Structural Change in Urban Labor Markets: Returns to Schooling and Experience for Migrants in Financial Crisis, Thailand

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Is Education More Robust than Labor-Market Experience in the Face of Crisis? Experimental Evidence from Thailand[1]

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Abstract

This paper examines the consequences that Thailand's 1997 financial crisis had on the labor market, using microdata from Bangkok, and focuses on changes in the returns to schooling and labor-market experience for migrants. Returns to schooling and labor -market experience are estimated in both the pre and postcrisis periods. Empirical evidence clearly demonstrates the evidence that, while returns to schooling remained constant (robust) throughout these periods, the returns to labor-market experience dropped in the postcrisis period. The returns to labor-market experience decreased due to the obsolescence of experience accumulated before the crisis. As a result, the complementarity of schooling and experience became weak after the crisis. These results imply that investments in education not only increase the earnings of the poor but also enhance resistance to external shocks and that long-term returns to labor-market experience will rise at a rate comparable to returns to education, if labor markets are stable.

JEL Classification: O15, J31, J61, D83

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1 Motivations

When agents face serious adverse circumstances such as unemployment during a recession or flood or drought in agriculture-based regions, the magnitude of negative impact on agents' livelihood and the length of transition from desperate to normal situations are crucial views of investigation for policy makers as well as researchers. Physical resources available to the poor are quite limited; in many cases their only resource is the human capital embodied in themselves. Though it is impossible to name each dimension of human capital, the most practical components are skills and knowledge accumulated through education and experience. In this paper, I examine the roles of education and labor-market experience in sustaining urban workers as they face exogenous negative shocks to the labor market.[1] For purposes of analysis, the 1997 financial crisis in Thailand serves as unanticipated exogenous change in this study. This quasi-experimental social condition enables us to assess changes in the returns to schooling and labor-market experience in the Bangkok labor market in response to the exogenous shock.

Many economists assert that education is more generally applicable than the experience that agents accumulate within specific firms, regions, or technologies, leading to a proposition that the former is equally useful in many places but the latter is not (Becker, 1962). For example, the experience acquired within a particular firm is not perfectly transferable to other firms[2]. In labor economics, this type of experience is called firm-specific human capital, whereas education is often considered general human capital.[3] Following similar reasoning, we can think of human

[1] In a recent IFPRI-World Bank conference on vulnerability and poverty, held at International Food Policy Research Institute, Washington, D.C. (September 23 – 24, 2002), a variety of issues including concepts, measurement, and analysis as well as empirical evidence from developing countries were discussed. However, most empirical evidence on this issue comes from rural households and agricultural risks. Among them, Ligon and Schechter (2002) show that more educated agents are less vulnerable to aggregate risks, which may imply that returns to schooling remains stable in the face of aggregate risks. However, the framework and motivation of Ligon and Schechter's study are completely different from those of this paper.

[2] Flinn (1986) analyzes job mobility of young workers, using NLSY. The implication of migrants' learning is similar to that of job mobility.

[3] Though both concepts are clear enough in theory, empirical tests for this distinction are not transparent in general, because in most cases a move from one place to another or a switch to another technology reflects endogenous decision making. Those who move are, therefore, not a random sample drawn from the population; they possess nonrandom characteristics in many cases. In the case of internal migration, those who move from rural to urban areas are not a group of agents randomly selected from regions of origin. Once migrants come to urban areas, they share some common chracteristics. Conditional to migration, we assume some homogeneity in the migrant sample.

capital as being specific to a particular regime. For instance, once an exgoneous shock such as the recent financial crisis in Asia triggers a structural change in labor markets from high to low labor-demand regimes, then wage and employment determination changes. Workers and firms whose lack of formal risk-mitigating and risk-coping mechanisms (e.g. flexible credit, unemployment insurance) leaves them vulnerable to the shock must accommodate the risks more individually, often by drawing upon resources from informal networks. Under this circumstance, it has not been empirically clear whether education and the labor-market experience are equally helpful in sustaining income for the poor. If they are not, which dimension of human capital - education or the labor-market experience - is more generally useful, with more robust returns in labor markets? Which is more specific to a particular regime in labor markets, with returns being vulnerable to a structural change?

Interesting cases emerge from the above setting. Suppose that the returns to schooling remains constant and the returns to labor-market experience drops to zero in a time of crisis. The income ranking will be preserved between the educated and the uneducated, given that schooling rerturns are often empirically larger than experience returns. In this case, education could be more robust than labor-market experience, since education enhances the ability to deal with disequilibrium associated with a regime change (Schultz, 1975), but the labor experience is more regime-specific. The income gap (in log earnings) between the two groups would be proportional to the difference in years of schooling. On the other hand, if the returns to labor market experience is constant and the returns to schooling drops to zero, the income ranking could be reversed when the regime changes. Since the uneducated started accumulating labor market experience earlier, the resulting income after the crisis would be higher for the uneducated than for the educated. This contrast between the two extreme cases would intuitively clarify the essense of discussion below. The findings would support the first case; education is more robust than experience and, as a result, is more helpful to those who are vulnerable in the face of risks[4].

In empirical analysis, I estimate the returns to schooling and destination (labor-market) experience, using pooled samples of migrants from different regimes and Bangkok natives. I use a sample of migrants in Bangkok (those who have stayed for less than 5 years) as well as a sample of natives (who have lived for more than 9 years) to identify the returns to destination labor-market experience[5]. In the first stage, the data from the pre-financial crisis period, 1994

[4]In a study of limited enpirical evidence from Brazil, de Barros (1992) finds that a medium level of schooling achieves the maximum adjustment capabilities.

