The Impact of Internal Migration on Local Labour Markets in Thailand

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Abstract

We estimate the impact of internal migration on local labour markets in Thailand. Using an instrumental variable estimation to control for the endogeneity of migration we then investigate how migration affects various aspects of local labour markets. Our results show that there appears to be a positive effect on male earnings, although only if these are measured in weekly terms. Net inward migration, in contrast, has strong negative effects on the female labour market. More specifically, we find that not only does it unequivocally reduce women's earnings, but also reduces the number of hours they work.

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1 Introduction

The 2009 Human development Report [UN (2009)] estimates that using a conservative definition approximately 740 million people worldwide are internal migrants, almost four times the number who have moved internationally. Despite this, perhaps because movements within borders often go undocumented, the literature on internal migration is relatively small.[1] A key difficulty in measuring the impact of migration on labour markets is the endogeneity of migration. Net migration is expected to be correlated with economic conditions in each region making it difficult to identify the impact of migration on variables such as the wage and employment level which also depend on these conditions. In this study we use the weather as an instrument to predict internal migration in Thailand using the framework developed in Boustan *et al.* (2010) to calculate the net inflow of migrants into each region associated with weather related shocks.

Well known studies such as Card (1991) looked at the impact of exogenous regional migration shocks such as the 1980 Mariel boatlift and found that migration had little impact on native wages. Critics argued that a possible cause for the absence of any observed effect of migration on natives is that natives might move to other local labour markets in response to an influx of migrants masking the impact of migration on wages and employment. While some studies such as Aydemir and Borjas (2007) use national data to overcome this problem and find a negative effect of migration on wages, Aydemir and Borjas (2010) note that "...the national labour market approach may find itself with as many different types of results as the spatial correlation approach that it conceptually and empirically attempted to replace."[2] An important advantage of the Boustan *et al.* framework used here is that it calculates instrumented inflows and outflows for each region. That is we get an instrumented measure of the change in net migration to each region, thus accounting for any native response to an influx of migrants.

An alternative explanation for the absence of important effects on wages and employment prospects for natives from an increase in migration is that native and migrant workers may be imperfect substitutes [Manacorda, Manning and Wadsworth (2006), Ottaviano and Peri (2012), Peri (2011)]. In particular Manacorda *et al.* (2006) suggest using U.K. data that, while migrants and natives are imperfect substitutes, migrants are close

[1] Also see Lucas (1997) or Mendola (2012) for reviews of the literature on internal migration in developing countries.

[2] Some examples of studies that have examined this question with mixed results are Bonin (2005) who reports a very weak impact of supply shifts on wages in Germany. Bohn and Sanders find a weak wage effect on the Canadian labor market. Aydemir and Borjas (2007) use data from Canada and Mexico and find a strong negative relationship between wages and supply shifts induced by immigration while Mishra (2007) studies the Mexican labor market and finds a significant positive effect of emigration and wages in Mexico.

substitutes for other migrants so that an increase in the stock of migrants lowers the wages of existing migrants but has little impact on natives.

The empirical literature on internal migrations also presents mixed results. Beals *et al.* (1967) study the migration phenomenon in Ghana and show that income differentials drive migration and that regions of large population are relatively more attractive. Sahota (1968) finds that internal migration in Brazil is highly responsive to earning differentials and inversely related to distance. More generally, economic costs and returns dominate the behaviour of migrants. Phan and Coxhead (2010) analyse inter-provincial migration and inequality during Vietnam's transition. Their analysis suggests that the impact of migration on inequality can be either negative or positive. Boustan *et al.* (2010) study the effect of internal migration in the 1930s on the economic welfare of residents in US destination cities and find a small and not significant impact of in-migration on hourly and weekly earnings while Ham *et al.* (2011) use a distance based measure of migration to measure the effect of internal U.S. migration on wage growth and find that migration significantly increases wage growth for college graduates. Kennan and Walker (2011) show that expected income is an important determinant of interstate migration in the U.S.

In this paper we analyse the effects of inter-provincial migration on wages and employment in Thailand. Using the methodology developed by Boustan *et al.* (2010) we estimate the net inflow rate of migrants into each province thus controlling for the labour supply responses of natives to changes in migration. We take into consideration the geographic distance between sending and receiving provinces. In fact, the distance constitutes an important determinant of the location choice of one migrant and several studies consider that distance has a strong negative effect on migration.[3] Furthermore, we consider the fact that, in developing economies, weather conditions and climate change might induce a spatial reallocation of the relatively mobile input, labour.[4] Thus, local weather conditions constitute an instrument for migration rates (Boustan *et al.*, 2010). Given the importance of climate to farming [Fishback *et al.* (2006)], we include interactions between climate and the percentage of a county's land used for agricultural activity.

