

Quantitative Analysis of Migration and Development in South Asia

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1. Introduction

Asia is a region of high emigrant. In 2010, 5 of the top 10 emigration countries were in the Asian region – notably, Bangladesh, China, India, Pakistan and the Philippines (World Bank 2011). On the other hand, in 2008, in this region, the main receiving countries as the emerging ones following Japan as top country are Singapore, Malaysia, Thailand, China, Korea and India.

1.1 Definition of migration

We can consider the two kinds of migrants; migration of highly skilled workers and of low-skilled workers. The former means people who have experienced the upper level education, more than tertiary. The latter is ones who have only basic education such as elementary school. Upon the situation of each countries, it could be explained which type of workers is more likely to move abroad as an international economic migrant. Therefore, the economic effect between sending and receiving countries will differ.

1.2 Migrations in Asia

Although international migration has a long history in Asia, it has acquired a huge scale and diversity. According to Hugo (2005), the United Nations' Second Asian Population Conference held in Tokyo, in 1972, international migration is not even mentioned in the review of demographic trends in the region over the previous decade. Summarizing the conference, he reported that it is a significant influence on the economic, social and demographic development of all Asian nations. International migration is now an established structural feature of the region although some nations still dismiss it as a temporary, passing phenomenon. In 2010, 5 of the top 10 emigration countries were in the Asian region – notably, Bangladesh, China, India, Pakistan and the Philippines (World Bank 2011). On the other hand, in 2008, in this region, the main receiving countries as the emerging ones following Japan as top country are Singapore (1.84 million), Malaysia (1.64 million), Thailand (1.05 million), China (0.59 million), Korea (0.55 million) and India (0.54 million).

1.3 Leading literatures using empirical method

As we mentioned, the focus on our study is to show whether the international migrant will give an effect to economic growth through heighten the productivity of a sending country. In the theory regarding the migrant as the positive effect in the sending country, Mountford (1997) indicate that their individual education level will be improved as they invest, at same time their country's productivity will be. On the other hand, it is shown not only the higher human capital income but also remittance is the important element for more income. When we consider the migrants as the stock of the human capital, we assume moving by the high-skilled workers. We will compare the differential level of workers on the presume that the effect to the economic growth through the international migrant will depends education levels of migrant and FDI induced by foreign laborer with high skill.

2. Model and Method

We will analyze the effect to economic growth through the migration from the viewpoint of the stock of the human capital. This paper continues the exploration of the links between FDI and the composition of migration of people with tertiary education, considering all three jointly. While the low skill intensity of exports is plausible and easy to justify (e.g. agriculture or unskilled-labor intensive exports like clothing and footwear), it is less clear that, on average, and the nontraded sector is high-skilled intensive. However, for many migrant-sending countries, the high-skilled manufacturing sector is negligible and most high skilled labor is employed in skill-intensive non-traded sectors – e.g. education, medical services and government administration. Along these lines, Bhargava and Docquier (2008) provide an example of high-skilled non-traded-sector specific migration, i.e. the very high rates of medical brain drain for a number of small developing countries.

The basic question we seek to examine is whether the economic growth of the country has influenced by the stock of migrants with high skills and FDI from migrant host countries, after controlling for other characteristics of the partner country. We collect statistic data in Asia and aggregate in dynamic panel. The duration of data is 1990-2000 and 2001-2010. The explained variable is the growth rate of GDP (2001-2010) and explanatory variables are the following factors:

$$Y_t = \alpha_1 \text{Attain}_{it} + \beta_2 \text{Mig}_{it} + \gamma_3 \text{Move}_{it} + \delta_4 \text{FDI}_{it} + \varepsilon_{it}$$

Y: GDP growth

Attain: Attain rate of higher education (to all population)

Mig: Emigration rate of tertiary educated

Move: movement rate from developing countries

FDI: FDI outflow amount to migrant sending country

ϵ : Error term

Subscript i and t represent country and time of each coefficients. We tried to explain the factor from the viewpoint of income. If it is proved that movement rate of tertiary educated labor has the positive effect to per GDP rate, we can say that they will go out their country more increasingly to earn higher income. And return to skilled workers depends on how many of them move to developed countries

3. Data

3.1 Data resource

The data we use are mainly given from the World Development Indicators (WDI) which is developed by the World Bank. World Development Indicators is a database of global economic conditions comprising six categories: world view, people, environment, economy, states, markets, and global links. The indicators are compiled by the World Bank and international partners, providing more than 900 variables for 208 economies from 1960 to 2016.

