or incomes (Table 2). The salary scale in the government is quite flat and increases very little with work experience. Public administration salaries are relatively high compared to their counterparts employed in the education and health sectors. According to LECS 3, on average, workers in the public sector earn only one half or less compared to their counterparts in

the private sector. In fact, government wages normally range from 150,000 to 500,000 kips. If additional income, for example, extra income from working with an international project, is excluded, the difference of earnings between the public and private sector is much larger.

With respect to gender disparities, there are many gender-specific jobs in Lao PDR that are difficult to compare. For example, males tend to work in construction and transportation sectors, whereas females tend to work in trade activities, especially in retails on a micro or small-scale business. But, except the trade activities, a male worker usually receives 20% to 50% more than a female worker in each sector. Likewise, the average monthly earnings in Vientiane Capital is also 20% to 50% more than the amount in the remaining seventeen provinces, depending on type of business. The combined data shows a slightly upward trend in Vientiane Capital due to its dominance.

Table 2: Average monthly earnings in Kip in selected type of businesses by region, 2002/03

Type of Business	Vientiane Capital	Other Provinces	Lao PDR
Private Sector			
Manufacturing	785,000	503,000	597,000
Construction	703,000	537,000	580,000
Trade activities	2,535,000	1,192,000	1,450,000
Transportation	1,222,000	812,000	885,000
Other service activities	647,000	634,000	639,000
Public Sector			
Public administration	527,000	418,000	463,000
Education and Health	373,000	383,000	380,000

Source: LECS 3 in 2002/03. (Average market exchange rate in 2002 was at 10,056 kip/dollar)

4. Data and empirical model

4.1. Data

Despite the urgent need for labor market information, the current statistics in Lao PDR are very limited. In this paper, we attempt to apply the data of Lao Expenditure and Consumption Surveys 3 (LECS 3) in 2002/03 as the updated version of LECS 2 in 1997/98 in our previous study (Onphanhdala and Suruga, 2006). While the LECS 1 (1992/93) was combined with a large module of social indicators, the LECS 2 and LECS 3 versions focused on economic activities of households. Particularly, LECS 3 is deemed very useful to monitor the impacts of education on income in the post-reform era. Also, this paper is the first of its kind to study the return to human capital in Lao PDR during its economic transition and during the post-Asian Financial Crisis period.

The LECS 3 conducted by the Swedish International Development Agency (SIDA) and the National Statistical Center of Lao PDR was undertaken from March 2002 to February 2003. The sample was conducted by interviewing 8,092 households, 49,790 persons from 540 villages. In this survey, there are 6,890 samples

reporting about income and transfers received in the prior to the interview month. The majority of samples are in the agriculture sector. After clearing the data, we finally have 2,219 samples of individual incomes (wages, salaries in cash): 1529 for the private sector and 690 for the public sector. 836 observations are female.

Summarizing the data of LECS 3, Table 4 presents the brief characteristics of the samples in the private and the public sectors, which includes schooling years, education levels, and age (experience). The samples are also classified into two geographical areas namely Vientiane Capital and the rest of the country (17 provinces). It is worth noting that Vientiane Capital alone comprises roughly one third of the sample size, which could justify the classification.