[5]Experience, in this paper, refers to the destination labor-market experience of migrants that helps their earnings to catch up with those of natives gradually. In this paper, the length of stay in the city since migration from non-Bangkok regions is interpreted as destination labor-market experience. However, the data sets described do not reflect the length of time of labor-force participation. Moreover, it is possible for sample workers to have returned only temporarily to other regions (e.g., their origins), keeping their residence and families in Bangkok. In this sense, I assume below that once workers migrated to Bangkok, they have kept their intention to localize

-1996, enabled me to estimate the benchmark returns to schooling and labor-market experience. In the second stage, I estimated the returns in the postcrisis period, 1998-2000, and compared the estimates between the precrisis and postcrisis periods[6]. Since the financial crisis in Thailand began in early fall 1997, marked by drastic currency depreciation and the collapse of financial markets, I did not use data from 1997, thus making a clear demarcation between the two periods. In fact, the disturbance in the labor market started in early 1998, once people realized that the shock was not short term and that it affected real sectors. The unemployment rate increased and the real wage subsequently declined, though some studies provide evidence that the low-income class was not hurt much from the crisis (Behrman and Tinakorn, 2000). From the viewpoint of identifying differences in the returns, there are two useful aspects of this labor-market shock. First, since the crisis started within the financial market, it can be considered exogenous at least for most workers in the labor market. Second, since the crisis was not anticipated, it was not in the information sets of economic agents, particularly for workers in the labor market. Hence I categorize this case as an experimental situation that is exogenous to most economic agents.

The next section describes the Labor Force Survey, Thailand. In particular, the data include the length of stay for migrants and the provinces from which they migrated. Section 3 sets up a basic framework for empirical analysis. Section 4 shows the empirical results. While the returns to schooling remained constant throughout the two periods, therefore demonstrating robustness against the crisis, the returns to labor-market experience dropped by nearly half. This clearly shows that a substantial fraction of the labor-market experience was rendered obsolet through the crisis. Second, due to the decrease in returns to labor-maket experience, the complementarity of schooling and experience observed in the precrisis period disappeared after the crisis. Concluding remarks appear in the final section.

in the destination labor market until the survey period. See, for example, Borjas (1989), Borjas and Trejo (1992), Chiswick (1978), and LaLonde and Topel (1992) for immigrants' assimilation process.

[6]In an earlier version of this paper, I tried to identify the sources of structural change by drawing more from my previous paper (Yamauchi, 2001b) that estimates the learning – catching-up behavior of migrants in 1994 –1996. Since the identification was not successful, I now focus on comparing estimates between the two periods and trying to clarify observations of robustness.

2 Data

This study uses data from the Labor Force Survey (LFS), Thailand, conducted by the National Statistical Office (NSO). The survey includes a wide range of information on labor earnings and employment status, such as wage and payment types, work practice, duration of unemployment, migration history, establishment size, and more. This study uses information from the first and third rounds of the survey during 1994 - 1996 and 1998 - 2000. The former directly proceeds the financial crisis, and the latter period comes after the crisis, thus facilitating the comparison of parameter estimates from precrisis and postcrisis periods, and making it possible to infer structural changes in labor markets. The first round of the survey occurs in February, the middle of the dry season, and the third round occurs in August, the monsoon season. (the second and fourth rounds are surveyed in May and November, respectively). Because the NSO does not survey the same sample of individuals from year to year, this study uses pooled cross-sections. However, since the field workers visit the same households in the first and third rounds, it is possible trace wage movements between the dry and monsoon seasons within the same year.

The sample used in this analysis comes from metropolitan Bangkok. Though the use of municipalities in the whole kingdom is possible, this study concentrates on the Bangkok urban labor market, since Bangkok is distinctly the largest among Thai urban clusters in terms of population, population density, labor force, and domestic product. The use of only the Bangkok sample also avoids heterogeneities in labor-demand conditions across local labor markets; and seasonal fluctuations in production are minor in Bangkok, except in some food-processing industries. Most importantly, the share of migrants in Bangkok's total population is large enough to ensure sufficient variations in the labor-market experience in the sample. Strikingly, the average shares of those who stayed for less than 9 years and less than 5 years, computed from the first rounds in 1994 -1996 are 21.23% and 13.11%, respectively[7].

The LFS reflects the length of stay (up to 9 years). The migrant sample was sorted by duration of stay, with a 1-year band. However, information on the migrants' previous province (origin) is available only for migrants who have stayed at their destination less than 5 years. In the estimation that uses origin-fixed effects, therefore, I restrict the migrant sample to migrants who have stayed in Bangkok for less than 5 years[8]. To identify the learning effects of destination labor-market experience, I assume as a normalization of learning effect that those who have

[7]For seasonal migration in Thailand, see Sussangkarn (1987).

[8]Tanabe and Yamauchi (2002) analyze the role of externalities from same-origin population toward employment probability for recent migrants in Bangkok, identifying the origin-specific effects of employment probability for migrants who have stayed for $1-4$ years on migrants who have stayed less than 1 year. It is shown that both the size of migration from the same province and the employment probability among previous migrants from the same province positively affect the likelihood of new migrants being employed.

stayed in Bangkok for more than 9 years have completely adjusted to the environment so that the marginal effect of experience (years) is assumed to be zero for this group[9].

One unique characteristic of the LFS is that the NSO attempted to survey an identical set of households in the first and third rounds and in the second and fourth rounds. Hence, the successful merging of data from these rounds by households and individuals can generate a panel data of individual wages from February to August, and from May to November in the same year. In the following analysis, I try to construct a panel of data over February and August. However, some households and individuals move, making the respondents nearly impossible to follow in surveys. To merge responses from the same individuals, I first merge responses from the same household ID in the same block in the first and third rounds. Then, from those households, I merge responses from individuals with the same member ID in the first and third rounds. Since some individuals had migrated between rounds, I select individuals whose age recorded in the third round is identical to or 1-year greater than the age recorded in the first round. Responses from nearly thirty percent of individuals surved are dropped in this procedure. In preliminary analyses that pool all regions, the attrition rate varied across regions, due to different migration probabilities.

