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RELATIVE WAGES AND WORKFORCE SKILL LEVEL IN A MODEL OF PERSISTENT MIGRATION

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Abstract: Countries that are predominantly a source of migrants are concerned with issues such as the loss of skilled workers while those that are primarily a destination for migrants are concerned with how the existence of low-skilled workers affects labor market outcomes. In this paper, we address this aspect of migration by identifying two types of labor: skilled and unskilled, in a two-period overlapping generations model where there are increasing returns, enabling migration to be persistent (Reichlin and Rustichini, 1998). We assume that both the skill choice and the migration choice are endogenous and that the probability of migrating may be less than one. We identify two patterns of migration where those who acquire skill in the migrant-sending country may migrate either as a skilled worker or as an unskilled worker. Using numerical simulations, we find that in terms of the composition of labor, i.e. the skilled to unskilled labor ratio, both the migrant-sending and the migrant-receiving countries benefit from a higher probability of mi-gration, either as a skilled migrant or as an unskilled migrant. This holds true even if migrants were allowed to migrate only as skilled workers. For the migrant-receiving country, one result is that their workforce composition is better the more immigrants acquire jobs as skilled workers. In terms of wages, we find that the unskilled to skilled wage gap is lower in the migrant-sending country the higher the probability of migrating, whether as a skilled worker or an unskilled worker. For the migrant-receiving country, however, a higher probability of skilled migration while limit-ing unskilled worker migration makes their unskilled to skilled wage ratio improve. We also note that if the migrant-receiving country were to accept more migrants as unskilled workers, then both countries experience wider wage gaps between their unskilled and skilled workers, than if they accepted more skilled workers. And, a higher probability of skilled worker migration is very ben-eficial to the migrant-sending country as both their skilled and unskilled wages are closer to those of the migrant-receiving country.

Keywords: international labor migration, overlapping generations, wages, skilled workforce, un-skilled workforce

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1 INTRODUCTION

It has been reported that 35 percent of all migrants from developing countries found in developed countries have a university degree, 30 percent graduated from high school, and around 35 percent left school before finish high school.(International Organization for Migration (IOM), 2008). Meanwhile, most migrant-receiving countries today have several programmes for the intake of workers of different skill levels and they also differ in their approach. This implies that success-ful migration can only occur with a given probability depending on the skill level or qualifications of the migrants. From the perspective of the migrant-sending country, the emigration of skilled workers is an issue which in the development literature has been assessed to see if it is detrimental or not to the economy, normally referred to as “brain drain.”. In the development literature, Bhag-wati and Hamada (1974) assess that brain drain may have negative effects welfare while some studies also show how the emigration of skilled workers can be beneficial for the migrant-sending country such as those of Miyagiwa (1991), Mountford (1997), Beine et. al.(2001) and Fan and Stark (2007) either through growth or some measure of the level of educated workers left behind in the migrant-sending country.

Another issue we consider is the existence of “overqualified” immigrants in destination countries. This issue may still be studied further in the migration literature as accounts of immi-grants adopting employment of a lower skill qualification do exist. According to the Organisation for Economic Co-operation and Development, in the year 2000, 25 percent, 17 percent and 19 per-cent of the foreign-born populations in Canada, U.S., and Australia were holding a job for which they were overqualified.[1]

Hence, in this paper, we take these issues into consideration and modify the model in-troduced by Reichlin and Rustichini (1998) and extended by Goenka and Sauler (2012) to take into account that migration flows are composed of both skilled and unskilled labor. Through an overlapping-generations model with two countries, we then numerically assess the effect of these on the relative skill level of the workforce as well as the relative wages of the migrant-sending country.

2 THE MODEL

In this model, three additional assumptions are made to the model of homogenous labor with persistent migration (Reichlin and Rustichini, 1998; Goenka and Sauler, 2012). First, all newborn at each time period t are born unskilled for both countries. The next two additional as-sumptions are made to simplify the model. One is that only individuals that are skilled can migrate. And, the other is that all those who apply for migration face the possibility of migrating as an un-skilled worker, even if they get a higher wage.

