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## **Is the Brain Drain an Unmitigated Blessing?**

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### **Abstract**

Increasingly, immigration policies tend to favour the entry of skilled workers, raising substantial concerns among sending countries. The 'revisionist' approach to the analysis of the brain drain holds that such concerns are largely unwarranted. First, sustained migratory flows may be associated with an equally large flow of remittances. Second, migrants may return home after having acquired a set of productive skills. Finally, the ability to migrate abroad may boost the incentive to acquire skills by home residents.

This paper takes a further look at the link between skilled migration, education, and remittances. It finds little support for the revisionist approach. First, a higher skilled content of migration is found to be associated with a lower flow of remittances. Second, there is little evidence suggesting that raising the skill composition of migration has a positive effect on the educational achievements in the home country.

Keywords: migration, brain drain, education, remittances

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## 1 Introduction

In the nineteenth century migration flows played a key role in fostering income convergence between Europe and the United States (O'Rourke *et al.* 1996). In the present globalization episode, however, the role of migration is much more limited (Faini *et al.* 1999). This is not because of lack of economic incentives. If anything, income differentials between sending and receiving countries are significantly larger than they were less than one century ago (Pritchett 1997).

Restrictive immigration policies in the traditional receiving countries largely account for the more marginal role of migratory flows. Since 1974, immigration policies particularly in Europe have taken an increasingly restrictive stance, seeking both to discourage further immigration and favour return migration.

In the most recent decade migration policies have taken a new turn. In response to the growing shortages of skilled labour, immigration policies have increasingly been geared to favour the entry of skilled workers, while continuing to penalize unskilled flows.

Such trends raises major concerns among sending countries, on at least two counts. First, sending countries will be substantially restricted in their ability to rely on unskilled migration as an engine of growth and convergence. Second, the bias toward skilled flows risks exacerbating the brain drain and could well deprive such countries from their most skilled and talented people. On both counts, it is argued, growth prospects in emigration countries will be curtailed.

The link between migration and growth in sending countries is however quite complex. First, sustained migratory flows may be associated with an equally large flow of remittances that may help relieve the foreign exchange constraint in the home country. Second, migrants may return home after having acquired a set of productive skills with a beneficial impact on the growth prospects of their home country. Finally, the policy bias in host countries toward skilled flows may not necessarily penalize sending countries. As argued most recently by Stark *et al.* (1997, 1998), the incentive to acquire skills may be strengthened by the prospect of being able to migrate. Even in the presence of a brain drain, therefore, the average education level of those left behind in the home country may be higher than otherwise.

Accordingly, in this 'revisionist' approach to the analysis of the brain drain, skilled migration may turn into a 'brain gain' even if no account is taken of the potentially positive effects on the home country of remittances and return migration. Allowing for such factors would then further strengthen the case of the revisionist approach, to the extent for instance that skilled migrants, because of their higher earnings, are likely to generate a larger flow of remittances.

As of now, however, the empirical evidence in support of the supposedly positive effects of skilled migration on the home country is at best limited. Moreover, even the theoretical predictions of the revisionist approach are not unambiguous. First, skilled migrants may have looser links with their home country, for instance because they are more likely to bring their family to the host country and may therefore remit less rather than more. Second, prospective migrants may want to strengthen their chance for admission to the host country by pursuing their graduate studies there. The most talented individuals would then have an incentive to migrate at a relatively early stage

of their school curriculum, thereby definitely reducing the average enrolment ratio in the home country's educational system. Contrary to the revisionist approach, then a higher probability for skilled workers to migrate may be associated with a decline in the home country's educational achievements. Moreover, as shown in the early contribution of Bhagwati and Hamada (1974), the brain drain may interact with domestic distortions so as to unambiguously reduce welfare in the home country. Finally, even the impact of return migration on the home country welfare may be less favourable than generally presumed (Constant and Massey 2002).

The purpose of this paper is to take a further look at the theoretical underpinnings and empirical evidence about the link between skilled migration, education, and remittances. We find little support for the revisionist approach. On the contrary, our results suggest that the concerns in sending countries about the economic impact of skilled migration are warranted. First, a higher skilled content of migration is found to be associated with a lower flow of remittances. As noted earlier, we interpret this result as indicating that skilled migrants tend to loosen their links with their home country, are more likely to bring their family to the host country and, therefore, have a lower propensity to remit. Second, we find little evidence suggesting that raising the skill composition of migration has a positive effect on the educational achievements in the home country. On the contrary, the tertiary enrolment ratio in sending countries is negatively associated with the skilled content of migration.