Tables 1a and 1b show descriptive statistics for the sample of Bangkok migrants (who stayed less than 9 years), by rounds and years, for precrisis and postcrisis periods.

Tables 1a and 1b to be inserted

From these tables, one can see that the distribution of these variables did not change substantially as a result of the crisis. The next section briefly discusses the framework for analysis.

[9]It is possible to identify the learning effect only with the initial and end points, either from prior knowledge or ex post information. In this study, the estimated returns to labor-market experience (in absolute value), therefore, depends on the assumed end point.

3 Wage Equations: Migrants and Natives

I estimate the standard wage equation with a transitional learning effect from the labor-market experience:

$$\ln w_{jt} = a + X_{jt}b + \phi(t_j, s_j) + \mu_j + \varepsilon_{jt} \tag{3.1}$$

where X_{jt} is a set of observable attributes of migrant j in general, μ_j is j's unobservable ability, $\phi(t_j, s_j)$ is the learning effect of the destination labor-market experience t joint with schooling s_j and ε_{jt} is error term with mean zero. As discussed, t is normalized as 10 years for the sample of natives ($0 \leq t_j \leq 10$). I assume that agents are Bayesian to learn about the destination environment and to adjust them to it[10].

$$\phi(t_j, s_j) \equiv q \prod_{k=1}^{n(s_j)} \left[1 - \left(y_{jt}^k - z_{jt}^k\right)^2\right]$$

where $n(s_j)$ is the complexity (number) of tasks that agents are engaged in, $y_{jt}^k = \theta^k + \xi_{jt}^k$ is a time-varying stochastic target value for task k, and z_{jt}^k is the decision variable that agents adjust in each period. In this loss function, the wage increases as the distance between the two values gets smaller ex post. I assume the normality for both prior to θ^k and noise ξ_{jt}^k so that the posterior would be also normal. Along with the learning process in this framework, $\phi(t_j, s_j)$ increases as t increases. It is assumed on the task complexity that $n(s_j)$ is related to s_j. Under this set of assumptions, I obtain

$$E\left[\phi(t_j, s_j)|\Omega_{tj}\right] = q\left[1 - \frac{1}{\rho_\theta(s_j) + t\rho_v(s_j)} - \sigma_v^2(s_j)\right]^{n(s_j)}$$

where $\rho_\theta(s_j)$ and $\rho_v(s_j)$ are precisions of θ^k and ξ_{jt}^k respectively. It is assumed that these precisions are equal for all k. Hence, as workers accumulate their labor-market experience, wage rises over time through a learning effect - an increase in $t\rho_v(s_j)$.

Characterization of this wage function in a stationary environment without any parameter changes is simple. In the case of $n = 1$ (the simplest task), schooling effect is

[10]Thsi analysis focuses on changes in the mean wage conditional to workers' characteristics. In a similar framework, I can analyze the dynamic behavior of the earning variance (Yamauchi, 2001a).

$$\frac{\partial E_t \ln w}{\partial s}|_{n=1} = q\frac{\rho'_\theta(s) + t\rho'_v(s)}{[\rho_\theta(s) + t\rho_v(s)]^2} + b_s^m > 0$$

The effect of labor-market experience is

$$\frac{\partial E_t \ln w}{\partial t}|_{n=1} = \frac{q\rho_v(s)}{[\rho_\theta(s) + t\rho_v(s)]^2} > 0.$$

Note that $\frac{\partial \ln w}{\partial s}|_{n=1}$ increases with t if $\rho'_v(s)$ is large enough, and that $\frac{\partial \ln w}{\partial t}|_{n=1}$ decreases with t. These predictions are consistent with stylized facts: the returns to schooling increases, but the returns to experience decreases as labor-market experience increases. Complementarity is measured by the schooling – experience interaction[11]

$$\frac{\partial^2 E_t \ln w}{\partial s \partial t}|_{n=1} = q\left[\frac{-2\rho'_\theta\rho_v + \rho'_v(\rho_\theta - \rho_v t)}{(\rho_\theta + \rho_v t)^3}\right]$$

which is positive if $\rho'_v(s)(> 0)$ is large enough. Schooling – experience complementarity exists but decreases over time. However, in the case that $n(h) > n(l)$ $(h > l)$, this situation would differ

$$\frac{\partial\left[\frac{\partial^2 E_t \ln w}{\partial s \partial t}\right]}{\partial t}|_{n(h)>n(l)} > 0$$

for small t, as shown. Schooling-experience complementarity would increase with experience

[11] Rosenzweig (1995) considers the case that $\rho'_\theta(s) \geq 0$, $\rho'_v(s) \geq 0$. He obtains that

$$\frac{\partial^2 \pi}{\partial s \partial t} > 0 \quad \text{if } \rho'_v(s) > 0 \text{ and } \rho'_\theta(s) \approx 0$$

where π is farm profit. However, in his case, $\frac{\partial^2 \pi}{\partial s \partial t} = \lambda\left[\frac{-2\rho'_\theta\rho_v + \rho'_v(\rho_\theta - \rho_v t)}{(\rho_\theta + \rho_v t)^3}\right]$ decreases as t increases. It is assumed that agents learn only from their own experience, measured by t, though Rosenzweig originally incorporates learning from neighbors.

if $n(h) > n(l)$. Therefore, when agents choose different types of jobs in the initial stage and educated workers are likely to be matched to more complex tasks, the task complexity is another source of the schooling-experience complementarity. For more formal discussions, see Yamauchi (2001b).