Samples are collected from ten countries: Bangladesh, China, India, Japan, Malaysia, Pakistan, Philippines, Singapore, Thailand and U.S. Japan, Malaysia Singapore and U.S are categorized as migrant host countries in this seven countries and, Bangladesh, China Pakistan, Philippines and Thailand are migrant sending countries. We developed panel data for year 1990 to 2000 and 2001 to 2011 from the WDI database. Panel data usually give the researcher a large number of data points, increasing the degrees of freedom and reducing collinearity among explanatory variables, hence improving the efficiency of econometric estimates.

Descriptive statistics of the samples are presented in Table 1. Except GDP growth and FDI outflow, datasets representing education attainment, high skilled migrant and migrant movement are containing missing values. We utilize multiple imputation to supplement missing values and develop a balanced dataset.

Table 1 Descriptive statistics of the samples

	Average	Median	Standard deviation	Number of obs.
GDP growth (%)	5.109915	4.965263	3.731564	210
Attainment rate of higher education (%)	29.99343	25.78312	24.55393	210
Emigration rate of tertiary education (%)	7.660076	4.063126	7.7393	210
Movement rate from developing countries (%)	5258458	1366394	10142763	210
FDI amount of outflow to migrant sending country (USD)	3.148981	1.493256	4.572826	210

3.2 Missing data imputation

Missing data are problems because nearly all standard statistical methods presume complete information for all the variables included in the analysis.¹ A relatively few absent observations on some variables can dramatically shrink the sample size. As a result, the precision of confidence intervals is harmed, statistical power weakens and the parameter estimates may be biased. The frequencies of each missing data pattern and the number of missing values are shown in Table 2. Three variables, attainment of tertiary education, emigration with tertiary education and movement rate of migrant are including missing values.

We used multiple imputation to handle these missing data. To impute the missing data, we constructed multiple regression models² including variables potentially related to the fact that the data were missing and also variables correlated with that outcome. Datasets used to impute presented in Table 3; these datasets are selected to have correlation coefficients > 0.4 with dataset with missing values (Collins et al. 2001). Calculations were done in Stata 11,³ estimation with multiple regression applied to each imputed dataset separately. These estimates and their standard errors were combined using Rubin's rule. Imputed dataset were also given from the WDI.

Table 2 Characteristics of missing data

Variables with missing values	Number of missing values	Number of obs.	Missing rate (%)
GDP growth (%)	0	210	0
Attainment rate of higher education (%)	62	148	29.52381
Emigration rate of tertiary education (%)	190	20	90.47619
Movement rate from developing countries (%)	160	50	76.19048
FDI amount of outflow to migrant sending country (USD)	0	210	0

Table 3 Imputed datasets for missing data

Variables with missing values	Variables used for imputation
Attainment rate of higher education (%)	Government expenditure on tertiary education (USD) Government expenditure on tertiary education, percent of GDP (%) Number of tertiary schools (schools)
Emigration rate of tertiary education (%)	Migration stock of the country (person) Enrolment rate of migrant sending country (%) Unemployment rate of tertiary educated (%)
Movement rate from developing countries (%)	Migration stock of the country to all population (%) Annual population growth of migrant sending country (%)

4. Analysis

4.1 Result of multiple regression

Hausman test was applied for the model specification whether fixed or random effect model should be utilized to analyze. The result of the test 0.00473 indicates fixed effect model is appropriate. We also utilized the F-test for model specification. According to these two tests, one-way fixed effect model is appropriate for estimation.