To simplify notation, we label the sending country as $^{0}D^{0}$, the domestic country and the receiving country as $^{0}F^{0}$, the foreign country.Firms in each country face a technology where there are two types of labor, where j = D; F and where t represents each time period.

$$Y_t^j = A(K_t^j)\,(L_t^j)\,(N_t^j)^1 \tag{1}$$

where $A = K_t$, which represents aggregate capital

Y_j = is total output
K_t^j = is the level of capital
L_t^j = is the level of skilled labor
N_t^j = is the level of unskilled labor

Due to perfect competition, the returns to capital and wages for skilled and unskilled workers are

$$w_t^j = \beta(K_t^j)^{\alpha+\eta}(\pi_t^j)^{\beta-1}(N_t^j)^{-\alpha} \tag{2}$$
$$v_t^j = (1-\alpha-\beta)(K_t^j)^{\alpha+\eta}(\pi_t^j)^{\beta}(N_t^j)^{-\alpha} \tag{3}$$

where $\pi_t^j = L_t^j/N_t^j$
w_t^j = the skilled labor wage
v_t^j = the unskilled labor wage.

There are two patterns of migration which can be assessed: Pattern 1, where we consider the flow of migration from country D to country F where immigrants become skilled workers and Pattern 2, where we consider the possibility where migrants from country D can become either a skilled worker or an unskilled worker in country F . For Pattern 1, we assume that for both countries D and F , it must be that $w_t^j > v_t^j$ where i; j = D; F . Thus, all newborn individuals are unskilled and make a decision on whether to acquire skill or not and this applies to both countries. Our assumption on skilled wages and unskilled wages for both countries in Pattern 1 is as follows: $w_t^F > w_t^D > v_t^F > v_t^D$. This automatically restricts the flow of migration from country D to country F and that only those with skill from country D can apply for migration. This rests on the assumption that only those who have acquired skill can apply for migration. For Pattern 2, the difference is in v^F and w^D. Our assumption on skilled wages and unskilled wages in this pattern is as follows: $w_t^F > v_t^F > w_t^D > v_t^D$. Hence, for this pattern, those who apply for migration from country D now face three possibilities. They may be accepted as a skilled migrant in country F , an unskilled migrant in country F or neither, and in which case the applicant will work as a skilled worker in country D.

From utility maximization, we can then solve for the relative wage structure and the cap-ital flows which follows from Reichlin-Rustichini (1998). For each time period t, we have these equations at steady-state with Pattern 2. Note that the equations below also apply when we have Pattern 1, except in that case q = 0.

$$t = \frac{(1 \quad t^{D})(t^{D}_{1} \; t \; 1 + t \; 1)}{(1 \; t^{F})(t^{F}_{1} + 1) + q \; t \; t^{D}(t^{D}_{1} \; t \; 1 + t \; 1)(1 \; p \; t} \tag{4}$$

$$t^{D} = \frac{q \; t)\, t^{D}}{(1 \quad t^{D})} \tag{5}$$

$$t^{F} = \frac{t^{F}(t^{F}_{1} + 1) + p \; t \; t^{D}(t^{D}_{1} \; t \; 1 + t \; 1)}{(1 \quad t^{F})(t^{F}_{1} + 1) + q \; t \; t^{D}(t^{D}_{1} \; t \; 1 + t \; 1)} \tag{6}$$

where

$$t^{D} = 1 \quad t^{D} \tag{7}$$

$$t^{F} = 1 \quad t^{F} \tag{8}$$

$$t = \frac{p(1 \quad t(\frac{t^{D}1}{t^{F}})) + q(t \quad t(\frac{t^{D}1}{t^{F}}))}{p + q \; t + (1 \quad p \quad q)\, t(\frac{}{t^{F}})} \tag{9}$$

where = =1 , = =1 and = =1 .

$_t$ = the ratio of unskilled labor

^{D} = the ratio of skilled to unskilled labor in country D ^{F} = the ratio of skilled to unskilled labor in country F r^{j}_{t} = the rental rate of capital

$_t$ = the proportion that wants to migrate

$^{j}_{t}$ = the proportion that acquires skill

p = probability of migrating as a skilled worker

q = probability of migrating as an unskilled worker

3 ANALYSIS AND RESULTS

We choose to use the following parameters: = 0:35; = 0:45 and = 0:25, which give us = 0:625; = 1:125 and = 0:444. We choose these parameters to be as close to typically used values for these parameters while still allowing for the condition on to hold. The other important parameter choice is that of , the ratio of birth rates. For this model, we also need > 1 for the migration to be sustained from country D to country F .[2]