Boustan *et al.* (2010) examine the New Deal's impact on inter-country migration from 1930 to 1940 and show that in-migration is more likely to be associated with greater average and extremes in precipitation in areas where farms are important. In contrast, in areas where farms are negligible, greater average precipitation is associated with out-migration. The empirical results indicate also that higher temperatures have significant effect on out-migration in farm areas but little effect on net migration in non-farm areas. In addition,

[3] See, for instance, Sjaastad (1962), Sahota (1968) and Schwartz (1973).

[4] In this study, we consider voluntary climate-induced migration and not climate-forced migration.

migrants have been identified as major actors in many studies. For instance, Yang and Choi (2007) examine how remittances sent by migrants respond to income shocks experienced by Philippine households. The authors use rainfall shocks as instrumental variables for income changes and show that, in households with migrant members, exogenous income declines are partially covered by foreign remittances. More particularly, households with migrant members enjoy a flat consumption path compared to households without migrants for whom consumption responds strongly to income shocks.

Our empirical analysis uses data from the Thai Labor Force Survey. Standards of living, economic and cultural structures and growth rates differ among provinces. As a consequence, levels and patterns of internal migration vary within the country. Thailand is one of the earliest Southeast Asian economies to implement an export-led growth strategy, the consequence of which is an increase in rural-urban migration, especially to the service sector in Bangkok (Guest, 2003). Moreover, the country had an increase in temporary and circular movements. Despite the 1997 crisis that altered migration patterns for seasonal and short-term workers, the long-term growth in labour migration remained positive.[5] Furthermore, Thailand is a particular case among Southeast Asian countries because there are remunerative jobs in rural areas in non-farm activities and females' migration is observed. The internal migration of workers is induced by the wage differentials observed among provinces and modifies wages in receiving provinces. Moreover, migrants benefit from a net income increase that they share with household members in the form of money and goods they remit home. Yang (2004) analyses the link between migration and cross-province inequality in Thailand and finds a significant effect of migration on income inequality. More particularly, she reports that a 1 percent increase in the mean fraction of out-migrants to Bangkok entails a 0.058 reduction in the average ratio of Bangkok's income to all other provinces. Vanwey (2003) analyses the role of land ownership in rural temporary migration in Thailand.

The paper is organized as follows. In the next section we describe our data set. The third section presents the empirical specification and econometric results. The final section concludes.

[5]More particularly, the seasonal migration from the northeast of Thailand, facilitated by wide networks of friends and relatives, has continued on a large scale (IOM, 2008). This form of migration represents the main source of remittances for out-migration region.

2 Data

We use data from the Thai Labour Force Survey between 1991 and 2000. The survey is conducted several times a year and with increasing frequency in recent years. We have data for the February and August surveys for each year. The survey is a large cross-section; for example, the February 2000 survey has 164,636 observations. In sum, the complete data is constituted of twenty waves with a total of 2,951,839 observations. August is the peak of the agricultural season and labour markets are much more buoyant with significant internal migration as workers return to rural areas for harvesting. February clearly represents the off-peak season in Thailand. The survey contains a wide variety of questions on location, employment status and job characteristics, income as well as demographic characteristics. Data on earnings asks workers if they are paid hourly, daily, weekly, or monthly and what the rate of pay is for the relevant category. In fact as the summary statistics in Table A1 shows just under 92% of workers are paid either daily or monthly. Most waged workers at the low skill end of the labour market are paid daily. There are seventy six provinces in Thailand as shown in Figure 1. In addition to providing the name of the province where they live, individuals answer the following question: "How long have you been living regularly in this village/ municipality?" Respondents can answer from less than a year, one year, two years, up until nine or more than nine years. We exclude people who move into the same province and calculate the number of recent arrivals as those who answer less than or equal to one year. This number corresponds to 124,185 individuals and represents 52.4% of total movers to new provinces.[6] We use this subsample of movers to compute the inflow and outflow rates. Then we define the province of origin and the destination province of all movers as people are asked "Which is the previous province of your residence before moving here?". The survey then asks for the reason of migration. Among recently moved people, some 35.71% were looking for a job or occupation. However, 7.62% of respondents migrate for further study, 22.75% follow their family and 28.53% report coming back to their former residence. Only 0.22% of migrants state moving from one province to another in order to be nursed. Concerning the province of destination, Bangkok counts the largest proportion of arrivals with 7.2% of total recent migrants.[7]

We construct a sample of non-migrants residing in different areas - municipal, non-municipal, sanitation district - in the 76 Thai provinces. More precisely, we drop observations of all recent migrants who moved within the same province and we reduce our sample to the working age population. Accurately 71.44% of people have a work activity

[6] Note that the category of movers within provinces represents 29% of all movers and that 49.4% of the sample of movers from this category moved one year ago at most.

[7] The second best destination province is Udon Thani with 4.26% of total recent migrants

during the survey week with about one third of self-employed. Then we reduce the sample to people who were not self-employed or attending school at the moment of the survey and who worked 95 or less hours a week. Moreover, we drop observations of workers who are in unpaid jobs. The size of the sample used is 982,232 observations. Table A1 provides summary statistics for employed workers for whom all the dependent variables are non-missing, that is the sample used in all the wage and hours regressions below.

