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Factor Mobility, Net Migration, Growth and the Lot of the Poorest Quintile in Developing Countries

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This article examines the impact of factor mobility and migration on per capita gross domestic product (GDP) growth and the welfare of the poorest quintile in developing countries. Based on data from the World Bank and using a sample of 46 developing economies, we found that the per capita GDP growth is linearly dependent upon net migration, infrastructure investment, the level of educational attainment, the percentage of rural and urban population with sanitation and water services, the possible effect of improved health and investment. The regression results also show that the share of the poorest quintile in national consumption or income is a linear function of the level of urbanisation, the level of educational attainment, infrastructure investment and investment. These results could assist policy makers in developing countries identify areas in which budgets need to be reallocated to stimulate economic growth.

Keywords: *Infrastructure, Net Migration, Urbanisation, Agglomeration, Sanitation Services, Developing Countries*
JEL Classifications: *O10, O12*

1. Introduction

Labour and capital, among other factors, help drive economic growth. It is their movements, however, that assist with concentration of economic activity. Since the 1970s, most restrictions on the flow of capital have been eliminated. Caselli and Feyrer (2007) attribute the persistence of low capital ratios in poor countries to low endowments of complementary factors and low efficiency, as well as to low prices of output goods relative to capital. On the other hand,

Minh Quang Dao is Professor of Economics at Eastern Illinois University, Illinois, USA; e-mail: mqdao@eiu.edu.
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relative to capital, labour is less mobile due to several factors such as cultural and linguistic barriers or political restrictions.

Unlike earlier migration theories based on surplus labour and decreasing returns to scale, new ones recognise that economically driven migration is beneficial, especially when it takes place in conjunction with agglomeration. Governments in developing countries, therefore, should undertake policies that can improve the quality of migration and encourage economic growth. Agglomeration benefits in places of choice due to labour mobility more than outweigh the social costs of congestion. Ratha and Shaw (2007) also estimated that South–South migration is nearly as large as South–North migration as 74 million, or nearly half, of migrants from developing countries reside in other developing countries, implying a shift in the pattern of international migration.[1]

Lower transport costs due to improvement in technology and infrastructure have resulted in steady growth of mobility of labour within countries throughout the twentieth century, with acceleration in its last two decades. According to the *World Development Report 2009* (World Bank, 2008), educational attainment also increases international migration, especially that of skilled workers. One may interpret this as a bias in the composition of international migration in favour of skilled workers as a result of 'selective' immigration policies in high-income countries. In addition, human capital, unlike other inputs in the production process, exhibits increasing returns to scale while at the same time generates positive spillovers, especially when people are clustered, as is the case in cities.

The present study empirically examines the impact of net migration, infrastructure investment, human as well as physical capital and institutions on economic growth and on the share of the poorest quintile in national consumption or income in a developing country. Statistical results of such empirical examination will assist policy makers in those countries identify areas the budgets for which need to be reallocated in order to stimulate economic growth and improve the lot of the poorest quintile.

This article is organised as follows. Section 2 gives a selected review of the literature on factor mobility and migration in developing countries. This is followed by the formulation of a statistical model to be estimated. Theoretical underpinnings for the inclusion of explanatory variables are included in Section 3. Statistical results are reported in Section 4. Finally Section 6 gives concluding remarks as well as policy recommendations.

[1] The top 15 destinations now include Côte d'Ivoire, India, the Islamic Republic of Iran, Jordan and Pakistan.

2. A Selected Review of the Literature

Harris and Todaro (1970) developed a model of labour mobility in developing countries to show that the persistence of rural–urban migration even in the face of high urban unemployment is consistent with rational behaviour on the part of the individual migrants. They demonstrate that wage subsidies or direct government hiring to generate urban employment opportunities may lead to worsening of the problem of urban unemployment. They then argue that a 'policy package' that includes both partial wage subsidies/direct government hiring and measures to restrict-free migration would be optimal.