Structural changes may alter the returns to schooling as well as to labor-market experience. I consider several scenarios of imperfect information (θ, ρ_θ, and ρ_v) and on job-schooling matching in the labor market ($n(s)$). First, a change in θ, if agents realize a change has occured, would make the experience obsolete. Therefore, t becomes zero at the regime change. Second, a change in ρ_θ will shift the wage level, but this is unrealistic since agents are not supposed to alter the initial prior ex post once learning gets started, except in the case of new migrants. Third, a change in ρ_v (i.e., the magnitude of noise in signals) would change the learning speed after the structural change. When noise increases, the marginal effect of additional labor-market experience decreases. Now there arises an identification problem between the first and third cases. While in the first case the experience acquired before the regime switch does not affect wages, the experience from the precrisis period contributes to wage level in the third case; however, the marginal effect would be altered in the postcrisis period. In the estimation below, therefore, these two cases will hardly be distinguishable given the number of years covered in the postcrisis period. Finally, implications from a change in $n(s)$ are rather straightforward. If the positive association of schooling and job complexity is weakened after a crisis, the complementarity of schooling and experience will decrease.

Given the above structural considerations, I estimate a reduced-form equation,

$$\ln w_{jt} = \alpha_t + \beta_{1t} s_j + \beta_{2t} t_j + \beta_{3t} s_j t_j + \beta_{4t} age_j + \mu_j + \varepsilon_{jt} \tag{3.2}$$

where s_j is schooling, t_j is experience, and μ_j is unobserved earnings endowment. A well-known self-selection problem exists in the above wage equation. The expected value of ε_{jt}, once conditional on migration, is not equal to zero, and therefore the errors are correlated with observable individual characteristics in the equation. The μ_j not only contains endowment but also reflects the self-selection probability that is likely to be correlated with both schooling and labor-market experience.

It should be noted that informational learning is not the only possibility that explains the convergence of migrants' earnings to natives'. Selection process of agents in destination markets would also generate a similar phenomenon. Among many, consider two scenarios. First, if ability is positively correlated to schooling (i.e., more able agents have high propensity to survive in the markets) or, as a consequence, if the ability is positively correlated with observed labor-market

experience, the returns to schooling as well as to labor-market experience will be overstated. Second, suppose that liquidity-constrained agents face negative shocks to their wages. To smooth their consumption, workers can leave urban labor markets for rural origins, for example. In this case, low-wage observations resulting from negative shocks are likely to drop from the next period sample. Thus, if inference is based on the cross-sectional observations of wage from different experience groups, the data erroneously imply inflated returns to labor-market experience. However, even under this circumstance, I can compare the returns estimates between the two regimes if bias is similar in both regimes. In the presence of upward bias, the inability to reject a null of being equal to zero would provide a strong sense of no returns. I also compare the cross-section results with those from panel data.

In particular, to handle the first problem, the strategy here is to take first differencing of log-wages over a 6-month interval (i.e., the 6-month growth rate) to eliminate unobserved endowments. I then regress log-wage difference over t and $t+1$ on predetermined period-t variables (the explanatory variables do not change over t and $t+1$ in the data). In this way, I can assess the effects of labor-market experience on wage growth more explicitly, but within 1 year.

$$\begin{aligned} \Delta \ln w^m_{j(t,t+1)} &= \left(\Delta\alpha + \beta_{2t+1} + \beta_{4t+1}\right) + \left(\Delta\beta_1 + \beta_{3t+1}\right) s_j \\ &\quad + \Delta\beta_2 t_j + \Delta\beta_3 s_j t_j + \Delta\beta_4 age_j + \Delta\varepsilon_j \\ &= \gamma_{0t} + \gamma_{1t} s_j + \gamma_2 t_j + \gamma_3 s_j t_j + \gamma_4 age_j + \Delta\varepsilon_j \end{aligned} \tag{3.3}$$

This equation makes clear the correspondence between cross-section and differenced-specification parameters. In particular, the coefficient of the schooling – experience interactions in the differenced specifications directly corresponds to the change in the effect of cross-sectional schooling – experience complementarity over time. To address the second issue raised by the self-selection problem, the observation of workers with large $\Delta\varepsilon_j$ (i.e., small $\varepsilon_{j,t}$ in $\varepsilon_{j,t+1} - \varepsilon_{j,t}$) is likely to be missed in the survey, so they are not included in the data. Although this omission may create some positive correlation between t_j and $\Delta\varepsilon_j$, since the next-period observations do not exist and I use time dummies to control common components in $\Delta\varepsilon_j$, the possibility of upward bias in γ_2 and γ_3 estimates is very small. In any case, the failure to reject the null of zero effects again supports the disappearance of the labor-market returns and the schooling - experience complementarity.

4 Empirical Results

4.1 Returns to Schooling and Destination Labor-market Experience: Before and After Financial Crisis

This section summarizes key empirical results. Log-wage equations of Mincerian type (3.2) and then differenced log-wage equations (3.3) are estimated here. Table 2 shows the parameter estimates of Mincerian log-wage equations in the Bangkok labor force less than 40 years of age. As discussed in Section 2, the LFS identifies origin provinces only for migrants who have stayed in Bangkok less than 5 years. For this reason, the migrant sample here includes only those migrants in Bangkok less than 5 years and the native sample includes individuals who stayed 9 years or more. For natives, I normalized the length of stay to 10 years to identify the learning effect. All the estimation controls time-fixed effects and origin-fixed effects[12]. Columns 1 to 3 show estimates from the precrisis period, and columns 4 to 6 show estimates from the postcrisis period. Before the crisis, both the returns to labor-market experience and schooling are positive and significant in columns 1 and 2. With the inclusion of schooling – experience interaction in column 3, the significance of the effect of labor-market experience and the schooling returns decrease. In this sense, the experience and upon-arrival schooling are complementary in wage adjustment in Bangkok labor markets before the financial crisis. However, due to positive correlations between the unobserved endowment and the survival probability in the Bangkok labor market, this estimate may be biased upward.