Table 3: Means of Selected Variables by Region, Sex and Sector

Variable	Vientiane C.			Provinces			Lao PDR		
	Male	Female	All	Male	Female	All	Male	Female	All
Private Sector									
Years of Schooling	8.3	7.1	7.7	6.3	5.1	5.8	6.9	5.7	6.3
Education Level									
No education	5.2	11.8	8.1	11.5	19.4	14.9	9.7	17.1	12.9
Primary	26.9	29.7	28.2	38.8	43.2	40.7	35.4	39.2	37.1
Secondary	47.8	46.6	47.3	41.3	34.2	38.2	43.2	37.9	40.9
Vocational/Technical	12.0	9.2	10.8	7.2	2.3	4.8	8.6	4.4	6.7
University	8.0	2.6	5.6	1.1	0.8	1.0	3.1	1.4	2.4
Age	35.0	31.3	33.4	36.8	34.2	35.7	36.3	33.3	35.0
Observations *N*	249	195	444	615	470	1085	864	665	1529
Public Sector									
Years of Schooling	11.5	11.8	11.6	9.4	9.4	9.4	10.2	10.4	10.3
Education Level									
No education	4.6	-	3.4	6.2	11.1	7.3	5.6	6.4	5.8
Primary	8.7	9.7	9.0	20.1	12.1	18.2	17.8	11.1	14.6
Secondary	27.2	33.3	28.8	35.5	36.4	35.7	32.4	35.1	33.0
Vocational/Technical	30.2	40.3	33.0	30.2	37.4	31.9	30.2	38.6	32.3
University	29.2	16.6	25.8	8.0	3.0	6.8	15.9	8.8	14.2
Age	40.8	31.8	38.4	39.8	32.6	38.2	40.2	32.3	38.2
Observations *N*	195	72	267	324	99	423	519	171	690

Source: LECS 3 in 2002/03.

On average, the schooling years range between 5 and 8 years in the private sector and between 9 and 12 years in the public sector. This is the exact same level as in neighboring Vietnam. Like in many countries, although fewer now than in the past, the majority of post-secondary graduates end up in public sector employment. Similarly, workers in Vientiane Capital have a higher schooling year than those in other provinces in both sexes and sectors. On the other hand, education at the primary and secondary levels does not

vary much among gender, regions and sectors. However, the proportion of workers without education records a significant difference between male and female in all regions and sectors. The ratio for males is roughly one half of that for females. Moreover, the higher the education level, the larger the gap is between male and female, and between Vientiane Capital and other provinces. The average age of the interviewees is about 35 years old, which results in comparable experience.

Table 4: Monthly earnings (1,000 Kip) by education in the two sectors.

Education	Vientiane Capital			Other provinces			Lao PDR		
	Private	Public	Ratio	Private	Public	Ratio	Private	Public	Ratio
No education	649	297	2.19	509	312	1.63	534	308	1.73
Primary	859	291	2.95	725	458	1.58	755	418	1.80
Secondary	1,211	462	2.62	850	416	2.04	971	432	2.25
Vocational/Technical	1,106	473	2.34	1,260	409	3.08	1,189	434	2.74
University	1,485	673	2.20	1,370	345	3.97	1,450	576	2.52
All levels	1,070	499	2.14	774	409	1.89	860	444	1.94

Source: LECS 3 in 2002/03. (Public sector earnings = 1)

Monthly earnings by education show significant differences in the private and public sectors among regions (Table 4). On average, workers in the private sector receive two times more than their counterparts in the public sector. The gap between two sectors is larger especially for tertiary educated workers and in other provinces. A private worker with a university education level may receive four times higher than his or her counterpart in the public sector in other provinces. In the public sector, on the other hand, a worker with a primary education level may earn more than higher education graduates in the other provinces suggesting that there are significant distortions in public sector pay. It is likely that factors other than education (perhaps, as in China and Vietnam, membership in the Communist Party) have an impact on public sector pay in Lao PDR.

4.2. Empirical model

Our basic model is taken from the human capital earnings function (Mincer, 1974):

$$\ln Y_i = c + \alpha S_i + \beta Ex_i + \gamma Ex_i^2 + u_i \qquad (1)$$

where Y_i is monthly earnings for an individual i, S_i is a measure of his/her schooling, Ex_i represents a measure of (Potential) work Experience, and u_i is a residual error.

The earnings function method is used to estimate average rate of returns to different levels of schooling by converting the continuous years of schooling variable S into a series of dummy variables representing the different levels of schooling, and other individuals' characteristics. After fitting the extended earnings function:

$$\ln Y_i = c + \alpha_1 PRIM_i + \alpha_2 SEC_i + \alpha_3 TECH_i + \alpha_4 UNIV_i + \beta Ex_i + \gamma Ex_i^2 + \theta X_i + u_i \qquad (2)$$

where $PRIM_i, SEC_i, TECH_i, UNIV_i$ are primary, secondary, vocational/technical, and university education by individual i, and X_i are dummy variables indicating male, urban area, ethnic groups, type of businesses, and regions. The omitted category for the level of education is no education, for type of business is other service activities, and for regional dummy is Vientiane Capital. Furthermore, we also attempt to monitor the rate of returns to education in the pre- and post-transition era by dividing the sample into two groups: workers with 16 years or less experience and workers with 17 years or more experience.

