

**In Search of the Diaspora Effect:  
Lessons from Taiwanese and Indian ‘brain gain’  
for Jamaican ‘brain drain’**

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## **I Introduction**

The movement of highly skilled persons - scientists, engineers as well as entrepreneurs - has been one of the key features of the current wave of globalisation. However, the bulk of the much-lauded factor mobility associated with globalisation has been one-sided, with capital moving with increased freedom from North to South and skilled (but critically, less so unskilled) labour from developing countries being welcomed in the North. Much of the recent influx of the highly skilled migrants has been directed towards the high technology poles in the advanced industrialised countries, such as Silicon Valley and Route 128 in the United States. However, an increasingly important trend currently being observed sees developing country migrants returning to their home countries after participating in high technology sectors overseas. Many of these returning migrants play important roles in technology-intensive ventures back home, both as employees recruited by existing firms as well as entrepreneurs, leading traditional discussions of 'brain drain' to increasingly include reference to 'brain gain' and 'brain circulation'.

This dynamic has perhaps been most evident in the pharmaceuticals and software sectors in India and in the electronics manufacturing sector in China (both mainland and Taiwan). It has allowed these countries to benefit from the skill base of its overseas nationals and has been an important contributing factor in the transfer of technology, knowledge and skills necessary for the development of the technological capabilities which have marked these countries' recent rapid industrial development. Most policymakers in developing countries (as well as increasingly in the OECD countries such as the UK) recognise the value of their highly-skilled diasporas but few have enjoyed success in enticing them back home to participate in the development of domestic high technology sectors.

This paper seeks to examine the 'brain gain' or 'brain circulation' dynamic that has been observed between India and Taiwan and the United States. It seeks to understand the influence of the Taiwanese and Indian diasporas on the development of their burgeoning

domestic technology- and knowledge-intensive sectors to see if there are lessons to be learned for technology and innovation policy in other developing countries, particularly those in the Caribbean with large US-based diasporas. Relative to other regions, the Caribbean has the largest overseas diaspora in the world – including both skilled and unskilled persons – and so their *potential* contribution to domestic development is great. However, this paper will argue that market forces cannot be relied upon for developing the capabilities necessary for technological upgrading. There is a clear role for innovative policymaking, including efforts aimed at tapping overseas-based skills.

The paper takes a comparative institutional approach in assessing the contribution of the Indian and Chinese diasporas in the development of technological capabilities and the growth of domestic technology-intensive entrepreneurial activities. The paper hopes to contribute to growing interest in technology and innovation policy in the Caribbean, particularly at time when rapid trade liberalization and economic integration are impressing upon regional policymakers and private sector actors the need to rapidly develop the capabilities required to shift towards high value-added, skill- and technology-intensive economic activities needed to boost dynamism in the industrial sector. These efforts are viewed as components of a broader long-term development strategy aimed at raising incomes and employment across society in order to protect and build on the development gains made since decolonisation. It also written in light increased interest in the development potential of the diaspora beyond remittances, as illustrated by the Jamaican government's hosting of a diaspora conference and creating a Jamaica Diaspora Institute.

The paper is organised as follows: Section II provides a background to international migration and the brain drain, including recent data on the size of the brain drain from select developing countries to the US. The focus is ascertaining whether the brain is even an issue and if so, how big a problem it is. Section III reviews the economic literature on brain drain from developing countries, focussing on the main strands of thought over the past 30 years. The focus is on approaches that facilitate a reversal of the brain drain, highlighting the importance of policy options that are cognisant of the importance of

knowledge and capabilities in promoting technological upgrading and economic growth. Section IV approaches the issue through sectoral case studies of the semiconductor industry in Taiwan and the software industry in India, which illustrate the effectiveness of specific policies targeting the overseas Diaspora and the effect on the dynamic growth of these sectors. Section VI concludes with a summary and identification of areas for further research in the context of the latent biotechnology and IT sectors in Jamaica.

## **II How big is the brain drain? Background and some empirical evidence**

The majority of economic literature on South-North migration tends to focus on its effects on the advanced countries and the ensuing policy responses, which usually entail restrictive immigration policies aimed at stemming the flow of incomers (often at the behest of domestic interest groups). However, particularly since the 1970s, there has been an increased focus on the effect of migration on the sending countries, most of which are located in the developing world. Desai et al (2002:1) note that while the impact of cross-border capital flows have dominated most of the discourse over the past few decades and elicited a strong policy response in industrialized and developing countries, migration flows are likely to be just as important “in shaping the political and economic landscape over the next 50 years.”