In the postcrisis period, a different picture emerges. While the returns to schooling are positive and significant as in the precrisis period[13], the returns to labor-market experience dropped substantially (column 5). Compared to the situation before the crisis, the role of destination

[12]With previous province dummies for migrants, the omited case is natives. Though they are not shown here, the dummies capture the differences in log-wage from that of natives.

[13]In preliminary results, it is found that schooling returns are higher for natives than for migrants in both periods, which is consistent with the literature (e.g., Eckstein and Weiss, 1999). Since natives are defined as those who stayed in Bangkok more than 9 years, they are more experienced and schooling returns are augmented by the destination experience.

labor-market experience had decreased, as structural changes in the labor market made past experience obsolete. The advantage of experienced workers seemed to disappeare postcrisis. The estimated parameter value is also smaller, about one-tenth of the value of the precrisis period. In column 6, the interaction of schooling and experience is shown to be significant. Therefore, the complementarity of schooling and experience seemed to exist, though the sources are not identified in this framework and the estimates are at risk of upward bias. Again, the parameter value dropped in the postcrisis period.

Table 2 to be inserted

Table 3 shows nonlinear approximations of differenced log-wage in (3.3), using samples from pre- and postcrisis periods. Columns 1 – 4 show results from the precrisis period, and columns 5 – 8 show results from the postcrisis period. The specification is robust against selectivity problems from endogenous duration choice and migration decision. In the period before the financial crisis, the growth effect from the labor-market experience is initially all negative. The wage growth rate decreases as workers accumulate experience, though the statistical significance is quite low. Second, the schooling effect is negative and significant. Third, most interestingly, labor-market experience and schooling are found to be complementary in wage growth in 5 percent sifnificance. Fourth, another interesting proposition to be tested is whether the complementarity changes as migrants age. To check this possibility, the schooling - experience interaction is again interacted with migrant's age. Although a negative sign is obtained as expected, it is insignificant (p value = 0.176). It is implied that migrants with more schooling not only can learn efficiently but are assortatively matched with more complex tasks in the destination labor market, which augments schooling – experience complementarity over time at least in the initial stage, in the precrisis period.[14][15]

[14]In the precrisis period, wage-growth equation for natives only – all ages – is,

-0.0059*yr_sch-0.002*age+0.00003*age^2+0.018*sex
(0.397) (0.494) (0.411) (1.266)

Explanatory power of these conventional variables is quite low in the wage-growth equation.

[15]To support the last statement more intuitively, I compare average wage growth between migrants and natives by occupational types. In the precrisis period, the average wage growth for migrants (in Bangkok less than 9 years) by occupation is: 0.1819575 (occp=0), 0.0581786 (occp=1), 0.1484223 (occp=2), 0.0480952 (occp=3), 0.0512158 (occp=6), 0.0296261 (occp=7-8), and 0.0323144 (occp=9). The first three categories achieve highest growth of

Table 3 to be inserted

In columns 5 to 8 of Table 3, we obtain different results. No estimate of interest here is statistically significant in the period after the financial crisis. The complementarity of schooling and experience that arises from the assortative matching of educated agents and complex tasks (occupations) disappears, which is consistent with the pooled cross-section results in this period. The negative effect of schooling on wage growth also does not exist in the period. The comparison of returns to schooling and to labor-market experience in wage level and growth suggests that (1) the returns to labor-market experience disappeared in the postcrisis period, and (2) the complementarity of schooling and labor-market experience weakened.

Table 4 to be inserted

Finally, Table 4 shows results on conditional wage convergence (e.g., Borjas, 1997). The first three columns summarize the precrisis period, and the last three columns summarize the postcrisis period. Estimates are, in general, biased due to correlations of unobserved earnings endowment (ability) μ_j and the period-t log wage.[16] The previous wage is not instrumented in the table. Given this limitation, it is found that the lagged log wage has a negative effect

wages in the migrant sample. From the multinomial logit results in Table 2, these occupations are ones that highly schooled migrants are likely engaged in. For natives, average wage growth by occupation is 0.0485158 (occp=0), 0.0156438 (occp=1), 0.0282601 (occp=2), 0.0656281 (occp=3), 0.005581 (occp=4), 0.0751287 (occp=6), 0.0545407 (occp=7-8), and 0.0630191 (occp=9). In the first three types, average wage growth for migrants is greater than that for natives, mainly due to the relatively small sample size for migrants; however, the differences are not significant.

[16]The conditional wage-growth equation for $N = 1$ is, when conditioned on period-t log wage, is

$$E\left[\Delta \ln w_j | \Omega_t\right] = \alpha - E_t \ln w_{jt} + s_j\beta + \phi_{t+1}(s_j) + \phi_j$$

where $\phi_{t+1}(s_j) = \left[1 - \frac{1}{\rho_\theta(s_j)+(t+1)\rho_v(s_j)} - \sigma_v^2(s_j)\right]^{n(s_j)}$. Substituting for $E_t \ln w_{jt}$,

$$\Delta \ln w_j \cong \alpha + \gamma E_t \ln w_{jt} + s_j \left\{\beta + \frac{\partial \phi(s_j)}{s_j}\right\} + \phi_j + \Delta\varepsilon_j$$

where $\gamma = -1$. Note that $E\left[\phi_j E_t[\ln w_{jt}]\right] > 0$, $E\left[\Delta\varepsilon_j E_t[\ln w_{jt}]\right] = 0$, $E\left[\Delta\varepsilon_j \ln w_{jt}\right] < 0$. Hence, the OLS estimate is $\hat{\gamma}_{ols} > \gamma$. The conditional wage-growth equation, usually estimated in most of the literature of migration,

on wage growth in both periods. Its parameter value is greater than -1 which is consistent with the existence of endowment-lagged wage correlation. Secondly, as in Table 3, the schooling - experience interaction is significantly positive in wage growth for relatively young migrants before the financial crisis, whereas the interaction is insignificant after the crisis. This implies again that the complementarity of schooling and experience is not supported after the crisis.