In terms of rates of return per year to different levels of schooling are then calculated as follows:

$$r_{PRIM} = \alpha_1 / S_{PRIM} \qquad (3)$$

$$r_{SEC} = (\alpha_2 - \alpha_1) / (S_{SEC} - S_{PRIM}) \qquad (4)$$

$$r_{TECH} = (\alpha_3 - \alpha_1) / (S_{TECH} - S_{PRIM}) \qquad (5)$$

$$r_{UNIV} = (\alpha_4 - \alpha_2) / (S_{UNIV} - S_{SEC}) \qquad (6)$$

The average number of years of schooling for the four levels of education is: primary = 5, secondary = 6, technical = 3 and university = 5. However, it is incorrect to assume that primary school graduates forego earnings for the entire duration of their studies. Therefore, only one year of foregone earnings is assumed for primary school graduates.

In this paper, given the lack of data - such as family background information and school quality - that can be used to either directly control for unobserved ability or as an instrumental variable for completed education, we opt to use only OLS for the estimations. To correct for possible selection bias in the earnings equations, as seen in many literatures, we also apply Maximum Likelihood (ML) estimates. Since ML yields strongly similar results with OLS, we simply show OLS results.

5. Estimation results

5.1. Returns to education in the private and public sectors

The results of the econometric analysis on rate of returns to education in the private and public sectors are presented in Table 5. Except for experience and experience-squared in the public sector, all the variables are statistically significant of at least the 5% level. The results of estimating a simple earnings function show education to be a marginal investment. An additional schooling year would yield 6.4% and 2.5% more earnings in the private sector and the public sector, respectively. The returns to one additional year of experience would increase earnings by 4.4% in the private sector. The estimates for experience in the public sector are

insignificant as is to be expected. The government employees are promoted one grade every two years, but the additional reward is negligible.

As can be noted, the wage differentials in the two sectors are significant due to the sharp changes in the wage structure that have resulted from the economic transition. The rapid emergence and spread of the private sector, with its emphasis on productivity, is the primary force shaping these changes. A person with a higher level of education and experience is likely to have better opportunities in finding a well paid job in a private enterprise or an international organization. The salary paid largely reflect the education level and experiences. On the other hand, the rate of returns to education in the public sector is usually low. By law, civil servants in Lao PDR receive different wage rates according to education levels, but the gap between each level is relatively small. However, a worker with higher educational attainment, for instance, a university-educated worker in Vientiane Capital, is likely to have better chances to participate in an international development project which will yield a high additional income.

Table 5: Earnings functions by sector. (Dependent variable is the natural log of monthly earnings)

Variable	Private Sector			Public Sector		
	Vientiane C.	Provinces	Lao PDR	Vientiane C.	Provinces	Lao PDR
Constant	12.241	12.017	12.081	12.201	12.239	12.232
	(74.84)	(94.55)	(119.60)	(62.06)	(84.86)	(106.41)
Schooling	0.0531***	0.0633***	0.0635***	0.0310***	0.0190**	0.0248***
	(4.63)	(7.18)	(9.14)	(2.69)	(2.48)	(3.99)
Experience	0.0434***	0.0465***	0.0435***	0.0127	0.0137	0.0119
	(4.14)	(5.81)	(6.85)	(1.05)	(1.51)	(1.64)
Experience-squared	-0.0005***	-0.0007***	-0.0006***	-0.0001	-0.0001	-0.0000
	(-2.72)	(-5.11)	(-5.56)	(-0.46)	(-0.61)	(-0.56)
R-squared	0.078	0.067	0.069	0.033	0.023	0.028
N	444	1085	1,529	267	423	690

Note: t-statistics in parentheses.