We discuss the results below of ^{i}, i = D; F , as a function of both p and q, the probabilities of migrating as skilled labor and unskilled labor, respectively, noting that p + q 1. For Pattern 1, as illustrated in Table 1, which is a summary of results, we observe that as the probability of migrating as a skilled worker increases, ^{D} then increases. This implies that there are now relatively more of the unskilled newborn that choose to go to school, and relatively fewer of those that actually get to migrate and, thus, the domestic country is left with relatively more skilled workers than unskilled workers as the probability of migrating as a skilled worker increases. As for country F , we find that steady-state ^{F} is increasing in p. This implies that as the probability of migrating as a skilled worker increases, then there will be relatively more skilled workers in country F , and thus have a higher skilled to unskilled workforce ratio. For Pattern 2, ^{D} is increasing in q which implies that there are still relatively more of newborn population that opt to stay unskilled as probabilities of migration are quite low. As for ^{F} , it is decreasing in q as there are relatively more unskilled migrants and they are thus increasing their unskilled workforce.

Table 1: The Role of Probabilities under Heterogenous Labor

Pattern 1: q = 0, p > 0					
	p = 0:20	p = 0:40	p = 0:60	p = 0:80	p = 1
	0.62431	0.89760	0.95481	0.97515	0.98461
D	1.07643	1.07712	1.07724	1.07728	1.07730
F	1.08421	1.08490	1.08502	1.08506	1.08508
Pattern 2: p = 0, q > 0					
	q = 0:20	q = 0:40	q = 0:60	q = 0:80	q = 1
	0.16277	0.26214	0.28724	0.29655	0.30093
D	1.07451	1.07503	1.07515	1.07519	1.07521
F	1.08003	1.07945	1.07932	1.07927	1.07925

[2]We have conducted numerous exercises on the value of and find that the equations are satisfied at steady-state only when > 1, though this cannot be verified analytically. This condition is similar to the case of homogenous labor where the birth rate of the migrant-sending country has to be greater than the birth rate of the migrant-receiving country.

As for wages, for Pattern 1, what we find is that all the relevant wage ratios, $v^D=w^D$, $v^F=w^F$, $v^D=v^F$, and $w^D=w^F$ are all increasing in the probability of migrating as a skilled worker. This can be noted in Table 3. For Pattern 2, we find that $v^D=w^D$, $v^D=v^F$, and $w^D=w^F$ all increase with the probability of migrating as an unskilled worker. However, $v^F=w^F$, the unskilled wage to skilled wage ratio decreases as q increases. This implies that the wage gap, or wage inequality, between unskilled workers and skilled workers increases as the migrant-receiving country opts to receive more unskilled labor. It is also worth noting that when we are comparing domestic to for-eign wages, Pattern 1 results in more favorable scenarios for the wage ratios when comparing the wages of country D to those of county F . The skilled wage and unskilled wage ratios between country D and country F are closer to 1. This implies that a high probability for skilled worker migration leads to a decrease in the gaps of both the skilled wage and unskilled wage between both countries. In addition to this, one result for Pattern 2 shows that the wage differences between country D and country F are much wider. In fact, when q is low (in this particular example, when q = 20%), the wage gap is larger for both skilled and unskilled wages.

Table 2: The Role of Probabilities in Relative Wages with Heterogenous Labor

Pattern 1: q = 0, p > 0					
	p = 0:20	p = 0:40	p = 0:60	p = 0:80	p = 1
$\frac{v^D}{w^D}$	0.47837	0.47867	0.47872	0.47874	0.47875
$\frac{v^F}{w^F}$	0.48182	0.48213	0.48218	0.48220	0.48221
$\frac{v^D}{v^F}$	0.73894	0.92717	0.96367	0.97646	0.98236
$\frac{w^D}{w^F}$	0.74428	0.93387	0.97064	0.98351	0.98946
Pattern 2: p = 0, q > 0					
	q = 0:20	q = 0:40	q = 0:60	q = 0:80	q = 1
$\frac{v^D}{w^D}$	0.47751	0.47774	0.47780	0.47782	0.47782
$\frac{v^F}{w^F}$	0.47996	0.47971	0.47965	0.47963	0.47962
$\frac{v^D}{v^F}$	0.31969	0.43111	0.45658	0.46581	0.47013
$\frac{w^D}{w^F}$	0.32133	0.43288	0.45835	0.46758	0.47189

4 CONCLUSION

We find that, in terms of the composition of labor, i.e. the skilled to unskilled labor ratio, the migrant-sending and the migrant-receiving countries benefit from a higher probability of mi-gration, either as a skilled migrant or as an unskilled migrant. This holds true even if migrants were allowed to migrate only as skilled workers. For the migrant-receiving country, an expected result is that their

workforce composition is better the more immigrants acquire jobs as skilled workers.