4.2 Job – Schooling Matching: Before and After Financial Crisis

To investigate the matching process of schooling and task complexity in the Bangkok labor market, the matching process of occupation and schooling is assessed in multinomial logit analysis (Table 5). Occupations are classified in eight groups as follows: 0 = professional, technical and related workers; 1 = administrative, executive and managerial workers; 2 = clerical workers; 3 = sales people; 4 = farmers, fishermen, hunters, loggers and related workers; 5 = miners, quarrymen, and related workers; 6 = transport and communication workers; 7–8 = craftsmen, production-process workers, and laborers; 9 = service, sports, and recreation workers. In the estimation, the benchmark group is group 9. The independent variables are years of schooling, age, and male dummy, and all those interacted with migrant dummy. In particular, the interaction of schooling and migrant dummy will capture the additional effects of new entrants on the role of schooling in finding different types of occupations. As before, origin province and year dummies are included in all specifications. In the estimation, samples are drawn only from the first rounds in the precrisis and postcrisis periods.

Table 5 to be inserted

Table 5 shows the coefficients of schooling and the schooling - migrant interactions only. In the table, a clear contrast is found in the two periods. Before the financial crisis (Table 5a), schooling raises the probability of being engaged in occupations 0, 1, 2, and 7 – 8. Those are white-collar occupations, and production workers. For migrants, schooling further raises the probability of occupations 1, 2, 3, 4 and 7 – 8. Except for occupation 4, educated migrants are more likely to

would produce biases in schooling and experience effects. Most estimates of γ in the literature, consistent with my conjecture, take a negative value that is larger than -1.

be engaged in professional and white-collar occupations and production processes. In terms of complexity required in tasks, schooling is matched with high complexity in the labor market in this period.

After the crisis (Table 5b), however, the schooling effects for migrants disappear. Though the educated are, in general, likely to be matched with occupations 0, 1, 2, and 3 (professional and white-collar jobs), the migrant schooling effects are insignificant. The difference between migrants and natives disappeared in the job–schooling matching process after the crisis. This finding is consistent with those in Table 3. The estimated γ_3 in (3.3) that captures the intertemporal change in schooling–experience complementarity decreased after the crisis. This implies that $n(h)$ approached $n(l)$ where $h > l$; that is, the assortative matching of schooling and task complexity had weakened.

5 Conclusion

Before the financial crisis of1997, the returns to initial human capital and to destination labor-market experience were significantly positive; and the complementarity between these factors is also found significant in the Bangkok labor market. The duration of stay in the destination market played a role in migrants' assimilation process. It is also found from the evidence on the schooling – experience complementarity that the initial human capital affected not only wage levels but also on wage growth. However, the results show that after the financial crisis attacked the Thai economy and its labor markets, the returns to labor-market experience disappeared – past experience was rendered obsolete by the crisis. Strikingly, the returns to schooling have been constant before and after the crisis.

In the light of these results, it is clear that education is more robust in the face of crisis than the labor-market experience acquired through labor markets. In this sense, it can be concluded that the labor-market experience is more regime-specific than education, at the time of financial crisis in Thailand. The results imply that if a society is vulnerable to risks and structural changes that occur frequently, the investment in schooling generates higher expected returns than the labor-market experience in the long run. Investments in education not only improve the earnings of the poor, but also enhance their ability to resist external shocks such as those investiagated in

this paper. Specific contents of the human-capital portfolio – education and experience – matter when the poor face risks. In a macroeconomic perspective, these results also imply that only if developing countries build up risk-mitigating and risk-coping mechanisms such as flexible formal credit and unemployment insurance in both ex ante and ex post senses, the long term returns to labor-market experience can rise stably and can be comparable to the returns to education.

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Table 1a Summary Statistics: Before Financial Crisis

Migrants Sample (experience: length of stay < 9 years)

	94/Rd1	94/Rd3	95/Rd1	95/Rd3	96/Rd1	96/Rd3
diff lnw		0.0272		0.0727		0.0409
		(0.2564)		(0.2538)		(0.3830)
		[220]		[326]		[232]
age	26.488	26.582	27.421	27.148	27.665	27.735
	(8.738)	(9.548)	(10.055)	(10.413)	(10.092)	(9.004)
	[1113]	[1044]	[1458]	[1282]	[1271]	[1123]
sex	0.4938	0.4539	0.5295	0.5256	0.5052	0.4960
	(0.500)	(0.500)	(0.499)	(0.500)	(0.500)	(0.500)
	[1113]	[1044]	[1458]	[1282]	[1271]	[1123]
#hh members	3.0638	3.3529	3.5046	3.0735	3.4257	3.0311
	(1.557)	(1.956)	(1.810)	(1.417)	(2.591)	(1.819)
	[1113]	[1044]	[1458]	[1282]	[1271]	[1123]
yr sch	7.3645	7.7894	7.4597	7.5273	7.3446	7.2655
	(3.871)	(4.135)	(3.970)	(3.953)	(3.816)	(3.982)
	[1110]	[1042]	[1450]	[1279]	[1268]	[1121]
weekly wage	1031.93	1168.43	1074.06	1448.55	1404.51	1285.80
	(893.59)	(928.43)	(821.76)	(1832.50)	(1833.88)	(758.80)
	[699]	[640]	[887]	[750]	[848]	[666]
ln weekly wage	6.7890	6.9063	6.8405	7.0437	7.0334	7.0446
	(0.5289)	(0.5510)	(0.5134)	(0.5617)	(0.5217)	(0.4778)
	[699]	[640]	[887]	[750]	[848]	[666]
duration of stay (yrs)	4.0717	3.8059	3.9958	3.9472	3.8525	4.0191
	(2.3386)	(2.356)	(2.444)	(2.398)	(2.455)	(2.315)
	[1113]	[1044]	[1458]	[1282]	[1271]	[1123]