Cole and Sanders (1985) pointed out the limitations of the Todaro's (1969) model and complemented it by developing one that utilises the perspective of an urban subsistence sector to which masses of relatively unskilled workers migrate and in which they work. They argue that the growth of the urban manufacturing sector leads to an increase in the demand for goods and services produced by the urban subsistence sector and thus to an increase in wages in the latter sector. This in turn will draw more rural residents to the urban subsistence sector and improve the overall productivity as well as the welfare of both migrants and those who stay in the rural sector. In the same vein, Morrison (1993) used a stochastic frontier production function framework to show that internal migration in Peru directly affects its urban development and has increased its gross domestic product (GDP).

Massey (1988) argued that the process of economic development in the short run will lead to an increase in international emigration as displaced people seek wider opportunities in more dynamic economies abroad. Only in the long run, when there is equalisation of standards of living through development do we see the disappearance of international and large-scale labour movement.

While exogenous growth models predict convergence as a result of factor mobility, endogenous growth models imply a cumulative process of regional divergence due to factor mobility. Faini (1996) developed a simple model of regional growth based on mobile factors, increasing return to scale and diminishing returns to a reproducible factor in order to give more solid micro-economic foundations to migration choice specification. He showed that while endogenous self-sustaining growth is not possible due to diminishing returns to the reproducible factor, convergence is not guaranteed even within the endogenous growth framework. In fact, he demonstrated that convergence is more likely to occur; the greater the scope for scale economies and the lower the degree of labour mobility.

On the other hand, more recently, Clemens, Montenegro and Pritchett (2008) argued that there exists a 'place premium' by documenting that for many countries the presence of barriers to movement across international borders causes the largest known forms of wage discrimination in the form of wage gaps. Such wage gaps account for one the largest remaining types of price distortions in any global market and they infer that free labour mobility is more effective than any existing type of antipoverty measures.

One undisputable major benefit of international migration is the volume of workers' remittances, which has surpassed all other types of capital flows to poor and middle-income countries (Pritchett, 2006; Ratha and Xu, 2008). The issue of brain drain has also recently received more attention in the development economics literature. Beine, Docquier and Rapoport (2006) found a positive impact of skilled migration prospects on gross human capital levels in a sample of 127 developing economies. They found that countries with low levels of human capital and low skilled emigration rates are likely to experience a net gain, while the converse is also true. Given that the largest developing countries are all winners, brain drain may result not only in an increase of skilled workers worldwide but also in a large number of them living in developing countries. For Africa, Easterly and Nyarko (2008) found that on an average the brain drain is good in the sense that it positively affects skill accumulation which more than offsets the loss of skills; even though their finding is based on special assumptions and unreliable data that merit further investigation.

In this article, we wish to empirically analyse the effect of net migration[2] on economic growth and the share of the poorest quintile in national consumption or income using a sample of 46 developing countries.[3] We hypothesise that per capita GDP growth in a developing country is a linear function of the following factors: net migration, infrastructure investment as measured by road density, the level of educational attainment as measured by the adult literacy rate, the percentage of the rural population and that of the urban population with

[2] While the economic literature on international migration emphasises the benefits to the developing countries of origin, we shall argue that recipient developing countries stand to gain more from labour movements across international borders. Hence, we would like to investigate the impact of net migration on economic growth in the developing world.