Table 5 looks at the distribution of migration rates across the population. Of course for a given population distributed across a set of provinces any province with a net inflow must have a corresponding province. For this reason the mean migration rate is close to zero for each subgroup in Table 4. The standard deviation is the typical deviation from the mean, we could think of this as the size of typical net migration flows across provinces (in absolute value terms). We see that there are substantial net migration flows with the standard deviation ranging from 5.5% for low skilled males to 7.1% for high skilled female. The size of these flows indicates the importance of interprovincial mobility in reallocating labour across the Thai economy.

3 Econometric Analysis

3.1 Construction of Instruments

In order to construct instruments for migration we follow the methodology proposed by Boustan *et al.* (2010), which consists of predicting the total outflow (inflow) from a region induced by weather shocks, and then decomposing this outflow (inflow) into destination regions by estimating the role of geographic distances in determining inter regional flows. We then use both weather and distance to construct the predicted inflow (outflow). More specifically, for the case of migration inflow this first involves regressing total outflow rates of each region on a set of climate determinants:

$$O - rate_{i,t-1\to t} = \alpha + \delta' Z_{i,t-1} + \epsilon_{i,t} \tag{1}$$

where $O - rate_{i,t-1\to t}$ is the outflow rate from source region i over time period $t-1$ to t, Z is a vector of climate specific indicators, and ϵ is an error term. Using the estimated coefficients from (1) the predicted flow of migrants leaving each region i, $\tilde{O}_{i,t-1\to t}$ is then just equal to the predicted outflow rate, $\bar{O} - rate_{i,t-1\to t}$, times the population at $t-1$:

$$\tilde{O}_{i,t-1\to t} = \bar{O} - rate_{i,t-1\to t} \cdot Population_{i,t-1} \tag{2}$$

One then separately for each sending area i regresses the actual set of destination specific outflow rates to each destination region j on their relative distances and it's squared and cubic value[8]:

$$O - rate_{ij,t-1 \to t} = \alpha_i + \theta_i Distance_{ij} + \theta_i Distance_{ij}^2 + \theta_i Distance_{ij}^3 + \mu_{it} \quad (3)$$

The instrument for in-migration to region j, $\bar{\bar{I}}_(j, t-1 \to t)$, is then just the sum of the predicted number of migrants over all areas $(i \neq j)$, $\bar{O} - rate_{ij,t-1 \to t}$ expected to settle in region j:

$$\bar{\bar{I}}_(j, t-1 \to t) = \sum_{i=1,\dots,n(i \neq j)} \tilde{O}_{i,t-1 \to t} \cdot O - rate_{ij,t-1 \to t} \quad (4)$$

One can then in a similar manner construct predicted outflow from area j by predicting the in-migration rates to each receiving area i using climatic determinants, using these rates to predict the number of inflowing migrants into i, and then constructed predicted outflow migrants by multiplying this figure by the from distance and its non-linear terms estimated inflowing rates between regions i and j $(i \neq j)$.

In order to estimate (1), as well as its analogous specifications for the in-migration, we use for the vector Z a number of measures that capture weather conditions in a region. In order to identify periods of extreme wetness and dryness in regions we first calculated the local standardized precipitation index (SPI), which has been argued to be particularly good at capturing the cumulative effect of high and low patterns of rainfall over time in a chosen locality, from the mean monthly precipitation values within our regions as calculated from the IPCC data set.[9] Following McKee *et al.* (1993) we then define a monthly extremely dry (wet) event as starting when the SPI reaches an intensity of -2.0 (2.0) or less (more) and as ending once the index become positive (negative) again. For each time period we then calculate the number of months of extreme dryness (wetness). To capture the effect of temperature, in particular with respect to its importance for agriculture, we construct a measure of reference evapotranspiration (ET) to represent the evaporative demand of the air within a basin. Following Hargreaves and Samani (1985), evapotranspiration is calculated as:

$$ET = 0.0023(T_{avg} + 17.8)(T_{max} - T_{min})0.5Ra \quad (5)$$

[8]One should note that Boustan *et al.* (2010) regress these rates only on distance and its squared value. For the case of Thailand we found that including its cubic value substantially increased the specifications fit.

[9]The calculation of the SPI is based on modeling the probability distribution of precipitation as derived from long term records by fitting these to a gamma distribution via maximum likelihood. An important component in this regard is the chosen time scale. Since we are interested in cropland productivity and soil moisture conditions are known to respond to precipitation anomalies over a relatively short time period, we use a 12 month scale. See http://www.drought.unl.edu/whatis/indices.htm.

where T_{avg}, T_{max} and T_{min} are mean, maximum and minimum temperature, respectively and Ra is the extraterrestrial radiation calculated following Allen *et al.* (1998). Since the effects of rainfall shortages and abundance on local agricultural are likely to some extent to depend on the local evaporative demand, we also allow for interactions between ET and WET and DRY. To construct all these climatic factors at the regional level we resort to information from the Inter-Governmental Panel on Climate Change (IPCC) climatic data set, which provides monthly precipitation and temperature measures across the globe at the 0.5 degree level over the entire 20^{th} century. This is used to calculate out regional averages of the inputs.