This literature on South-North migration tends to focus on the movement of the highly skilled<sup>1</sup> i.e. the ‘brain drain.’<sup>2</sup> Migration flows have been one of the most enduring features of the global economy over the last 500 hundred years, and have shaped the pattern of today’s economic and social structure. In the West, much of this migration from the 16<sup>th</sup> onwards involved the movement of Africans and Europeans to the Americas. From the mid-19<sup>th</sup> century onwards these flows increasingly involved Asian migrants, particularly from China to North America and from India to the Caribbean. In

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<sup>1</sup> This paper recognises that the distinction between high and low skilled is somewhat ambiguous and, particularly from a normative standpoint, potentially problematic. Therefore for the purposes of this paper, skill level is considered to be synonymous with educational level, with the term ‘highly-skilled’ referring to persons with a tertiary degree.

<sup>2</sup> Attention has also been paid to migration low-skilled migratory flows, particularly Mexican and Central American migrant flows to the US, Turkish and North African migrant flows to the EU, and South Asian migrant flows to the Gulf States.

the early 20<sup>th</sup> century restrictions began to be placed on immigration to the United States stemming what had previously been a free flow of European migration. These restrictions became increasingly selective over the course of the century and varied according to US domestic policy considerations. The current phase of capitalist globalisation has seen increased liberalisation of trade and financial flows while largely maintaining restrictions on the movement of labour. However, movement of persons have been a critical though often underappreciated factor in the diffusion of knowledge and technology central to globalisation.

Over the past three-plus decades US immigration policy has made a discernable shift towards favouring highly skilled migration while maintaining more stringent restrictions on entry of unskilled migrants. This policy shift has been driven by two main factors: (i) a growing gap between the domestic demand and supply of skilled labour, which is made urgent by increased global competition and (ii) concerns about the sustainability of the social security system due to America's ageing population.

Increasing the influx of highly skilled migrants has become an increasingly important aspect of industrial policy in most industrialized countries. Increased global competition in high-technology, high value-added goods and services amongst the advanced industrialised countries (AICs) - and increasingly from developing countries such as South Korea, Taiwan, China (PR), India and Brazil – is leading US, Canada and Western Europe to bolster the share of skilled labour in their populations via migration. In an OECD paper Cervantes and Guillec (2002:1) note that during the 1990s migration flows from Asia to the US, Canada, the UK and Australia increased due to “strong demand in the OECD countries for IT and other skills in science and technology as well as the selective immigration policies that favour skilled workers.”<sup>3</sup> The threat that ageing

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<sup>3</sup> They go on to highlight the importance of multinational firms in driving this dynamic, noting that “The globalisation of firms has helped fuel temporary flows; in the mid-1990s intra-company transfers accounted for 5-10% of the total flows of skilled workers to the United States from Canada. The United States is the main pole of attraction for foreign skilled workers; 40% of its foreign-born adult population have tertiary level education. Since the early 1990s, some 900 000 highly skilled professionals, mainly IT workers, from India, China, Russia and a few OECD countries (including Canada, the UK and Germany) have migrated to the United States under the H1B temporary visa programme. The United States also takes in 32% of all foreign students studying in the OECD countries. Indeed, higher education is an important channel for US

populations in North America and Western Europe pose to the viability of national social security systems adds further impetus to this trend. Increasing migration flows - particularly amongst the highly skilled who command high incomes and pay the most taxes- is seen as a means to averting an impending crisis in the welfare state.<sup>4</sup> For example, Kapur (2001:282) cites recent research which places the net present value of highly-skilled migrants in the 40-44 year age bracket at \$96,000 as compared to negative \$88,000 for a new born American.