Numbers in middle and large parentheses are standard deviations and numbers of observations, respectively. Duration of stay in Bangkok (years) is defined to be the median year, computed from interval index, e.g. 0.5 is assigned if length of living is less than a year. Weekly wage is estimated from types of wage payment (daily, weekly, monthly, etc.) and amount of payment closest to the survey week. Difference in log weekly wage is ln wage (round 3) minus ln wage (round 1), and the number of observations is reduced mostly because sample observations are screened out if ages are not matched between the two rounds of six-month intervals.

Table 1b Summary Statistics: After Financial Crisis

Migrants Sample (experience: length of stay < 9 years)

	98/Rd1	98/Rd3	99/Rd1	99/Rd3	2000/Rd1	2000/Rd3
diff lnw		0.0233		0.02054		0.01629
		(0.2256)		(0.2349)		(0.2324)
		[229]		[285]		[282]
age	26.774	27.909	27.930	27.705	27.457	27.125
	(9.359)	(10.020)	(10.055)	(8.880)	(9.842)	(9.003)
	[1111]	[1196]	[1064]	[1045]	[1179]	[1133]
sex	0.5006	0.4851	0.4691	0.4823	0.4828	0.5056
	(0.500)	(0.500)	(0.499)	(0.500)	(0.499)	(0.500)
	[1111]	[1196]	[1064]	[1045]	[1179]	[1133]
#hh members	3.1516	3.2224	3.0051	2.9892	3.0742	3.007
	(1.835)	(1.786)	(1.483)	(1.608)	(2.096)	(2.032)
	[1096]	[1157]	[1064]	[1045]	[1179]	[1133]
yr sch	8.8769	8.7879	8.6538	8.7702	9.0997	8.7854
	(4.3176)	(4.375)	(4.228)	(4.415)	(4.160)	(4.340)
	[1108]	[1119]	[1061]	[956]	[1177]	[1015]
weekly wage	1591.99	1691.25	1509.02	1642.58	1594.39	1579.580
	(1240.45)	(1570.25)	(1404.28)	(1665.60)	(1773.84)	(1376.78)
	[706]	[717]	[631]	[631]	[661]	[670]
ln weekly wage	7.2264	7.2394	7.1680	7.2324	7.1942	7.2159
	(0.4868)	(0.5556)	(0.4863)	(0.5091)	(0.5132)	(0.4839)
	[706]	[717]	[631]	[631]	[661]	[670]
duration of stay (yrs)	4.1070	4.3711	4.1987	4.3683	4.2488	4.0896
	(2.335)	(2.426)	(2.414)	(2.376)	(2.396)	(2.341)
	[1111]	[1196]	[1064]	[1045]	[1179]	[1133]

Numbers in middle and large parentheses are standard deviations and numbers of observations, respectively. Duration of stay in Bangkok (years) is defined to be the median year, computed from interval index, e.g. 0.5 is assigned if length of living is less than a year. Weekly wage is estimated from types of wage payment (daily, weekly, monthly, etc.) and amount of payment closest to the survey week. Difference in log weekly wage is ln wage (round 3) minus ln wage (round 1), and the number of observations is reduced mostly because sample observations are screened out if ages are not matched between the two rounds of six-month intervals.

Table 2　Returns to Schooling and Destination Experience

Cross-section

	Dependent variable: log weekly wage					
	Sample: Age<40, Round 1					
	1994 – 1996			1998 – 2000		
yrs of schooling	0.0713	0.0713	0.0457	0.0734	0.0734	0.0582
	(25.46)	(25.42)	(5.58)	(42.47)	(42.47)	(8.71)
yrs of sch.* expr.			0.0028			0.0017
			(3.03)			(2.35)
experience		0.0285	0.0141		0.0020	-0.0108
		(2.06)	(0.95)		(0.21)	(1.06)
age	0.0546	0.0508	0.0501	0.0624	0.0621	0.0620
	(3.62)	(3.31)	(3.26)	(5.93)	(5.77)	(5.75)
age squared	-0.00044	-0.00038	-0.00037	-0.00058	-0.00057	-0.00057
	(1.62)	(1.37)	(1.34)	(3.04)	(2.96)	(2.97)
sex	0.1328	0.1319	0.1344	0.1375	0.1375	0.1389
	(6.19)	(6.15)	(6.26)	(9.47)	(9.47)	(9.58)
# obs.	3471	3471	3471	4273	4273	4273
adj-R sq	0.5609	0.5617	0.5638	0.5097	0.5097	0.5105

Absolute t values are in parentheses. Standard errors are robust estimates with individual-level heteroskedasticity. Origin fixed effects are included in all specifications. Migrants in this estimation are those who have stayed in Bangkok for less than 5 years., and natives are those who have stayed in Bangkok for more than 9 years. For the Natives sample, the length of stay (experience) is set as 10 years.　Schooling is that of upon-arrival