[3] The sample consists of the following countries: Albania, Algeria, Argentina, Armenia, Bangladesh, Benin, Bolivia, Brazil, Bulgaria, Burkina Faso, Cambodia, Cameroon, Chile, Costa Rica, Côte d'Ivoire, Croatia, Ecuador, Egypt Arab Republic, Ethiopia, Ghana, Guinea, Hungary, India, Indonesia, Jordan, Kenya, Malaysia, Mali, Mexico, Moldova, Morocco, Nepal, Nicaragua, Pakistan, Panama, Peru, Philippines, Russian Federation, Senegal, Sri Lanka, Tajikistan, Tanzania, Tunisia, Turkey, Uganda and Ukraine.

sanitation services, the percentage of the urban population with water access, male life expectancy at birth used as a proxy for the possible effect of improved health and investment as measured by gross capital formation as a percentage of GDP. We also hypothesise that the share of the poorest quintile in national consumption or income is linearly dependent upon the level of urbanisation as measured by the agglomeration index, the level of educational attainment as measured by the primary completion rate, infrastructure investment as measured by rail density and investment as measured by gross capital formation as a percentage of GDP.

3. The Statistical Model

If we assume that various factors linearly affect per capita GDP growth in a developing country, we can state the following statistical model:

$$PGDPGr = \beta_0 + \underset{(+)}{\beta_1 GrossK} + \underset{(+)}{\beta_2 Literacy} + \underset{(+)}{\beta_3 NetMigr} + \underset{(+)}{\beta_4 UrbSan} + \underset{(+)}{\beta_5 Road} + \underset{(+)}{\beta_6 RurSan} + \underset{(+)}{\beta_7 UrbH_2O} + \underset{(+)}{\beta_8 MaleExp} + \varepsilon \quad (1)$$

where *PGDPGr* = GDP per capita growth, 2006–07
GrossK = gross capital formation as a per cent of GDP, in 2007
Literacy = adult literacy rate, as a per cent of persons aged 15 and above, in 2005
NetMigr = total net number of migrants, in thousands of people, during 2000–05
UrbSan = per cent of the urban population with sanitation access, in 2004
Road = road density, in road kilometre per 100 km^2, 2000–06
RurSan = per cent of the rural population with sanitation access, in 2004
$UrbH_2O$ = per cent of the urban population with access to water, in 2004
MaleExp = male life expectancy at birth in years, in 2005
ε = random-error term, with mean 0

Following neoclassical growth models, we assume that the saving rate is exogenous and equal to the ratio of gross capital formation to output. A higher saving rate allows for a higher steady-state level of output per effective worker as he/she has more capital with which to work. This in turn increases the per capita growth rate for a given starting value of GDP.

To capture the effect of human capital on growth, we use two variables: the adult literacy rate[4] and following Dao (2009) the male life expectancy at birth used as a proxy for the possible effect of improved health. The ability to read and write is a prerequisite for workers to follow directions as well as communicate with other fellow workers and their supervisor in the production process.[5] We thus expect that developing countries with a higher percentage of the population being literate are more likely to experience more growth. Similarly, when workers are healthy, they are more likely to show up for work more often, and this in itself is a measure of labour productivity. Developing economies in which people are more healthy thus are more likely to grow faster than those in which a large segment of their population suffer from illnesses that prevent them from being able to actively participate in the productive process.

As the international migration of skilled workers relative to that of unskilled workers has been rising since the 1970s for every developing world region, we expect that receiving countries would experience an increase in labour efficiency. We treat this as a proxy for technological progress, which over time expands the receiving country's ability to produce. An increase in net migration, or the number of immigrants less the number of emigrants, including both citizens and non-citizens, is expected to lead to a raise in per capita GDP growth.

To estimate the effect of institutions on economic growth in developing countries, we include both the percentage of the urban and rural population having sanitation services as well as the percentage of the urban population with water access.[6] Finally, the role of infrastructure investment in promoting economic growth is estimated using road density. We expect all these four variables to exert a positive effect on growth.

We next specify a model explaining how factor mobility affects the share of the poorest quintile in national consumption or income in a developing country. Assuming that this share is linearly affected by various explanatory variables, we state the following statistical model:

$$\underset{}{Low20} = \underset{}{\beta_0} + \underset{(+)}{\beta_1 GrossK} + \underset{(+)}{\beta_2 Agglomeration} + \underset{(+)}{\beta_3 Primary} + \underset{(+)}{\beta_4 Rail} + \varepsilon \qquad (2)$$

[4] In one of the early regressions, we include the percentage of students completing the last year of primary school, but find that it is statistically insignificant, and thus remove it from the statistical model. Results of these regressions are available from the author upon request.