The results of estimating (1) for the annual regional out- and in-migration rates, controlling for regional specific fixed effects and region common time specific factors are given in Table 1a. Moreover, we calculate Driscoll and Kray (1998) standard errors corrected for spatial correlation throughout. As can be seen, for both of inflow and outflow rates, the set of climatic variables are almost all significant, producing highly significant F-tests of joint significance. Examining the individual factors, one finds that for the precipitation related factors the signs meet a priori expectations. More specifically, one finds that extremely dry as well as extremely wet weather, indicative of drought and flood like conditions, respectively, act to increase overall outflow from regions. Moreover, the negative impact of rainfall shortage is further exacerbated by a high evapotranspirative demand of the air. Somewhat surprisingly, the direct effect of evapotranspiration is to reduce outflow from a region, although in absolute terms this impact is small. For the inflow rate, one finds that extremely wet periods tend to reduce the inflow rate, while droughts have no significant effect. Furthermore, a high evapotranspirative demand of the air tends to reduce the effect of the latter. Somewhat peculiarly one finds that this demand on its own acts to increase person flowing to the region, although again not substantially so. To construct the predicted inward and outward migration rates by sub-group we proceeded in similar manner as for the overall sample, except restricting construction via (1) through (4) to the sub-sample in question. We report the estimation for (1) for the outflow and inflow rates in Tables 1b and 1c, respectively. As can be seen, for the outflow rate all climatic variables are significant, where the signs are in congruence with the overall sample. Unsurprisingly the joint F-tests attests to their power as predictive factors. For the inflow rates, the majority of coefficients are significant and similar to those from the overall sample. Similarly, the F-test statistics provides evidence of their predictive power.

In terms of estimating (3), since this involves estimating different specifications for each region, we only provide a brief outline of the results. One may want to first note that since our distance measures do not vary over time, our estimated specification in (3) does not control for region specific effects, but does include a set of time dummies to control for common region time specific factors determining the migration flows. We used Driscoll and Kray (1998) standard errors corrected for spatial correlation as we did for (1). For each region specific regression, we, after estimating the parameters on distance conducted an F-test of the null hypothesis that these were jointly zero. In the case of out-migration rates for only 4 regions, while in the case of in-migration rates for only 6 could the null hypothesis not be rejected. As with the overall sample the F-test of the distance variables suggested strong predictive power in almost all cases for the estimation of (3) for subgroups.

In Tables 2a and 2b we depict the results from the first stage regression where we use predicted migration rates constructed as outlined above to predict actual net migration rates. Table 2a shows the results for the males and females subsamples and Table 2b for the high and low skilled subsamples. As can be seen, the predicted inflow rate variables significantly predicts an increase in actual net migration, whereas predicted out-migration rate acts to decrease net migration. Using bootstrapped standard errors shows similar results although standard errors are somewhat larger. The predicted inflow and outflow rates show that the model predicts substantial interprovincial net migration.

Table 5 looks at the distribution of migration rates across the population. Of course for a given population distributed across a set of provinces the inflows in provinces with a net inflow must equal the net outflows across provinces with net outflows. For this reason the mean migration rate is close to zero for each subgroup in Table 4. The standard deviation is the typical deviation from the mean, we could think of this as the size of typical net migration flows across provinces (in absolute value terms).

3.2 The Effect of Net Migration on the Local Labour Market

We next examine the impact of net inward migration on the weekly wage, weekly hours and employment probability for individuals of working age (15-64 controlling for individual characteristics. In particular when we look at the impact of migration on the wage we control for age and age squared, marital status (four dummies indicating single, married, widowed or divorced status), a set of twelve educational indicator dummies, ten occupation dummies and ten industry dummies, seven firm size dummies, dummies indicating whether the worker is paid hourly, daily, weekly or monthly, a male dummy and a dummy indicating whether the worker lives in a municipal area. We also include average age and the fraction of workers with no education at the province level as well as province and time specific effects. The results on the estimated coefficient on the net inward migration rate for weekly wage and weekly hours are reported in Tables 3a-3d. So for example the coefficient of -.106 on male wages in the OLS results in Table 3a indicates that an increase in the net migration rate of 10% (which means the working age population increases by 10% due to net migration) is associated with a decrease in male wages by 10.6%. A clear worry here is that, as noted earlier, we might expect migration inflows to depend on local economic conditions which also affect the wage level or level of hours worked. The results from the instrumental variables regression confirm that this worry is legitimate showing a wage decrease of 41.6% for males when migration increases population by 10%. We find no statistically significant effect on the wage of women or on hours worked for either gender.