The remainder of this paper is organized as follows. In the next section, we present the simple static welfare computation of outward migration. We then assess in section 3 how the skilled composition of migration affects education and remittances. We also consider the role of return migration. Section 4 focuses on the existing institutional set-up for international labour flows and concludes with some constructive suggestions.

## **2 The welfare impact of out-migration<sup>1</sup> without a brain drain**

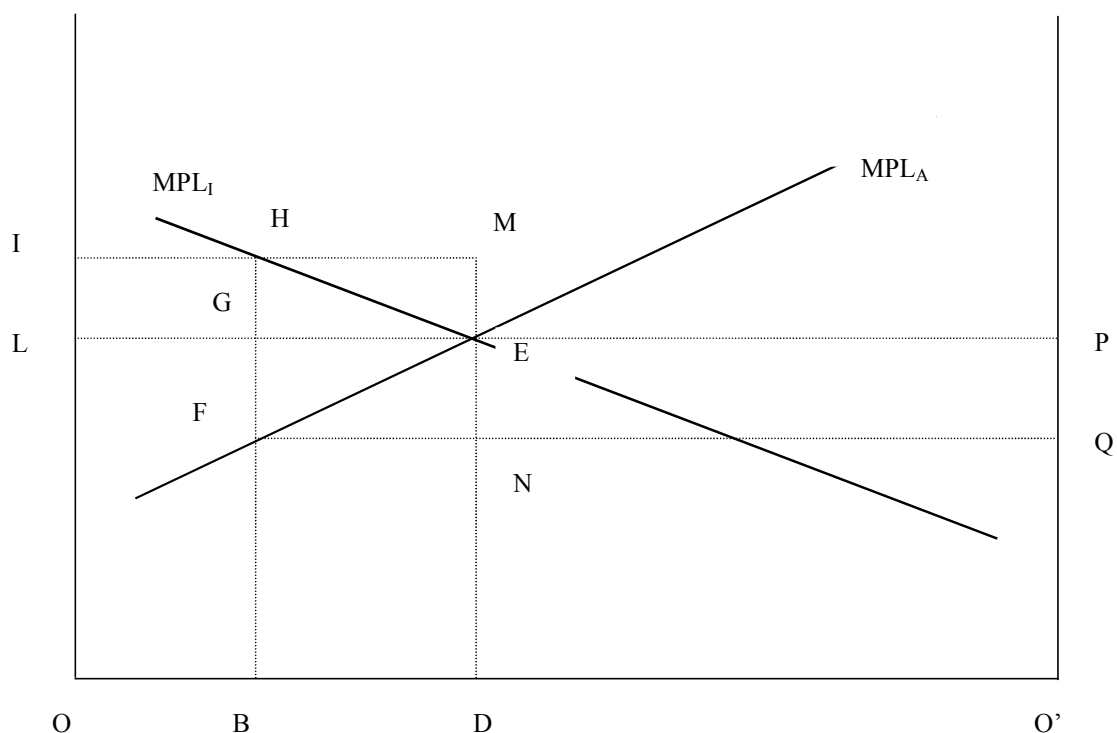
One unresolved issue in the analysis of international migration is whether the welfare of migrants should be attributed to the host or to the home country. Presumably, the simple strategy would be to count temporary migrants that retain close links to their home country in the sending country population and attribute permanent migrants to the receiving country. Yet, this classification is fraught with difficulties, given that by and large the initial intention of migrants to move permanently or temporarily may not coincide with their final choice. Moreover, even permanent migrants retain some links with their country of origin. Overall, therefore, it seems more appropriate to analyse the welfare impact of migration separately for those left behind in the sending country, the migrants themselves, and the receiving country (Bhagwati and Rodriguez 1975).

With these caveats in mind, we can turn to the standard representation of a two country economy in Figure 1. Let A be the source country and I be the host country. Employment in country A ( $L_A$ ) is measured from right to left, in country I ( $L_I$ ) from left to right. The two schedules,  $MPL_A$  and  $MPL_I$ , measure the marginal productivity of

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<sup>1</sup> This section draws on Faini (2002).