While the industrialized countries of North America and Western Europe are the main receiving countries for highly skilled labour flows, developing countries in Africa, Asia and Latin America are the principle source.<sup>5</sup> Most observers argue that developing countries suffer a double-blow as a result of the structure of Northern immigration policy. Increased barriers to unskilled migration constrain developing countries' ability to vent surplus unskilled labour and ease population growth, unemployment and accompanying social pressure.<sup>6</sup> Further, the high demand for skilled labour in the US and Western Europe has raised concerns in developing countries of a brain drain that "could well deprive such countries [of] their most skilled and talented people" and thus curtail their short- and long-term growth prospects. (Faini, 2003:1) Certainly the data justifies these concerns. Table 1 shows that the brain drain is a real and important phenomenon, in both relative and absolute terms. For example, Mexico and the Philippines each have almost a million highly-skilled migrants in the US. While this figure is somewhat balanced by the high flow of unskilled migrants (which is almost certainly higher than this data suggests), the highly-skilled comprise the overwhelming majority of Filipino migrants. The same is

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firms recruiting highly skilled migrants; some 25% of H1B visa holders in 1999 were previously students enrolled at US universities." They conclude by noting that while the US has dominated this dynamic, other OECD countries are rapidly following suit, particularly Canada, France and Germany (Cervantes and Guillec, 2002:1-2)

<sup>4</sup> The other principal policy option to address the weakness of the social security system is increased taxes. However, there is little support for this option within the current US administration. See Borjas (1995) for further discussion.

<sup>5</sup> Please note that there is also significant migration within the Western industrialized countries, as well as to the Gulf States. For example, the US attracts significant amounts of highly-skilled migrants from Canada and the UK. However, developing countries remain the principle source of highly-skilled migrant flows.

<sup>6</sup> This escape valve of sorts has played an important historical role for a number of developing regions, such as the Caribbean and South Asia with their high migrant flows to the UK in the 1950s and 1960s in response to low-skilled labour shortages during Britain's post WWII reconstruction period. (Nurse, 2003)

true for migrants from India, Morocco, Jamaica and El Salvador. Indeed, Adams (2003) notes that over 80% of tertiary educated Jamaicans reside overseas. Given the reality of the brain drain we now consider some of the approaches taken to highly-skilled migration in the economic literature.

### **III Literature Review: Theoretical approaches to the brain drain**

Traditional economic approaches to the effects of the brain drain in developing countries have focused on this negative developmental effect and the policy suggestions have sought redress. The oldest and most-well known of these calls for taxation of South-North migrant flows. More recently there has been increased focus on potential positives or ‘mitigating factors’ that it is argued might alleviate concerns about the brain drain. These include remittances, increased domestic investment in education as a response to the potential to migrate and earn higher wages, and temporary or permanent return migration.<sup>7</sup> These are further examined below.

#### ***Brain Drain: taxation of labour flows***

One of the earliest and best-known analyses of the impact of the brain drain on developing countries is associated with Jagdish Bhagwati (e.g. Bhagwati and Rodriguez, 1976; Bhagwati and Wilson, 1989; and Bhagwati, 1998). Bhagwati argued that migration of skilled labour from developing countries to the AICs resulted in a welfare loss in the sending countries. Operating within a neoclassical general equilibrium framework, Bhagwati suggested that recipient countries should compensate the sending countries in the form of a ‘brain drain tax’. This tax would compensate developing countries for the loss of tax revenue which would have accrued from these skilled workers, as well as for the lost investment in education, since it was assumed that developing countries bore this cost. Though there continued to be academic contributions through the late 1980s this line of thought received less attention following Bhagwati’s early works, at least in part

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<sup>7</sup> It is important to note, however, that of these three elements of the ‘revisionist approach,’ two are in fact not so new: both the potential for return and the issue of remittances were discussed in the early brain drain literature in the 1960s and 1970s. However, the lack of data at the time proved to be a serious constraint, particularly for analysis of remittances. In fact, it is improvements in data on remittances in the 1990s, particularly through the IMF’s Balance of Payments statistics, that has facilitated this renewed focus.

due to concerns about the low likelihood of the implementation of a tax on advanced countries given asymmetric power differentials between the AICs and developing countries.