** Statistically significant at the 5% level; *** at the 1% level.

The estimates for Lao PDR are still low compared with the returns to education estimated for other developing countries. Worldwide, another year of schooling increases earnings by about 10% (Psacharopoulos and Patrinos, 2002). However, as mentioned above, estimated returns to education are generally low in centrally planned economies, but successful reform will eventually lead to higher returns (for instance, Newell and Reilly, 1999). By comparing with the previous study of the returns to education in Lao PDR, it is found that the rate of returns to education has risen significantly from 3.2% in 1997/98 to 6.4% in 2002/03. Nevertheless, this study should be viewed with caution as the results are based on data in which it could not be

distinguished whether a worker was in the private and public sector. This may have lead to downward biased estimates for 1997/98 (Onphanhdala and Suruga, 2006). However, an empirical analysis of the returns to education for the pre- and post-transition periods in the private sector reveals that the returns for young workers (8.2%) are considerably higher than for older workers (4.9%) (See the next section). This might suggest that a labor market exists that places a value on human capital.

Table 6 shows the estimated results of an extended version of the Mincer model. As discussed in the model description, dummy variables for various education levels, gender, area, ethnicity, type of businesses and regions are included. The dummies for secondary and tertiary levels indicated a significant increase in earnings as the education level rises. In particular, it is interesting to observe that the incremental earnings at these levels for the two sectors are roughly the same. At the lower level, we can not observe a significant difference between no education and primary education regardless of sector and region.

With regard to gender differences, on average a female would earn roughly 15% less than a male in other regions, although there is no significant difference in Vientiane Capital. This issue will be discussed in more detail in Section 5.3. As expected, by law, civil servants in Lao PDR receive the same wage rate regardless of region and ethnicity. But ethnic workers may earn about 20% less in the private sector. In terms of occupation, workers employed in trade activities and transportation earn more than in any other sub-sector. A more detailed categorization of data into the northern, central and southern regions has confirmed our expectation, that employment outside Vientiane Capital yields a lower income. More specifically, a worker in the northern, central and southern regions earns about 37%, 20%, and 26% lower than his/her counterpart in the capital, and this is a slightly greater difference than in 1997/98. Bourdet (1998) came to the same conclusions regarding increasing regional differences in income.

5.2. Pre- and post-transition generations

A cross-sectional sample may not be very instructive in a rapidly changing economy. For this reason our sample is divided into two groups: workers with 16 years or less experience (pre-transition in 1986) and workers with 17 years or more experience (post-transition in 1986). We focus on the private sector, because it is assumed that here reforms have had a larger impact than on the public sector. Younger workers are expected to be more affected by recent changes as they enter directly into a free market wage economy.

In fact, those with fewer years of labor market experience receive higher returns to education: 8.2 percent versus 4.9 percent for more experienced workers (Table 7). When earnings functions of younger workers are estimated separately, males have lower returns to education than females: 7.7 percent versus 9.3 percent. In Vietnam too, the returns to education for younger workers are higher than for older workers, showing that in

both Lao PDR and Vietnam the returns to education increase as newer generations enter the labor market (Moock, Patrinos and Venkataraman, 1998).