Figure 1  
The welfare impact of international migration



labour in country A and I respectively, both as a declining function of their employment levels. The initial equilibrium is at point B. The post-migration equilibrium is at point D, with BD workers having migrated from country A to country I. It can be easily seen that those left behind in the home country suffer a welfare loss. The gains in labour income (the area NEPQ) are more than offset by the losses in income from capital (the area FEPQ). The net loss is equal to FEN. Conversely, the host country enjoys a net welfare gain (HGE). What about migrants? They are clearly better off; otherwise they would not have migrated. More crucially, the gains to migrants (FGEN) more than offset the losses of those left behind. Independently of whether migrants are classified in the home or the host country population, the key fact is that the gains from migration overwhelm the losses of those left behind. Migrants could therefore fully compensate the losers in their host country and still be better off. Moreover, while in most of the welfare literature compensating income transfers are typically seen as a merely theoretical possibility, in the case of migration such transfers do occur, in the form of remittances. Summing up, the net welfare effect of migration on the sending country is ultimately an empirical matter, and will depend on the way migrants are classified and on the amount of remittances. Interestingly enough, these two factors are likely to be closely interrelated to the extent that the propensity to remit may be larger for temporary migrants. On both counts, therefore, the welfare of the sending country should increase. Conversely, the flow of remittances from permanent migrants should be small. The home country will then lose out both because migrants are no longer part of its welfare and because remittances are small.

But how large is the welfare effect of emigration? In a one-good two-factor economy, the rough and ready formula for computing the aggregate welfare impact of migration (Borjas 1995) is:

$$\Delta Q/Q = -(\alpha_L m^2 \varepsilon)/2$$

where  $m$  is the out-migration rate,  $\alpha_L$  is the income share of labour,  $\varepsilon$  is the elasticity of wages with respect to labour, and the welfare change ( $\Delta Q$ ) is measured as a ratio to initial GDP. Suppose that  $\alpha_L = 0.7$ ,  $\varepsilon=1$ ,<sup>2</sup> and that 10 per cent of the home country population lives abroad ( $m=0.10$ ). The welfare loss from emigration would then be equal to less than four-tenths of one per cent of annual GDP, a relatively small effect. Would this effect be offset by remittances? Most likely yes, given the sheer size of remittances. Consider for instance the case of Turkey where the share of the population living abroad is fairly large, around 8 per cent (that is,  $m=0.08$ ). During the 1990s remittances averaged almost 2 per cent of GDP, dwarfing therefore the welfare loss from emigration. Similarly, existing estimates suggest that slightly more than 7 per cent of Mexico's population lives abroad. According to our simple formula, welfare losses should be about three tenths of one per cent of GDP. Remittances on the other hand account for more than 1 per cent of GDP, more than offsetting therefore the loss from emigration.

These are simple back-of-the envelope calculations. To answer the question whether the net effect of out-migration is positive after allowing for remittances we would need some firmer evidence on the relationship between remittances and the number of migrants abroad. If we simply assume that the GDP share of remittances ( $R$ ) is a function of the percentage of the home country population living abroad,<sup>3</sup> with  $R = \beta m$ , the welfare effect of out-migration becomes:

$$\Delta Q/Q = -(\alpha_L m^2 \varepsilon)/2 + \beta m$$

Based on a simple cross-country regression, we take  $\beta$  to be equal to 0.3. This estimate is subject to errors but appears to indicate that if  $m$  is not exceedingly large, that is,  $m < \beta/\varepsilon\alpha_L \cong .43$ , the welfare impact of additional out-migration is positive.

### 3 The brain drain as a hindrance to welfare and growth

Abstracting from the brain drain, the welfare impact of emigration is likely to be small and more than offset by the flow of remittances. However, the calculations in the previous section assume labour to be homogeneous. Still, the most often voiced concern is that migration deprives sending countries of their most skilled and most entrepreneurial workers. Skilled workers may generate strong positive externalities in

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<sup>2</sup> With CES production function,  $\varepsilon=(1-\alpha_L)/\sigma$ , where  $\sigma$  is the elasticity of substitution. Then  $\varepsilon=1$  is consistent with  $\alpha_L=0.7$  and  $\sigma=0.3$ .