Table 3b provides results by high and low skill group and gender. This makes a substantial difference to the OLS results where when we look within separate skill groups. Skill specific migration is negatively associated with wages for high skilled male and female workers with a 8-9% fall in wages for a 10% increase in population. There is a similar effect on low skill male wages but no statistically significant effect on low skilled female.[10] Once again instrumenting makes a substantial difference to the results. For the instrumental variables analysis wages of skilled workers are unaffected by migration while unskilled male wages fall by 73% in response to a 10% increase in the population. Once again we find no statistically significant effect on female wages or on weekly hours for any group.

We might be concerned that migrants differ systematically in unobserved ways that affect their productivity. If this is so a substantial net inflow/outflow of migrants could impact on the average wage through a composition effect. Table 3c looks at the results for incumbents only (that is excluding recent migrants). The results are broadly similar to Table 3b. For OLS regressions high skill workers of both genders wages fall by around 10% when migration increases the population by 10% and the same is true for low skilled women. The instrumental variable results indicate no statistically significant change in the wage of high skilled workers of either gender or low skilled women while a fall in male wages of 54% is associated with a 10% increase in population. Table 3d provides the results of instrumental variables analysis where the full sample is included but a dummy variable is included for recent migrants to allow for the fact that migrant status might have an independent effect on the wage that should be controlled for. The dummy variables indicate that low skilled migrants do earn lower wages (3.7% lower for low skilled males and 6.2% lower for low skilled females). The coefficients on migrant status are very similar

[10]We explored the possibility that low/high skill worker's wages and hours might be affected by the migration rate of the other group: that is that to explore whether these groups were complements/substitutes for one another. Unfortunately migration rates for are highly correlated across groups (even when instrumented) making it difficult to identify a separate effect.

to the results fron Table 3b indicating that low skilled migrant's wages fall by 73% when the working age population of this group increases by 10%. The tables discussed above also provide estimates of the effect of migration on hours worked. The coefficients are not statistically significant in any specification and often small. As a way of getting a handle on the economic significance of the coefficients in a very simple way we could assume that labour supply is inelastic and that firms are on their labour demand curves. In this case the results indicate that if migration increases labour supply by 10%, this is associated with a 73% decrease in wages of low skill males.[11] This would indicate that there is a percentage change in employment of 1% for every 7.3% fall in the wage or a demand elasticity of -0.14 for unskilled male workers.

Given that the substantial net flows documented in Table 2a do not appear to affect wages and hours of many workers it is worth investigating how an influx of migrants affects employment rates. It may be that an influx of migrants is associated with a change in participation rates so that the net change in labour supply differs from the change in migration. In Table 4 we investigate the impact of migration on employment probabilities. That is does an increase in migration lower the probability of employment. While the OLS results indicate a positive relationship between the probability of employment and net migration for almost all subgroups, when we control for endogeneity of migration flows we cannot find any statistically significant impact on the probability of employment for any subgroup for either the sample of all workers (including the new migrants) or for incumbents.

In summary the results indicate that the substantial exogenously driven migration flows documented in Tables 2a and 2b are not associated with changes in weekly hours or employment probabilities or with weekly wages apart from unskilled male workers. For unskilled males we see a substantial decline in wages.

4 Conclusion

In this paper we have examined the impact of net inward migration on local labour markets in Thailand. To this end we have constructed a data set of regional migration flows and individual labour market outcomes for the period 1991 to 2000 using the Thai Labour Force Survey. Our results show that instrumenting for the possible endogeneity of net inward migration is crucial to the analysis. The results suggest that wages of low skill male workers are highly flexible with substantial adjustments in wages in response to short term

[11] While we there are many models of the labour market where some firms will not be on the labour demand curve (equilibrium search models, models with adjustment costs etc.)

changes in labour supply. We find no effect on high skilled workers or low skilled females. It may be that wages are slower to adjust for skilled workers due to implicit contracts, firm specific capital or other institutional features that limit firms' ability or willingness to adjust wages in response to possibly temporary shock.[12]

[12]See Beaudry and Dinardo (1991) for an example and some evidence for an implicit contracts model while Hall (2005) shows that the local monopoly rents in a search matching model mean that wages can be sticky without violating rationality.

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Figure 1: Thai Provinces

Table 1a: The Effect of Weather on Migrant Flows

	Outrate	***Inrate***
Dry	0.00266*	-2.45e-05
	(0.00130)	(0.000964)
Wet	0.00352*	-0.00358**
	(0.00135)	(0.000701)
EVAPO	-0.000222*	0.000710**
	(8.90e-05)	(0.000192)
EVAPO*Wet	3.04e-05	-5.95e-05**
	(1.55e-05)	(1.16e-05)
EVAPO*Dry	3.36e-05*	-1.34e-05
	(1.56e-05)	(6.74e-06)
Observations	1,440	1,440
Number of groups	72	72
F-Test	4.963	8.616

Notes: (i) Driscoll and Kray (1998) standard errors corrected for spatial and autocorrelation in parentheses; (ii) ** and * are 1 and 5 per cent significance levels; (iii) Standard errors are in parentheses; (iv) Year and binannual dummies included but not reported; (v) F-test is test of joint significance of the climatic variables.