[5] However, one must exert caution when using this data because developing countries define literacy differently while also using different methodologies of data collection.

[6] We did include the percentage of the rural population having water access but found it to be insignificant and thus decided to omit it from the model. Again, these results may be obtained from the author upon request.

where
Low20 = share of the poorest 20 per cent of the population in consumption or, in some cases, income, for 1992–2005
GrossK = gross capital formation as a percentage of GDP, in 2007
Agglomeration = agglomeration index, 0 (low) to 100 (high), in 2000[7]
Primary = primary completion rate, in 2006
Rail = rail density, in rail kilometre per 100 km^2, 2000–06

Data for all variables are from the World Bank (2008).

4. Empirical Results

Table 1 gives least-square estimates of regression coefficients in equation (1) for a sample of 46 developing economies. The goodness-of-fit of the model to the data is good as indicated by the value of 0.395 of the adjusted coefficient of determination. We observe that all variables with the exception of the percentage of the urban population with access to water are statistically significant. We also note that the coefficient estimates for both the percentage of the rural population with sanitation services and male life expectancy at birth have the unexpected negative sign. This may be due to some degree of collinearity among explanatory variables. All else equal, a one-percentage point increase in the share of gross

Table 1 Dependent Variable: Per Capita GDP Growth Rate

	Coefficient Estimate	*t-Statistic*
Intercept	–2.368	–0.833
GrossK	0.195	2.980**
RurSan	–0.080	–2.743**
UrbSan	0.108	2.658**
Road	0.024	2.446**
Literacy	0.099	4.650**
NetMigr	0.001	1.740*
$UrbH_2O$	0.004	1.306
MaleExp	–0.163	–2.212*

Source: Author's calculations.
Notes: Adjusted $R^2 = 0.395$.
*Significant at the 5 per cent level.
**Significant at the 1 per cent level.

[7] See the discussion on the computation of the agglomeration index and its advantage in the World Bank (2008: p. 54).

capital formation in the GDP is expected to result in a 0.195 per cent increase in per capita GDP growth rate in a developing country included in the sample. On the other hand, a one-percentage point increase in the share of the urban population with access to sanitation services is expected to lead to a 0.108 per cent increase in per capita GDP growth rate. Holding all other variables constant, as road density increases by 1 km per 100 km^2, we would expect the average annual growth rate of GDP per capita to increase by 0.025 per cent.

All else equal, a one-percentage point increase in adult literacy rate is expected to lead to an increase of 0.099 per cent increase in per capita GDP growth rate. Holding other variables constant, a one-thousand person increase in net migrants is expected to bring about an increase of 0.001 per cent in per capita GDP average annual growth rate.

Table 2 presents least-square estimates of regression coefficients in equation (2) for the same sample of 46 developing economies. We note that the goodness-of-fit of the model to the data is reasonably good as indicated by the value of 0.339 of the adjusted coefficient of determination. We also observe that all variables with the exception of the agglomeration index are statistically significant. However, the coefficient estimate for this variable and that for the primary completion rate do not have the expected positive sign. This again could be due to the severe multicollinearity problem that is present among the explanatory variables, as indicated by the sample correlation coefficient matrix presented in Table 3.

All else equal, a one-percentage point increase in the share of gross capital formation in the GDP is expected to lead to a 0.094 per cent increase in the share of the lowest quintile in consumption of income. On the other hand, as rail density increases by 1 km per 100 km^2 in a developing country, one would

Table 2 Dependent Variable: Share of the Poorest 20 per cent of the Population in Consumption or Income

Right-hand Variable	*Coefficient Estimate*	*t-Statistic*
Intercept	6.355	4.698
GrossK	0.094	2.199*
Agglomeration	–0.018	–1.049
Primary	–0.025	–1.691*
Rail	0.585	3.738**

Source: Author's calculations.
Notes: Adjusted $R^2 = 0.339$.
* Significant at the 5 per cent level.
** Significant at the 1 per cent level.