<sup>3</sup> This relationship however is likely to depend also on the skill composition of migration, the attachment of migrants to their home country, the wage differentials between the host and the source country and other complicating factors. A more accurate analysis of remittances behaviour is presented below.

production (Barro and Sala-i-Martin 1995; Lucas 1990) and lead to faster growth. Moreover, the costs of education are typically borne by the home country, with its attendant benefits being lost to the country if the worker emigrates (Bhagwati 1976). In terms of Figure 1, the marginal productivity schedule would shift inward as a result of the emigration of skilled workers and the dissipation of the related externalities. The size of such an effect would wipe out the second order magnitude of the traditional Harberger triangle described in the previous section.

While therefore the 'old' development literature tended to see the brain drain as a significant hindrance to the economic prospects of developing countries, more recently these concerns have been greatly amplified by the emphasis in the new growth theory on human capital as a key engine of growth. In an interesting extension of the endogenous growth approach, Miyagiwa (1991) shows that the emigration of skilled workers will hurt mostly other skilled workers – those who do not migrate – that used to benefit relatively more from the scale externality associated with a large pre brain drain stock of skills. Contrary to conventional presumptions, unskilled workers would be relatively less affected.

The development literature also held that the brain was a large scale phenomenon. However, as acknowledged by Bhagwati (1976), the empirical evidence on the size of the brain drain was at best patchy. Moreover, available data referred to flows rather than stocks and captured only gross flows with no information on reverse migration. Most of the evidence came from disparate and typically not comparable sources. In turn, lack of systematic evidence severely hampered empirical investigations in this field.

Still, the size of the brain drain has been largely undisputed. More recently, Stalker (1994) reports that sub-Saharan Africa lost 30 per cent of its skilled personnel between 1960 and 1987. The Caribbeans are also hard hit, presumably because of the proximity to the US and the relative ease in emigrating there. For instance, Jamaica had to train five doctors in order to keep one. More recently, the presumption about the size of the brain drain has been confirmed by the excellent study of Carrington and Detragiache (1998). This is the first attempt to provide systematic and comparable evidence on the brain drain. The authors rely on the 1990 Census of the United States to estimate the educational attainments of migrants there. They then relate these figures to the Barro-Lee data on educational levels in the source country to get migration rates for separate educational groups. Some selected results are reported in Table 1. The authors also compute total migration rates to the OECD by assuming that for each sending country the skill composition of OECD migration is the same as that to the US. Obviously, this set of estimates is bound to be somewhat less reliable, particularly if migration to the US only accounts for a relatively small share of total migration from a given country. In spite of all these caveats, the results are remarkable. First, migration rates are disproportionately large among educated people. Second, the absolute figures are substantial. For instance in Ghana, more than 15 per cent of the home country population with a tertiary education has migrated to the US. Extending the analysis to the OECD raises the migration rate for this educational group to 25.7 per cent. This latter figure must however be interpreted with some caution since only slightly more than 50 per cent of Ghana's migrants go to the US. The figures for poorer countries in North America are equally impressive. More than 20 per cent of Mexicans with a secondary education live in the US. For the Dominican Republic the figure rises to 29.7 per cent; for El Salvador to 29.1 per cent.

Table 1  
The brain drain: migration rates by educational attainments  
(percentage of host country's educational group)

Origin country	To the US		To the OECD	
	Secondary education	Tertiary education	Secondary education	Tertiary education
Korea	1.2	5.7	3.3	14.9
Philippines	4.4	6.6	6.0	9.0
Ghana	0.3	15.1	0.7	25.7
Uganda	0.6	15.4	0.6	15.5
Domin. Rep.	29.7	14.2	30.5	14.7
Guatemala	29.1	13.5	29.1	13.5
Colombia	3.6	5.6	3.8	5.6
Mexico	20.9	10.3	20.9	10.3

Source: Carrington and Detragiache (1998).