Table 1b: The Effect of Weather on Outflow Rates

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Dry	0.00142*	0.00142*	0.00160*	0.00124*	0.00166*	0.00120	0.00153*	0.00118*
	(0.000625)	(0.000603)	(0.000677)	(0.000556)	(0.000648)	(0.000618)	(0.000712)	(0.000549)
Wet	0.00235**	0.00250**	0.00234**	0.00251**	0.00231**	0.00238**	0.00236**	0.00237**
	(0.000709)	(0.000746)	(0.000763)	(0.000691)	(0.000692)	(0.000736)	(0.000846)	(0.000722)
EVAPO	-0.000227**	-0.000205**	-0.000229**	-0.000203**	-0.000262**	-0.000197**	-0.000197**	-0.000148*
	(7.61e-05)	(6.79e-05)	(7.14e-05)	(7.38e-05)	(8.85e-05)	(6.81e-05)	(6.22e-05)	(5.99e-05)
EVAPO*Wet	2.75e-05**	2.93e-05**	2.52e-05**	3.14e-05**	2.54e-05**	2.95e-05**	2.50e-05**	2.62e-05**
	(7.25e-06)	(7.59e-06)	(7.43e-06)	(7.43e-06)	(7.64e-06)	(7.35e-06)	(8.06e-06)	(6.84e-06)
EVAPO*Dry	1.88e-05*	1.87e-05*	2.04e-05*	1.69e-05*	2.14e-05*	1.65e-05*	1.94e-05*	1.37e-05*
	(7.68e-06)	(7.95e-06)	(8.54e-06)	(7.05e-06)	(9.34e-06)	(6.40e-06)	(8.19e-06)	(6.57e-06)
Sample	Male	Female	Low	High	Male-Low	Male-High	Female-Low	Female-High
Observations	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,438
Number of groups	72	72	72	72	72	72	72	72
F-Test	9.028	7.538	7.099	9.617	8.172	9.926	5.605	7.564

Notes: (i) Driscoll and Kray (1998) standard errors corrected for spatial and autocorrelation in parentheses; (ii) ** and * are 1 and 5 per cent significance levels; (iii) Standard errors are in parentheses; (iv) Year and binannual dummies included but not reported; (v) F-test is test of joint significance of the climatic variables.

Table 1c: The Effect of Weather on Inflow Rates

	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*
Dry	-0.000417**	-0.000271	-0.000544**	-9.76e-05	-0.000562**	-0.000375**	-0.000664**	0.000187
	(0.000153)	(0.000151)	(0.000145)	(0.000314)	(0.000129)	(0.000129)	(0.000187)	(0.000472)
Wet	-0.000891*	-0.000972*	-0.000995**	-0.000927*	-0.000797*	-0.000764**	-0.00100**	-0.000713
	(0.000366)	(0.000409)	(0.000285)	(0.000428)	(0.000325)	(0.000266)	(0.000305)	(0.000482)
EVAPO	0.000636**	0.000573**	0.000691**	0.000447**	0.000613**	0.000439**	0.000606**	0.000327**
	(0.000182)	(0.000180)	(0.000199)	(0.000138)	(0.000163)	(0.000160)	(0.000192)	(0.000110)
EVAPO*Wet	-8.68e-06	-1.35e-05	-1.08e-05	-1.27e-05*	-5.18e-06	-9.63e-06	-1.30e-05*	-9.06e-06
	(6.42e-06)	(6.81e-06)	(5.74e-06)	(6.12e-06)	(5.34e-06)	(4.97e-06)	(5.92e-06)	(6.92e-06)
EVAPO*Dry	-9.25e-06	-1.21e-05	-1.35e-05	-5.84e-06	-9.87e-06	-9.74e-06	-1.80e-05	-1.29e-07
	(1.10e-05)	(9.60e-06)	(1.07e-05)	(4.90e-06)	(7.63e-06)	(6.74e-06)	(1.11e-05)	(3.59e-06)
Sample	Male	Female	Low	High	Male-Low	Male-High	Female-Low	Female-High
Observations	1,440	1,440	1,440	1,440	1,440	1,440	1,440	1,438
Number of groups	72	72	72	72	72	72	72	72
F-Test	18.15	8.693	19.35	19.35	31.16	8.963	13.19	6.039

Notes: (i) Driscoll and Kray (1998) standard errors corrected for spatial and autocorrelation in parentheses; (ii) ** and * are 1 and 5 per cent significance levels; (iii) Standard errors are in parentheses; (iv) Year and binannual dummies included but not reported; (v) F-test is test of joint significance of the climatic variables.