Table 6: Extended earnings functions by sector

Variable	Private Sector			Public Sector		
	Vientiane C.	Provinces	Lao PDR	Vientiane C.	Provinces	Lao PDR
Constant	12.224	12.244	12.376	12.196	12.058	12.103
	(52.88)	(76.54)	(88.55)	(42.02)	(69.67)	(79.94)
Primary	0.1471	0.1404	0.1451*	-0.0662	0.2077	0.1615
	(0.82)	(1.54)	(1.79)	(-0.23)	(1.55)	(1.30)
Secondary	0.3173*	0.2087**	0.2440***	0.3656	0.2841**	0.3268***
	(1.71)	(1.99)	(2.70)	(1.39)	(2.09)	(2.68)
Vocational/	0.5978***	0.4742***	0.4963***	0.3253	0.3471**	0.3517***
Technical	(2.74)	(2.95)	(3.96)	(1.23)	(2.48)	(2.81)
University	0.6500**	0.4225***	0.4925***	0.5072*	0.2488	0.4628***
	(2.51)	(1.38)	(2.71)	(1.91)	(1.41)	(3.42)
Experience	0.0300***	0.0325***	0.0326***	0.0103	0.0082	0.0082
	(2.84)	(4.14)	(5.19)	(0.84)	(0.89)	(1.11)
Experience-squared	-0.0004*	-0.0005***	-0.0005***	-0.0000	-0.0000	0.0000
	(-1.96)	(-3.89)	(-4.51)	(-0.27)	(-0.27)	(-0.28)
Male	0.1296	0.2041***	0.1684***	0.0610	0.1703**	0.1203*
	(1.22)	(2.88)	(2.87)	(0.56)	(2.22)	(1.92)
Urban	-	0.1211*	0.0665	-	0.0328	0.0398
		(1.92)	(1.21)		(0.51)	(0.68)
Ethnic	-0.2152	-0.1832***	-0.1770***	0.2908	0.0843	0.0605
	(-1.06)	(-2.63)	(-2.70)	(0.87)	(1.27)	(0.95)
Manufacturing	0.1271	-0.3012***	-0.1320*	-	-	-
	(1.03)	(-3.05)	(-1.72)			
Construction	0.1426	-0.1064	0.0232	-	-	-
	(1.09)	(-1.08)	(0.30)			
Trade	0.9007***	0.4519***	0.6091***	-	-	-
	(6.64)	(4.76)	(7.99)			
Transportation	0.4912**	0.1373	0.2911***	-	-	-
	(2.19)	(1.07)	(2.70)			
Northern	-	-	-0.3654***	-	-	-
			(-4.82)			
Central	-	-	-0.1949***	-	-	-
			(-2.93)			
Southern	-	-	-0.2562***	-	-	-
			(-2.96)			
R-squared	0.169	0.153	0.160	0.055	0.041	0.038
N	444	1085	1,529	267	423	690

Note: t-statistics in parentheses.

* Statistically significant at the 10% level; ** at the 5% level; *** at the 1% level.

Table 7: Earnings functions in private sector by pre- and post-transition

Variable	Males		Females		All	
	Pre-	Post-	Pre-	Post-	Pre-	Post-
Constant	13.292	11.770	12.606	11.913	13.088	11.884
	(34.09)	(47.41)	(22.93)	(35.92)	(41.02)	(58.97)
Schooling	0.0392***	0.0770***	0.0587***	0.0929***	0.0486***	0.0818***
	(3.57)	(6.07)	(3.38)	(5.18)	(5.24)	(7.83)
Experience	-0.0194	0.0462	0.0244	0.0439	-0.0082	0.0378
	(-0.90)	(0.94)	(0.76)	(0.69)	(-0.46)	(0.96)
Experience-squared	0.0002	0.0003	-0.0006	-0.0009	0.0000	0.0000
	(0.78)	(0.11)	(-1.27)	(-0.27)	(0.05)	(0.05)
R-squared	0.034	0.144	0.0741	0.096	0.048	0.111
N	551	313	403	262	954	575

Note: t-statistics in parentheses.

*** Statistically significant at the 1% level

5.3. Gender and regional differences on the returns to education

The difference between males and females is significant in all regions (Table 8), and this is the same as international standards (Psacharopoulos and Patrinos, 2002). For all regions, the coefficients of schooling years and experience are statistically significant of at least the 10% level. Overall, women have a higher return to their schooling investment.

Table 8: Earnings functions in private sector by gender

Variable	Vientiane C.		Provinces		Lao PDR	
	Males	Females	Males	Females	Males	Females
Constant	12.293	12.127	12.063	11.900	12.106	11.995
	(58.08)	(46.08)	(76.85)	(55.93)	(95.47)	(71.84)
Schooling	0.0341**	0.0812***	0.0593***	0.0673***	0.0552***	0.0761***
	(2.41)	(4.13)	(5.63)	(4.22)	(6.59)	(6.17)
Experience	0.0528***	0.0343*	0.0392***	0.6503***	0.0419***	0.0516***
	(4.15)	(1.92)	(4.09)	(4.68)	(5.46)	(4.74)
Experience-squared	-0.0007***	-0.0003	-0.0005***	-0.0012***	-0.0005***	-0.0009***
	(-3.12)	(-0.91)	(-3.05)	(-4.81)	(-4.05)	(-4.36)
R-squared	0.086	0.092	0.066	0.087	0.070	0.080
N	249	195	615	470	864	665

Note: t-statistics in parentheses.