Table 4 presented the result of one-way fixed effect model analyzing the relationship among economic growth, migration and FDI flow. Our analysis showed that attainment of tertiary education, emigrant with tertiary education and FDI outflow are statistically significant. Coefficients of education migrant with tertiary education and FDI outflow are positively

connected to GDP growth of the country. The coefficient of migrant with tertiary education equals to 0.12203, which implies that if proportion of migrants with tertiary education increased in 1%, the GDP growth of the country would increase in 0.12%. The coefficient of FDI outflow equals to 0.18241, which implies that if FDI outflow to migrant sending countries increase in 1 USD, GDP growth would boost by 0.18%. However, attainment of higher education in the country represented statistically significant but negative effect on GDP growth. This could mean that high movement rate of laborers who have high skill or high diploma seeking higher wages than home countries. Contrarily to this, the coefficient of movement rate of migrant including not only the high skilled but also the low skilled did not show statistically significant result.

Table 4 Result of multiple regression

Estimation method	One-way fixed effect model	
Constant term	6.48273	
Independent variable	Partial regression coefficient	Standard error
Attainment rate of higher education (%)	-0.08499*** [-6.69642]	0.01269
Emigration rate of tertiary education (%)	0.12203* [1.71456]	0.10047
Movement rate from developing countries (%)	0.00004 [0.78836]	0.00005
FDI amount of outflow to migrant sending country (USD)	0.18241** [2.43255]	0.07496
R-squared	0.47688	
Adjusted R-squared	0.22742	
Hausman	0.00473	
Number of obs.	210	

*, ** and *** represent $p < 0.1$, $p < 0.05$ and $p < 0.01$ respectively.

t values are in brackets.

4.2 Robustness check

Table 5 presented the result of robustness check of our estimation model. We utilized quantile regression to check robustness check. Table 5 presented robustness check on estimation model in three cases, 1) full regression; 2) 0.25 quantile 3) 0.5 quantile (median regression) and 4) 0.75 quantile. Column 1 presents the results of multiple regression with full percentile; column 2

presents the results of 25 percentiles, column 3 presents results of 50 percentiles and column 4 showed result of 75 percentiles. In all four cases, both coefficients representing the emigrants with tertiary education and FDI outflow to migrant sending countries represent consistently stable and statistically significant on GDP growth.

Table 5 Result of robustness check

Dependent variable	Literacy rate (%)			
	(1) Full regression	(2) 0.25 quantile	(3) 0.5 quantile	(4) 0.75 quantile
Attainment rate of higher education (%)	-0.08499***	-0.07325***	-0.08087***	-0.08833***
Emigration rate of tertiary education (%)	0.12203*	0.15065*	0.13628 *	0.10068*
Movement rate from developing countries (%)	0.00004	0.00009	0.00006	0.00002
FDI amount of outflow to migrant sending country (USD)	0.18241**	0.29669**	0.05891**	0.26831**
R-squared	0.47688	0.1228	0.1647	0.2036
Number of obs.	210	210	210	210

*, ** and *** represent $p < 0.1$, $p < 0.05$ and $p < 0.01$ respectively.

5. Concluding Remarks

According to the results of multiple regression analysis, emigrant with tertiary education and FDI outflow are positively correlated with GDP growth and economic development of the migrant host and sending countries. We suppose that this result proved that the positive effect of high skilled migration could help economic development of host countries and also attract investment to home or migrant sending countries.

In this analysis, high skilled migration is appeared significantly positive on economic development; however, migrants with high skill are often related to brain drain of migrant home countries. Brain drain in leading literatures is described as negative factor of economic growth of migrant sending countries however, the result presented in this paper might prove that not low skilled but high skilled migrant attract FDI from the host countries. This paper proves quantitative relation between high skilled migration, FDI and economic growth in Asia-Pacific however, relationship between suzerain states and former colonial countries are

not considered in estimation model. In our samples, Bangladesh, India and Pakistan still have strong relationship with UK, and large number of both low, high skilled people migrated to Britain.

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Notes

- 1 According to Dermirtas and Hedeker (2008), 25% of missing rate is the upper limit to accurate estimation.
- 2 A regression model (below) is fitted for each variables with missing values, previous variables as covariates:

$$Y = \beta_0 + \beta_1 Y_1 + \beta_2 Y_2 + \beta_3 Y_3,$$
 where Y is a variable with missing values; Y_1 , Y_2 and Y_3 are imputed variables.
- 3 Stata is a general-purpose statistical software package created in 1985 by StataCorp. Most of its users work in research, especially in the fields of economics, sociology, political science, biomedicine and epidemiology..