#### 4 The revisionist approach to the brain drain

Is the brain drain a definite concern for sending countries? Or are there any mitigating factors? The traditional answer to the latter question is a cautious yes. First, as noticed earlier, migration may be associated with a substantial flow of remittances toward the home country. Under the plausible presumption that the earnings of skilled workers are relatively larger, we would expect the flow of remittances associated with the brain drain to be also more substantial. Second, skilled migrants may eventually return to their home country and bring with them valuable skills that will contribute to economic growth there. Third, and more recently, it has been argued that the prospect of migration by itself may foster domestic investments in education, provided that returns to skills are higher abroad. Stark *et al.* (1997, 1998), Mountford (1997) and Stark (2002) have all developed models where the possibility of emigrating abroad may result in more education even for those left behind. Beine *et al.* (2001) offer some empirical support to the claim that the brain drain may boost growth in the sending countries. By and large, therefore, the revisionist approach would hold that not only are there mitigating factors to the brain drain but also that the emigration of skilled workers may be beneficial for the home country. In Stark's words, the argument against the brain is then 'turned on its head'.

In what follows we review the case for the revisionist approach. We assess separately the three main arguments in favour of the 'brain gain' – the boost to remittances, the role of return migration and the greater incentive to acquire education – on both theoretical and empirical grounds. We conclude that the case for the brain gain is at best unproven and argue that the more traditional concerns about the negative impact of the emigration of highly skilled workers on the economic fortunes of sending countries remains warranted.



#### 4.1 Does the brain drain boost remittances?

IMF data for the mid 1990s put the total amount of remittances to US\$65 billion. To put the number in perspective, this is larger than the total flow of official development assistance. Remittances play indeed a critical role as a source of foreign exchange in several countries, as documented by Table 2. The key question however is how remittances are influenced by the skill composition of emigration. If skilled migrants tend to remit more, then the concern about the welfare impact of the brain drain may be diminished. Alternatively, the finding of smaller propensity to remit by skilled migrants would magnify such concerns.

Table 2  
Aid, exports, and remittances  
(1990-97 averages, percentages)

	Remittances GDP (in %)	Aid GNI (in %)	Exports GDP (in %)
CE Europe & Central Asia	4.16	2.70	37.00
Turkey	1.96	0.33	17.82
East Asia & Pacific	1.05	3.41	42.88
Philippines	5.46	1.96	34.67
Indonesia	0.24	1.07	26.82
Latin America & Caribbean	2.17	4.56	27.54
Colombia	1.16	0.23	17.24
Mexico	1.19	0.09	21.92
Middle East & N. Africa	7.19	3.07	32.20
Egypt	8.69	6.85	23.84
Morocco	6.68	2.76	26.08
South Asia	2.87	4.68	17.50
Bangladesh	3.05	4.49	9.19
India	1.59	0.64	9.70
Sub-Saharan Africa	3.71	15.06	27.42
Ethiopia	0.28	16.89	10.15
Nigeria	2.11	0.91	43.13
Senegal	3.04	12.99	28.84

Source: World Bank data.

Unfortunately, existing evidence on the propensity to remit of skilled workers is quite limited. Early evidence showed that remittances tend to increase with the level of education (Johnson and Whitelaw 1974; Rempel and Lobdell 1978). For the case of Philippines, however, Rodriguez and Horton (1994) find that the educational level of migrants has no effect on the amount of remittances. In addition to the limited and sometimes conflicting evidence, there is a more fundamental problem with this strand of

literature. Suppose that skilled migrants tend to stay longer abroad,<sup>4</sup> say because they are more willing to reunify with their families in the host country<sup>5</sup> or face lesser constraints in their ability to do so. One typical finding of the remittance literature is that the flow of remittances tend to decline with the length of the migrants' stay (Lucas and Stark 1985). Therefore, even a positive coefficient of education on remittances cannot be taken as evidence that the brain drain is associated with a larger flow of remittances. The direct effect of skills may indeed be positive, but the overall effect, that controls for the longer propensity to stay of skilled migrants in the receiving country, may well be negative. By and large, therefore, it is difficult to draw any firm conclusions on the relationship between education and remittances from the existing literature.

To cast further light on this issue, we report the findings in Faini (2002) who runs a simple set of regressions relating the ratio of remittances to GDP (or, alternatively, to the home country population) to a set of regressors that includes the stock of migrants, the income per capita in the sending country and, crucially, the skilled composition of migration. The latter variable comes from the Carrington and Detragiache data set.<sup>6</sup> There is no control for the length of migrants' stay in the host country. Hence, the coefficient of skills should capture the total impact of education on remittances. The results are shown in Table 3. Three facts stand out. First, as expected, remittances are an increasing function of the stock of migrants. Second, remittances decline with income per capita in the sending country, lending support to the altruistic motive for income transfers. Third, and more crucially, remittances decline as the share of migrants with a tertiary education goes up. The latter result is consistent with the notion that more skilled migrants tend to move permanently to the host country. Their attachment to the home country gets progressively weaker and so does the propensity to remit. Additionally, the ease of family reunification that these migrants typically enjoy further weakens their willingness to remit. Overall, these effects obfuscate the more traditional channel where migrants with a higher education have larger earnings, and should therefore remit more.