* Statistically significant at the 10% level; ** at the 5% level; *** at the 1% level.

For the years of schooling in the capital, the rate of returns for females (8.1%) is over twice that for males (3.4%). In terms of returns to experience, men have a higher return to additional work experience than women

do. The coefficient of return to experience is even bigger than the return to education. The discrepancy between the two sexes for the remaining seventeen provinces is somewhat different. While the rate of returns to education for women is slightly higher than for men, the rate of returns to experience for females is also higher than for males.

5.4. Regional differences on the rate of returns by education levels

In the previous section, the rate of returns on years of schooling has been estimated for the entire samples (Table 5). In this section, we will address the rate of returns to schooling for education levels (only those completed a level of schooling).

Table 9: Earnings functions with education levels

Variable	Vientiane C.	Provinces	Lao PDR
Constant	12.465	11.892	12.103
	(45.26)	(62.41)	(79.98)
Primary	0.2627	0.3548***	0.3423***
	(1.16)	(3.41)	(3.61)
	[*0.2627*]	[*0.3548*]	[*0.3423*]
Secondary	0.6448***	0.7934***	0.8127***
	(2.69)	(5.54)	(6.83)
	[*0.0637*]	[*0.0731*]	[*0.0784*]
Technical	0.5522**	0.8506***	0.8141***
	(2.13)	(4.79)	(5.82)
	[*0.0322*]	[*0.0551*]	[*0.0524*]
University	0.8010**	1.1562***	1.0957***
	(2.48)	(2.72)	(4.69)
	[*0.0312*]	[*0.0726*]	[*0.0566*]
Experience	0.0326**	0.0541***	0.0416***
	(2.18)	(4.42)	(4.44)
Experience-squared	-0.0004	-0.0008***	-0.0006***
	(-1.46)	(-4.18)	(-3.90)
R-squared	0.056	0.096	0.092
N	233	554	787

Note: t-statistics in parentheses. *"Per year" returns education in brackets.*

　　** Statistically significant at the 5% level; *** at the 1% level.

The estimated coefficients are presented in Table 9. As the table shows, the estimation results maintain the classic pattern of falling returns to education by level of education for all regions. Overall, the rates of returns to education in the capital are lower than in the other provinces. For Vientiane Capital, the return to primary education is statistically insignificant. Recently, a high education level is a necessary condition to find a well

paid job in the capital. In particularly, the wage premium is pronounced for tertiary-educated workers. However, the rates of returns per year to secondary and tertiary education levels are 6% and 3%, respectively. These rates are very low when compared with the 17% and 19% of worldwide standards (Psacharopoulos and Patrinos, 2002).

On the contrary, for the other provinces, the return to primary education is statistically significant and the highest at 35 percent. This rate is even higher than the rate of 27% for the international standards. On the other hand, the rates of returns to secondary and tertiary education levels are also low at about 7 percent for both levels. While large earnings premiums translate into workers with a high level of education in the private sector, the best investment (most profitable) for a large number of the employed population, is still the primary level.

6. Conclusions

This research work updates our analyses on the returns to education in Lao PDR, a country largely neglected by the literature. The research found that the rate of returns rise significantly with the transition from 3.2% in 1997/98 to 6.4% in 2002/03. The high rate of return (8.2%) observed for younger generations is one bright sign that the returns would increase more as the market reforms take full effect.

The research findings have important implications for public sector salaries and the financing of education in Lao PDR. First, we found a private sector earnings advantage, particularly workers with tertiary education level. The two sector wage differential suggests that it is difficult for the public sector to retain and attract skilled employees, and the widening wage gaps might promote inefficiency and moonlighting. Attempts to decrease the wage gap will increase the wage bill and strain the fiscal position of the public sector. Although painful, the best way to satisfy the need for higher public sector efficiency and ease the fiscal strain, may be to reduce public sector employment and pay higher wages to educated workers.