In terms of wages, we find that the unskilled to skilled wage gap is lower in the migrant-sending country the higher the probability of migrating, whether as a skilled worker or an unskilled worker. For the migrant-receiving country, however, a higher probability of skilled migration while limiting unskilled worker migration makes their unskilled to skilled wage ratio improve. It is also interesting to note that if the migrant-receiving country were to accept more migrants as unskilled workers, then both countries experience wider wage gaps between their unskilled and skilled work-ers, than if they accepted more skilled workers. And, a higher probability of skilled worker migra-tion is very beneficial to the migrant-sending country as both their skilled and unskilled wages are closer to those of the migrant-receiving country.

REFERENCES

[1] A Profile of Immigrant Populations in the 21st Century (2008), Organisation for Economic Co-operation and Development.

[2] Altonji, J. and Card, D. (1991). The effects of immigration on the labor market outcomes of less-skilled natives, in Immigration, Trade and the Labor Market, John M. Abowd and Richard B. Freeman, eds. 201-231, Chicago: The University of Chicago Press.

[3] Amegashie, J. (2004). A political economy model of immigration quotas. Economics of Gov-ernance, 5, 255-267.

[4] Beine, M., Docquier, F. and Rapoport, H. (2001). Brain drain and economic growth: theory and evidence. Journal of Development Economics. 64, 275-289.

[4] Bhagwati, J. and Hamada, K. (1973). The brain drain, international integration of markets for professionals and unemployment. Journal of Development Economics. 1, 19-42.

[5] Borjas, G. (2009). The analysis of the wage effect of immigration. NBER Working Papers 14796, National Bureau of Economic Research, Cambridge, MA.

[6] Butcher, K. and Card, D. (1991). Immigration and wages: evidence from the 1980s. The Amer-ican Economic Review. 81, 292-296.

[7] Card, D. (2001). Immigrant inflows, native outflows and the local labor market

impacts of higher immigration. Journal of Labor Economics. 19, 22-64.

[8] Comay, Y (1972). The migration of professionals. The Canadian Journal of Economics. 5, 419-429.

[9] Docquier, F., Ozden, C. and Peri,G. (2010). The wage effects of immigration and emigration. NBER Working Paper 16646, National Bureau of Economic Research, Cambridge, MA.

[10] Faini, R. (1996). Increasing returns, migrations and convergence. Journal of Development Economics. 49, 121-136.

[11] Fan, C. and Stark, O (2007). International migration and "educated unemployment". Journal of Development Economics. 83, 76-87.

[12] Friedman, R. and Hunt, J.(1995). The impact of immigrants on host country wages, employ-ment and growth. The Journal of Economic Perspectives. 9, 23-44.

[13] Goenka, A. and Sauler, M. (2012). Persistent migration with heterogenous labor. Unpublished manuscript.

[14] Gonzalez III., J.L. (1997). Filipina domestic helpers in Singapore two years after the Con-templacion furore: some observations for Philippine policy elites". in Proceedings of the In-ternational Conference on Women in the Asia-Pacific Region: Persons, Powers and Politics, Singapore 11-13 August, 1997. Singapore: National University.

[15] Lien, D. and Wang, Y.(2005). Brain drain or brain gain: a revisit. Journal of Population Economics. 18, 153-163.

[16] Miyagiwa, K. (1991). Scale economies in education and the brain drain problem. Interna-tional Economic Review. 32, 743-759.

[17] Mountford, A. (1997). Can a brain drain be good for growth in the source economy?. Journal of Development Economics. 53, 287-303.

[18] Orrenius, P. and Zavodny, M. (2007). Does immigration affect wages? A look at occupation-level evidence. Labour Economics. 14, 757-773.

[19] Ottaviano, G. and Peri, G. (2008). Immigration and national wages: clarifying the theory and the empirics. NBER Working Paper, 14188. National Bureau of Economic Research, Cambridge, MA.

[20] Reichlin, P. and Rustichini, A.(1998). Diverging patterns with endogenous labor migration. Journal of Economic Dynamics and Control. 22, 703-728.