If confirmed by future research, these results are striking. Sending countries lose from migration on three grounds. First, there is the standard welfare loss, as described by Figure 1. Second, the loss of skills attendant on the brain drain typically carries a negative externality. Third, skilled migration may lead to a smaller rather than a larger flow of remittances.

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<sup>4</sup> More direct evidence on the positive relationship between education and duration of stay comes from Reagan and Olsen (2000) for the US. Similarly, the intended duration of stay is found to rise with education in Germany (Steiner and Velling 1994). This issue is more fully tackled in the next section.

<sup>5</sup> Faini (2003) develops a simple model showing that high wage migrants have a larger propensity to reunify with their family in the host country.

<sup>6</sup> Given the way the Carrington Detragiache data set has been compiled, those sending countries for which the share of migration to the US falls below 30 per cent – and for which therefore the data on the skilled composition of migration are bound to be much less reliable – have been excluded from the sample.

Table 3  
Remittances and the skill composition of emigration

Dependent variable	REM/POP	REM/GDP
Explanatory variables		
Constant	91.4 (62.2)	0.07 (2.00)
SM	10.8 (4.82)	0.28 (2.02)
MSEC	-0.27 (0.43)	0.0007 (1.42)
MTER	-0.93 (1.84)	-0.0005 (1.95)
$Y_{pc}$	-9.76 (1.30)	-0.008 (1.97)
$R^2$	0.53	0.33
NOB	33	38

Notes: REM: remittances; POP: working age population; SM: migrants abroad as a percentage of the home country population; MSEC: percentage of population with a secondary education living abroad; MTER: percentage of population with a tertiary education living abroad;  $Y_{pc}$ : income per capita in the home country. NOB: number of observations. T-stats in parentheses.

#### 4.2 Does return migration mitigate the concern about the brain drain?

Return migration has a significant bearing on the impact of the brain drain. Returnees may bring back home not only their original skills but also those that they have acquired during their stay in the host country. The original loss to the home country may then be more than offset by the new and valuable skills that the migrants was able to acquire abroad. Furthermore, as emphasized in the new migration literature, a temporary move abroad may be a key component of a strategy designed to overcome domestic market failures. For instance, if because of credit market imperfections a home country resident is unable to undertake a profitable project, then a temporary stay abroad may allow him or her to accumulate sufficient capital to finance such project. Similarly, in the absence of complete insurance markets, a home country household may be unwilling to undertake a high return but high risk project. Temporary migration, until the uncertainty about the project is resolved, may offer a way out. Indeed, the household may reduce its risk exposure by having some of its members migrate to a country where returns are not perfectly correlated with the domestic economy. It may then be in a better position to take on additional risk and hence to implement the project.

On a more pessimistic note, returnees may be those that have not succeeded abroad. Migrants will typically return home if their initial expectations about wages and working conditions abroad are not met. In Duleep's (1994) definition, these are 'mistaken migrants'. Negative selection of returnees may also occur if skilled migrants are in a better position to acquire new skills – say language proficiency – in the host country. To the extent that such skills are imperfectly rewarded in the home country, returnees will be those with more limited skill initially and lesser skill accumulation abroad. Moreover, as already noticed, skilled migrants may be more willing to reunify with their families in the host country or face lesser constraints in their ability to do so. Once again, return migrants will be negatively selected.

Borjas and Bratsberg (1996) provide a fairly general model of return migration. They show that whether returnees will be positively or negatively selected cannot be determined on a priori ground. What can be said however is that, under fairly general conditions, return migration will tend to amplify the initial selection bias. If migrants were negatively selected to begin with, then returnees will be relatively more skilled. Conversely, if migrants were initially relatively skilled, then the least skilled will most likely return to their home country. Intuitively, if the initial selection bias is positive with the more skilled also more prone to migrate, then the least skilled will be the marginal migrants and will be more likely therefore to reconsider their initial decision. In this case, return migration will be negatively selected and, as a result, will do little to alleviate the negative welfare and growth impact of the brain drain.