Second, primary education, the most profitable sub-sector judging from the estimated rate of return results, especially outside of Vientiane Capital, is much less subsidized than higher levels. In fact, the high subsidy levels for higher education contribute to the low rates of return for these sub-sectors. Family contributions to direct cost financing at the primary level are a heavy burden, especially for the poor, and this is neither socially optimal nor equitable. Thus, Lao's policy makers may need to improve the supply of primary education services, and consider a more direct subsidy of primary school education for the poor.

References:

Adamchik, V. A. and A. S. Bedi, 2000. Wage differentials between the public and the private sectors: Evidence from an economy in transition. *Labour Economics 7*, pp. 203-224.

Asian Development Bank, 2005. *Key Indicators 2005*.

Bourdet, Y., 1998. The dynamics of regional disparities in Laos: The poor and the rich. *Asian Survey 38 (7)*, pp. 629-652.

Brainerd, E., 2000. Women in transition: Change in gender wage differentials in Eastern Europe and FSU. *Industrial and Labour Relations Review, 54(1)*, pp. 139-162.

Dustmann, C. and A. van Soest, 1998. Public and private sector wages of male workers in Germany. *European Economic Review 42*, pp. 1417-1441.

Glewwe, P. and M. Kremer, 2005. Schools, teachers, and education outcomes in developing countries. CID Working Paper No. 122, Harvard University.

Katz, L. and A. Krueger, 1991. Changes in the structure of wages in the public and private sectors. In Ehrenberg, R. (Ed.), *Research in Labour Economics*. JAI Press, Greenwich, CT, pp. 137-172.

Mincer, J., 1974. *Schooling, Experience and Earnings*. New York: National Bureau of Economic Research.

Moock, P., H. Patrinos and M. Venkataraman, 1998. Education and earnings in a transition economy (Vietnam). World Bank Policy Research Paper 1920.

Newell, A. and B. Reilly, 1999. Rates of return to education in the transitional economies. *Education Economics, 7(1)*, pp. 67-84.

Onphanhdala, P. and T. Suruga, 2006. Education and earnings in Lao PDR: Regional and gender differences. GSICS Working Paper Series No. 4, Kobe University.

Pastore, F. and A. Verashchagina, 2006. Private returns to human capital over transition: A case study of Belarus. *Economics of Education Review 25*. pp. 91-107.

Psacharopoulos, G. and H. A. Patrinos, 2002. Returns to investment in education: A further update. World Bank Policy Research Paper 2881.

Research Triangle Institute, 2000. Health and education of ethnic minorities in the Greater Mekong Sub-Region: Lao PDR Country Report. North Carolina.

Shapiro, D. M. and M. Stelcner, 1989. Canadian public-private sector earnings differentials, 1970-1980. *Industrial Relations 28,* pp. 72-81.

Smith, S., 1976. Pay differentials between federal government and private sector workers.

Industrial and Labour Relations Review 29, pp. 233-257.

Svejnar, J., 1999. Labour markets in the transitional Central and East European economies. In O. Ashenfelter and D. Card (Eds.), *Handbook of labour economics,* Vol. 3b, pp. 2809-2857.

Trostel, P., I. Walker, and P. Woolley, 2002. Estimates of the economic return to schooling for 28 countries. *Labour Economics, 9(1)*, pp. 1-16.

Van der Gaag, J., M. Stelcner and W. Vijverberg, 1989. Wage differentials and moonlighting by civil servants: Evidence from Cote d'Ivoire and Peru. *The World Bank Economic Review 3*, pp. 67-95.

World Bank, IMF, ADB, 2002. *Public expenditure review: Country financial accountability assessment. Vol.2*, Washington, D.C.

Xie, Y. and E. Hannum, 1996. Regional variation in earnings inequality in reform-era urban China. *American Journal of Sociology*. 101(4): 950-992.