Table 2a: Relationship between Predicted and Actual Migration
- Men and Women Subsamples -

	Total Sample	***Men Subsample***	***Women Subsample***
WLS Regression			
Predicted in-migration rate	7.246	8.225	8.023
	(1.222)	(2.480)	(2.777)
Predicted out-migration rate	-5.607	-8.418	-8.350
	(1.273)	(2.251)	(2.511)
F-Statistic	7.75	6.82	6.35
Bootstrapped Procedure			
Predicted in-migration rate	8.032	12.429	9.744
	(1.881)	(4.707)	(4.546)
Predicted out-migration rate	-5.977	-10.510	-9.179
	(1.912)	(3.989)	(3.819)
Wald's Statistic	320.71	332.30	275.41

Table 2b: Relationship between Predicted and Actual Migration
- Subsamples of High-skilled and Low-skilled -

	High-Skilled			*Low-Skilled*		
	All	***Men***	***Women***	***All***	***Men***	***Women***
WLS Regression						
Predicted in-migration rate	7.766	4.155	3.792	7.949	3.964	4.304
	(2.617)	(1.259)	(1.395)	(2.547)	(1.239)	(1.248)
Predicted out-migration rate	-8.024	-4.117	-3.772	-8.037	-4.045	-4.325
	(2.300)	(1.052)	(1.162)	(2.347)	(1.123)	(1.106)
F-Statistic	5.56	4.81	5.55	6.84	7.66	6.15
Bootstrapped Procedure						
Predicted in-migration rate	18.879	11.444	13.589	8.236	8.053	5.812
	(6.387)	(3.580)	(4.125)	(3.648)	(2.864)	(2.380)
Predicted out-migration rate	-15.258	-9.409	-11.178	-7.504	-6.965	-5.181
	(5.020)	(2.661)	(3.112)	(3.192)	(2.171)	(1.922)
Wald's Statistic	233.00	245.81	257.23	235.40	279.83	205.39

Notes: (i) Regressions are estimated using individual data from the Thai LFS from 1991 to 2000; (ii) Standard errors are in parentheses and clustered by provinces and waves; (iii) Dependent variable is net migration in each province; (iv) In the bootstrapping procedure, we randomly selected 200 observations per province and per wave to ensure that each province at each wave contributes equally to the estimation; (v) We define low-skilled persons all those who have an education level lower than secondary and high-skilled persons those who have an education level equal to or higher than secondary.

Table 3a: Effect of Net Migration on Weekly Wages and Work Time
- Men and Women Subsamples -

	Total Sample	***Men Subsample***	***Women Subsample***
Ordinary Least Squares			
ln(weekly wage)	-0.050	-0.106	-0.017
	(0.017)**	(0.034)**	(0.026)
ln(hours worked)	0.029	0.026	0.100
	(0.042)	(0.058)	(0.075)
Instrumental Variable			
ln(weekly wage)	-0.273	-0.416	-0.145
	(0.105)**	(0.129)**	(0.126)
ln(hours worked)	-0.110	-0.248	0.010
	(0.111)	(0.136)	(0.144)

Notes: (i) Regressions are estimated using individual data from the Thai LFS from 1991 to 2000; (ii) Standard errors are in parentheses and clustered by provinces and waves; (iii) Dummies for salaries period of payment (hourly, daily, weekly and monthly) are introduced.

Table 3b: Effect of Net Migration on Weekly Wages and Work Time
- Subsamples of High-skilled and Low-skilled -

	High-Skilled			***Low-Skilled***		
	All	***Men***	***Women***	***All***	***Men***	***Women***
Ordinary Least Squares						
ln(weekly wage)	-0.081	-0.082	-0.091	-0.035	-0.094	0.045
	(0.025)**	(0.034)*	(0.028)**	(0.029)	(0.036)**	(0.039)
ln(hours worked)	0.056	0.051	0.073	0.077	0.026	0.146
	(0.061)	(0.069)	(0.062)	(0.074)	(0.066)	(0.103)
Instrumental Variable						
ln(weekly wage)	-0.166	-0.095	-0.105	-0.504	-0.731	-0.249
	(0.113)	(0.130)	(0.151)	(0.169)**	(0.236)**	(0.187)
ln(hours worked)	0.034	-0.093	0.183	-0.143	-0.333	-0.023
	(0.107)	(0.114)	(0.126)	(0.170)	(0.198)	(0.211)

Notes: (i) Regressions are estimated using individual data from the Thai LFS from 1991 to 2000; (ii) Standard errors are clustered by provinces and waves; (iii) Dummies for salaries period of payment (hourly, daily, weekly and monthly) are introduced. (iv) For wage regressions, we introduce the number of weekly working hours and its squared term; (v) We include both the high-skilled and low-skilled net instrumented migration rate for each of the six subsamples shown above; (vi) ** and * denote significance at the level of 1% and 5% significance levels, respectively.