Table 3 Wage Growth and Experience-Schooling Complementarity

	Dependent variable: Difference in Log Weekly Wage							
	Sample: Age < 40, Rd 1 and Rd 3 Merged							
	1994 – 1996				1998 – 2000			
experience	0.0214	0.0112	-0.0210	-0.0244	0.0146	0.0139	0.0120	0.0071
	(1.90)	(1.00)	(0.46)	(0.52)	(1.60)	(1.49)	(0.63)	(0.38)
exp squared			0.0062	0.0064			0.0003	0.0005
			(0.71)	(0.73)			(0.13)	(0.24)
exp * sch		0.0015	0.0015	0.0024		0.00008	0.00007	0.0013
		(1.85)	(1.89)	(2.32)		(0.16)	(0.13)	(0.19)
exp*sch*age				-0.00003				-0.00004
				(0.93)				(1.52)
yrs of sch.	-0.00044	-0.0146	-0.0150	-0.0147	0.0006	-0.0001	9.71E-06	6.51E-06
	(0.24)	(1.88)	(1.93)	(1.85)	(0.47)	(0.02)	(0.00)	(0.00)
age	-0.0204	-0.0214	-0.0218	-0.0252	-0.0096	-0.0095	-0.0094	-0.0126
	(1.69)	(1.78)	(1.81)	(1.97)	(0.80)	(0.80)	(0.79)	(1.03)
age squared	0.00034	000035	0.00036	0.00047	0.00014	0.00014	0.00014	0.00026
	(1.63)	(1.71)	(1.74)	(1.919)	(0.70)	(0.69)	(0.68)	(1.16)
sex	0.0148	0.0163	0.0161	0.0161	-0.0043	-0.0042	-0.0042	-0.0036
	(0.94)	(1.03)	(1.02)	(1.015)	(0.33)	(0.32)	(0.32)	(0.27)
# obs.	1997	1997	1997	1997	2074	2074	2074	2074
adj-R sq	0.0739	0.0760	0.0762	0.0769	0.0419	0.0419	0.0419	0.0430

Absolute t values are in parentheses. Standard errors used here are robust estimates with individual-level heteroskedasticity. Origin fixed effects are included in all specifications. Schooling is that of upon-arrival. Migrants in this estimation are those who stayed in Bangkok for less than 5 years., and natives are those who stayed in the city for more than 9 years. For natives, the length of stay (experience) is set as 10. The sample consists of individuals of same individual and household ID, who show same age or one year older in the third round than the first round.

Table 4 Wage Equations

Conditional Convergence

Dependent variable: Difference in Log Weekly Wage						
Sample: Age < 40						
	1994 – 1996			1998 – 2000		
lagged ln wage	-0.1521	-0.1553	-0.1551	-0.1389	-0.1390	-0.1403
	(5.60)	(5.73)	(5.72)	(6.84)	(6.84)	(6.85)
experience	0.0236	0.0102	-0.0116	0.0133	0.0116	0.0354
	(2.06)	(0.91)	(0.25)	(1.44)	(1.24)	(1.80)
exp squared			0.0042			-0.0038
			(0.48)			(1.49)
exp * yrs of sch.		0.0020	0.0020		0.0002	0.0003
		(2.36)	(2.40)		(0.38)	(0.64)
yrs of schooling	0.0108	-0.0076	-0.0079	0.0109	0.0092	0.0079
	(3.83)	(0.94)	(0.98)	(6.07)	(1.97)	(1.65)
age	-0.0103	-0.0115	-0.0117	-0.0011	-0.00097	-0.0018
	(0.91)	(1.02)	(1.05)	(0.09)	(0.08)	(0.15)
age squared	0.00025	0.00026	0.0003	0.00006	0.00006	0.00008
	(1.27)	(1.37)	(1.40)	(1.17)	(0.30)	(0.37)
sex	0.0320	0.0343	0.0342	0.0149	0.0150	0.0149
	(2.08)	(2.22)	(2.21)	(1.17)	(1.18)	(1.17)
# obs.	1997	1997	1997	2074	2074	2074
adj-R sq	0.1146	0.1182	0.1183	0.0924	0.0924	0.0929

Absolute t values are in parentheses. Standard errors used here are robust estimates with individual-level heteroskedasticity. Origin fixed effects are included in all specifications. Schooling is that of upon-arrival. Migrants are those who stayed in Bangkok for less than 5 years, and natives are those who stayed in the city for more than 9 years. The length of stay (experience) for natives is set as 10.

Table 5 Matching: Schooling and Occupations

Sample: Age < 30, Round 1, 1994 – 1996					
		*migrants			*migrants
0: sch	0.3070	0.0268	4: sch	-0.04792	-0.406749
	(5.00)	(0.12)		(0.86)	(2.31)
1: sch	0.2024	0.3930	6: sch	-0.0290	0.0559
	(2.48)	(2.77)		(0.44)	(0.53)
2: sch	0.2593	0.3684	7-8: sch	-0.0820	0.13608
	(5.98)	(3.85)		(1.83)	(1.82)
3: sch	0.0502	0.2252			
	(1.16)	(2.45)			
# obs.	3298				
Sample: Age < 30, Round 1, 1998 – 2000					
		*migrants			*migrants
0: sch	0.3312	0.0455	4: sch	-0.0803	-0.0138
	(4.39)	(0.12)		(0.57)	(0.04)
1: sch	0.3378	0.0092	5: sch	0.0318	1.2478
	(3.77)	(0.02)		(0.23)	(0.62)
2: sch	0.2495	-0.0243	6: sch	0.0300	0.0420
	(3.47)	(0.09)		(0.37)	(0.15)
3: sch	0.1289	-0.0136	7-8: sch	0.0036	-0.0010
	(1.90)	(0.06)		(0.05)	(0.01)
# obs.	2601				

*migrant shows differences from benchmark estimates (migrants and natives pooled). Numbers in parentheses are asymptotic absolute t-values (standard normal). Chi-squared statistics computed from Wald tests are shown with degrees of freedom. Age, sex and both interested with migrant dummy, origin dummies, year dummies are included in the specifications. Migrants are defined as those who stayed in Bangkok for less than 5 years, and natives are defined as those who stayed in Bangkok for more than 9 years.