There is considerable evidence about the negative selection bias of return migration. Solimano (2002) reports that, at least in science and engineering (S&E), a large fraction of PhD graduates from developing countries tend to remain in the US after graduating. National Science Foundation data show that, four years after graduation, 88 and 79 per cent of respectively China's and India's graduates in S&E are still working in the United States. More comprehensive evidence comes from Lindstrom and Massey (1994) for Mexican migrants, Reagan and Olsen (2000) for the US, Bauer and Gang (1998) for Egypt, Steiner and Velling (1994) and Schmidt (1994) for Germany. Rodriguez and Horton (1994) show that, in the case of the Philippines, returnees are somewhat less educated than those still abroad. Similarly, Knerr (1994) finds that for Pakistan skilled migrants tend to stay longer abroad than unskilled workers. Finally, Borjas (1989) shows that the least successful foreign scientists are more likely to return home from the US.

In apparent contrast, Jasso and Rosenzweig (1988) for the US and Ramos (1992) for Puerto Rican migrants to the US conclude that returnees tend to be more skilled. However, these findings are not inconsistent with the Borjas and Bratsberg model to the extent that returns to skills are relatively high in Puerto Rico and the initial flow of migrants tend therefore to be negatively selected. Return migration, once again, tends to amplify the initial selection bias.

The bottom line of this literature can be best summarized as follows. Return migration will not provide much consolation to a country suffering from a brain drain problem. Only if initial migrants were mostly unskilled, as in Puerto Rico's case, will returnees be positively selected. Otherwise, the loss of human skills will at best be mitigated by return migration. There is also in addition some evidence that returnees have difficulties in readapting to the economic and social environment of their home country (Dustmann 1996). Often, as observed by Knerr (1994) for Pakistan, skilled returnees tend to be

unemployed for longer periods. Finally, as argued previously, if skilled migrants are more able or more willing to reunify with their family, the home country residents will be further penalized by the decline in remittances.

### **4.3 Educational achievements and the brain drain**

The revisionist approach holds that the brain drain may foster growth by raising the return to education. Stark (2002) and Beine *et al.* (2001) develop simple models where the sheer possibility to migrate increases the return to education, thereby fostering further investments for skill acquisition and ultimately boosting growth. Beine *et al.* (2001) also provide some cross-country evidence in support of such claim.

From an analytical point of view, the conclusion that the brain drain will boost the incentive for education is not particularly new. The early literature on this issue fully acknowledged this possibility (Bhagwati and Hamada 1974), but went further to assess the interplay between the brain drain and domestic distortions. Bhagwati and Hamada (1974) and Hamada and Bhagwati (1976) show that even in the case where skilled workers are involuntarily unemployed in the home country (and their marginal productivity is plausibly small if not nil) the brain drain may be detrimental to the home country. Therefore, allowing unemployed or underemployed doctors to migrate may not necessarily raise home welfare. First, in the absence of the possibility to migrate abroad, the doctor may have moved inland where his social marginal productivity is likely to be high. Second, the increase in the return to education may prompt more workers to seek education, even more so if the domestic wage of domestic skilled workers tend to catch up with its foreign level. Skilled unemployment would then go up if the increase in the supply of skilled workers combined with the fall in their demand more than offsets the impact of skilled migration. Finally, income per capita of those left behind would fall on the account both of the larger costs of education (which reduce home GDP) and the fall in skilled employment. Bhagwati and Hamada (1974) aptly conclude that ‘in the society where welfare function depends on per capita income and unemployment rate, national welfare will quite possibly go down’.

On the empirical front, the evidence of Beine *et al.* (2001) is not conclusive. Their main finding is that in relatively poor sending countries educational levels are positively associated with migration. However, this result is not necessarily consistent with the revisionist view that skilled migration encourages more investment in education. Given that the authors use data on total rather than skilled migration, their result is also compatible with the very simple notion that migrants from relatively poor countries are mostly unskilled. Large flows of unskilled migrants would then almost automatically lead to a rise in the average skill level of those left behind in the home country. Hence, the finding that (total) migration and human capital at home are positively correlated.