Table 3c: Effect of Net Migration on Weekly Wages and Work Time
- Subsamples of High-skilled and Low-skilled Incumbent Workers only -

	High-Skilled			***Low-Skilled***		
	All	***Men***	***Women***	***All***	***Men***	***Women***
Ordinary Least Squares						
ln(weekly wage)	-0.096	-0.089	-0.115	0.008	-0.056	0.099
	(0.025)**	(0.034)**	(0.029)**	(0.024)	(0.031)	(0.042)*
ln(hours worked)	0.051	0.051	0.061	0.063	0.010	0.140
	(0.062)	(0.071)	(0.061)	(0.077)	(0.069)	(0.108)
Instrumental Variable						
ln(weekly wage)	-0.172	-0.123	-0.131	-0.282	-0.540	0.044
	(0.113)	(0.131)	(0.149)	(0.156)	(0.222)*	(0.190)
ln(hours worked)	0.026	-0.061	0.131	-0.160	-0.379	0.007
	(0.102)	(0.109)	(0.116)	(0.181)	(0.209)	(0.233)

Notes: (i) Regressions are estimated using individual data from the Thai LFS from 1991 to 2000; (ii) Standard errors are clustered by provinces and waves; (iii) Dummies for salaries period of payment (hourly, daily, weekly and monthly) are introduced. (iv) For wage regressions, we introduce the number of weekly working hours and its squared term; (v) We include both the high-skilled and low-skilled net instrumented migration rate for each of the six subsamples shown above; (vi) ** and * denote significance at the level of 1% and 5% significance levels, respectively.

Table 3d: Effect of Net Migration on Weekly Wages and Work Time
- Subsamples of High-skilled and Low-skilled with Dummy for Migrant Worker -

	High-Skilled			***Low-Skilled***		
	All	***Men***	***Women***	***All***	***Men***	***Women***
Instrumental Variable						
ln(weekly wage)	-0.164	-0.096	-0.099	-0.497	-0.727	-0.237
	(0.113)	(0.130)	(0.152)	(0.170)**	(0.236)**	(0.188)
Migrant	0.006	-0.002	0.013	-0.049	-0.037	-0.062
	(0.005)	(0.007)	(0.006)*	(0.008)**	(0.008)**	(0.009)**
ln(hours worked)	0.026	-0.061	0.131	-0.160	-0.379	0.007
	(0.102)	(0.109)	(0.116)	(0.181)	(0.209)	(0.233)
Migrant	0.042	-0.087	0.197	-0.148	-0.335	-0.031
	(0.107)	(0.114)	(0.126)	(0.170)	(0.198)	(0.211)

Notes: (i) Regressions are estimated using individual data from the Thai LFS from 1991 to 2000; (ii) Standard errors are clustered by provinces and waves; (iii) Dummies for salaries period of payment (hourly, daily, weekly and monthly) are introduced. (iv) For wage regressions, we introduce the number of weekly working hours and its squared term; (v) We include both the high-skilled and low-skilled net instrumented migration rate for each of the six subsamples shown above; (vi) ** and * denote significance at the level of 1% and 5% significance levels, respectively

Table 4: Marginal Effect of Net Migration on Employment

	Probit		*Instrumental Variables*	
	All Persons	***Incumbent Persons***	***All Persons***	***Incumbent Persons***
Total Sample	0.024	0.018	-0.006	-0.197
Female Subsample	0.110*	0.104*	0.241	-0.025
Male Subsample	-0.004	-0.012	1.084	0.775
Low-Skilled Subsample†	0.094*	0.086*	0.205	-0.208
High-Skilled Subsample†	0.023	0.017	0.458	0.351
Low-Skilled Female Sub-Sample†	0.142*	0.132*	-0.504	-1.043
Low-Skilled Male Sub-Sample†	0.000	-0.005	1.876	1.722
High-Skilled Female Sub-Sample†	0.050*	0.047*	0.728	0.946
High-Skilled Male Sub-Sample†	-0.012	-0.019	-0.098	-0.728

Notes: (i) Regressions are estimated using individual data from the Thai LFS from 1991 to 2000; (ii) Standard errors are clustered by provinces and waves; (iii) Dependent variable is the salaried employment dummy; (iv) We define low-skilled persons all those who have an education level lower than secondary and high-skilled persons those who have an education level equal to or higher than secondary; (v) We include the net instrumented migration rate of the subsample itself when noted by (†).

Table 5: Mean and Standard Deviation migration rates
- Subsamples of Male/Female, High-skilled/Low-skilled -

	Mean	***Standard Deviation***
High Skilled	-0.005	0.073
High Skilled Male	-0.007	0.070
High Skilled Female	-0.006	0.071
Low Skilled	0.003	0.062
Low Skilled Male	0.002	0.055
Low Skilled Female	0.001	0.060