Table 3 Sample Correlation Coefficient Matrix

	GrossK	*Agglomeration*	*Primary*	*Rail*
GrossK	1			
Agglomeration	0.198	1		
	1.343			
Primary	0.145	0.620	1	
	0.975	**5.238**		
Rail	0.301	0.297	0.276	1
	2.092	**2.061**	1.902	

Source: Author's calculations.
Note: Bold t-statistics imply statistical significance at the 10 per cent or lower level.

expect that the share of the bottom quintile in consumption or income to increase by 0.585 per cent, holding other variables constant.

Table 4 presents regression results when interaction variables are included in the model explaining cross-country differences in the share of the poorest 20 per cent of the population in consumption or income. We note that the goodness-of-fit of the model to the data improves as indicated by the higher value of 0.364 of the adjusted coefficient of determination.

Table 4 Dependent Variable: Share of the Poorest 20 Per cent of the Population in Consumption or Income (With Interaction Variables)

	Coefficient Estimate	*t-Statistic*
Intercept	8.323	8.390
Agglomeration	–0.069	–2.571*
Primary	–0.023	–1.591
Rail	0.569	3.698*
AgglGross	0.002	2.583*

Source: Author's calculations.
Note: Adjusted $R^2 = 0.364$.
*Significant at the 5 per cent level.

Although the share of gross capital formation in the GDP variable itself is no longer statistically significant, its interaction with the agglomeration index variable does exert a significant impact on cross-country variations in the share of the lowest quintile in consumption or income in a developing country. On the other hand, the agglomeration index now linearly affects the dependent variable even though its coefficient estimate has the unexpected negative sign. We observe that the primary completion rate variable is close to being statistically

significant, but its coefficient estimate continues to have the unexpected negative sign. This may imply that an improvement in the primary completion rate adversely affects the share of the poorest quintile in consumption or income in a developing country. We also note that the impact of rail density on the dependent variable is almost the same whether or not interaction variables are included in the statistical model.

The impact of gross capital formation in a developing country is enhanced by the degree of urbanisation, as measured by the agglomeration index. Both investment and institutions work together to improve the lot of the poorest segment of the population in the developing world, as indicated by the positive value of the coefficient estimate for the interaction variable between the agglomeration index and share of gross capital formation in the GDP. However, agglomeration in itself may worsen the lot of this segment of the population.

5. Conclusion

We have used a statistical model and data from a sample of 46 developing economies to empirically analyse the impact of factor mobility and migration on per capita GDP growth and the share of the bottom 20 per cent of the population in consumption or income. Based on this, we can make certain observations. First, while the share of gross capital formation in the GDP positively influences growth in a developing country, it is its interaction with the agglomeration index that leads to an improvement in the share of the poorest quintile in consumption or income. This empirical finding supports the beneficial impact of factor mobility on this segment of the population in the developing world.

Second, institutions in the form of spatially blind and universal policies do play an important role in fostering economic growth in developing countries. For example, increasing the percentage of both the urban and the rural population with access to sanitation services as well as the fraction of the urban population with an improved water source goes a long way towards raising per capita GDP growth.

Further, infrastructure investments that increase road and rail density exert a significant impact on growth as well as the well-being of the poorest segment of the population in the developing world. Additionally, human capital investments that lead to an improvement in either the literacy rate or the primary completion rate as well as an increase in average male life expectancy lead to higher growth as well as an improvement in the lot of the poorest

20 per cent of the population. And finally, an increase in net migration, as a result of removing restrictions on labour mobility, positively influences economic growth in developing countries.

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