The bottom line therefore is that aggregate migration data cannot be used to find out whether skilled migration fosters education. To correctly identify the effect of the brain drain what is absolutely needed are data on the skill composition of migration. This is indeed what the Carrington and Detragiache data set provides. Using this information, Faini (2003) estimates a simple equation relating educational achievements to a set of explanatory variables that include emigration. Rather than relying on the total migration rate – a fairly inadequate measure of the incentive to acquire skills – the Carrington and Detragiache data set is used to define an indicator of the migration probability for each

educational group. These probabilities therefore are both country and skill specific. The results do not support the conclusions of Beine *et al.* (2001). First, a higher migration probability for workers with a secondary education has no visible impact on the home country secondary educational achievements. The coefficient has the ‘wrong’ sign but is not significantly different from zero. Second, a higher probability of migration for workers with a tertiary education has a significant and positive impact on the rate of secondary school enrolment. This finding suggests that increasing the return of higher (tertiary) education boosts the incentive to acquire lower (secondary) education. Third, and perhaps more surprisingly, the migration probability for workers with a tertiary education has a negative impact on tertiary enrolment. One way to interpret this result is to argue that prospective migrants may want to strengthen their chance for admission to the host country by pursuing their graduate studies there. The most talented individuals would then have an incentive to migrate at a relatively early stage of their school curriculum, thereby definitely reducing the average enrolment ratio in the home country’s university system. The evidence in the previous section about the large fraction of S&E doctoral graduates from developing countries still working in the US four years after graduation is consistent with the notion that prospective migrants pursue their graduate studies abroad also with a view to strengthening their chance of being able to immigrate.

These results provide little evidence in support of the ‘brain gain’ argument. It is true that a higher probability of migration for individuals with a tertiary education seems to raise the return to secondary education. However, it is also associated with a lower level of tertiary enrolment. To fully assess the growth impact of these conflicting effects one would need to estimate a growth equation controlling for both secondary and tertiary education. In assessing the full effect of the brain drain, its impact on the flow of remittances will also have to be taken into account.

## **5 Conclusions and policy implications**

We find little support for the optimistic view that the bias toward skilled migration in host countries may be beneficial for sending countries. Our results add therefore to the concern that the process of globalization may unduly penalize relatively poor countries. First, the bias against unskilled migration may deprive these countries from one of the most powerful engine of growth and convergence. Second, the growing preference for skilled migration may exacerbate the effects of the brain drain and further hamper growth prospects in sending countries. To the traditional case against the brain drain, I have highlighted in this paper the possibility that skilled migrants may have, perhaps surprisingly, a lower propensity to remit. I have also shown that, while it is true that a more liberal policy toward skilled migration may raise the return to secondary education, this effect is to some extent negated by the unfavourable impact on tertiary enrolment. Finally, I have argued that the evidence on the supposedly beneficial impact of return migration is far from conclusive.

Policymakers have been increasingly preoccupied with the new round of trade negotiations and with the global financial architecture. These concerns are fully warranted, given the need to expand and strengthen the multilateral trade system on the one hand and to prevent the recurrence of disruptive financial crises in emerging markets on the other. At the same time, however, little or no attention has been devoted

to a key component of the international economic system, namely the international labour market. A more symmetric approach to global policymaking would then require to define a multilateral framework for labour mobility (along the lines perhaps suggested by Rodrik 2002; see also Solimano 2001) and add labour standards to the existing proliferation of international codes. This would involve strengthening the 'fourth' international economic institution, in addition to the IMF, the World Bank, and the WTO: the International Labour Office. The ILO was created well before the other three institutions. As one of its senior officials stated, it relies mainly on 'persuasion' to convince member countries to adopt and implement its codes. It has limited resources and, as a result, a very much scaled down surveillance activity. Still, it is the recognized standard setting agency in the field of labour. Its role should be strengthened by broadening its mandate, to include for instance the definition of a multilateral framework for migration, by expanding its surveillance role, and by providing it with additional resources. The new ILO would not work through sanctions, as the WTO, or through conditionality, as the IMF. A closer cooperation with the World Bank should be envisaged with a view to providing additional finance to countries that are genuinely intent to reform their labour markets. The reform of the ILO along these lines should loom high on the international economic agenda.

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