Academic work in the tradition of Bhagwati's 'brain drain tax' has however been recently revisited by others, most notably Desai, et al (2002; 2003). In this research the authors build on Bhagwati's earlier theoretical proposition through emphasis on specific tax instruments and "the actual experience of alternative tax regimes and their potential impact on source countries." (Desai et al, 2002:3) There are four means through which such a tax could be captured: an exit tax, a flat tax, a variant of the 'American model' of taxing overseas nationals, and through a multilateral cooperative model. (Kapur, 2001) However, the authors admit problems with all four, namely avoidance, administrative weaknesses, weak incentives for cooperation based on migrants not planning to return and again, asymmetric power relations between industrialised and developing states which would make it difficult for developing countries to elicit support for a multilateral approach from the industrialised world.<sup>8</sup>

### ***Remittances***

The next major round of interest in migration and developing countries arose in the late 1990s and focussed on remittances. While the importance of remittances had long been recognised financial liberalisation conducted under neoliberal reforms led to flows of remittances being captured in national statistics. A remittances-based approach to skilled migration and brain drain might suggest positive benefits in the form of increased remittances, which serve a number of important purposes in the home country including poverty reduction, easing the foreign exchange constraint, and potentially can provide a pool of investment income for the home country recipients. (Faini, 2003) The World Bank has been the principal source of research on this issue, which is unsurprising given the nature of remittances and the Bank's new explicit focus on poverty reduction.

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<sup>8</sup> It should be said however that negotiations under Mode IV of the General Agreement on Trade in Services (GATS) could provide the forum and institutional framework within which such an approach could be made feasible. However, this would likely be limited to temporary migration (which may carry some positive 'brain gain' attributes discussed later) and might do little for the most damaging permanent flows.

There is no question that remittances are an important source of external finance, and that they are playing a critical role in most developing countries at the macro, mezo and micro/household levels. First, the volume of remittances in is significant in both relative and absolute terms, and flows appear to be growing at double digit rates.<sup>9</sup> (See table 2) Second, it has been argued that remittances have been filling the void of decreased private capital flows since the mid-1990s as well as declining international aid flows. (Nurse, 2003) This has been critical in maintaining macroeconomic stability in many developing countries, particularly small open economies like Jamaica and the Dominican Republic where remittances are over 10% of GDP.<sup>10</sup> Third, it is clear from anecdotal evidence as well as statistical analysis that remittances have an important effect on poverty alleviation, if not poverty reduction.<sup>11</sup> Remittances in this view are an informal means of social insurance. (Kapur, 2003) For example, a World Bank cross-country empirical study finds that international migration generally has a strong statistical impact on reducing poverty, with a 10% increase in migration leading to a 1.9% decline in poverty and specifically, a 10% increase in the ration of remittances to GDP leads to a 1.6% decline in poverty. (Adams and Page, 2003)

However, despite these admitted positives, the effect of remittances on structural poverty and productive investment needed for long-term development appears to be weak. Kapur (2003) argues that it is important to dispel the myth that remittances compensate for the brain drain. That is, the argument that while countries lose one scarce factor of production (human capital) they gain another scarce factor (financial resources in the form of remittances). However, these are not substitutes. (Ibid) A closer analysis of the

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<sup>9</sup> Data on remittances is likely to significantly underestimate the true size of the phenomenon as it only captures funds sent through official sources. Actual flows could easily be over twice the officially reported size. Particular caution is advised in interpreting growth of remittances as flows in the 1980s are likely to be significantly underreported due to poor data collection during that period.

<sup>10</sup> While the macroeconomic benefits are extremely important, on the other hand one could argue that flows of remittances have allowed countries to sustain higher fiscal deficits than might otherwise have been possible. Kapur (2003) notes this caveat in the case of India (a large, not-very-open economy), where he argues that a consistently high fiscal deficit of around 10% of GDP has been facilitated by a positive current account buoyed by the inflow of remittances amounting to 2.5% of GDP.

<sup>11</sup> The distinction being made here views poverty alleviation as a short-term effect and poverty reduction as a long-term effect, akin to structural poverty.

phenomenon of remittances provides some insights as to why this may be so, and why developing countries should find little consolation in remittances as a mitigating factor to brain drain.

Based on the long-term developmental view taken by this paper there are at least two problems with considering remittances to be a mitigating factor in brain drain. These concern the use of remittances and the source. First, remitted funds tend to be consumed rather than invested in productive economic activity (Nurse, 2003) with the important exception of remittances that go towards paying for education of dependents within the household.<sup>12</sup> Thus remittances do not appear to contribute significantly to domestic savings and investment. Second, highly-skilled migrants are not big remitters. A simple view of remittances may consider migrants as a largely undifferentiated group. However, when one begins to disaggregate the behaviour of skilled and unskilled migrants in the context of remittances a more nuanced picture emerges. Despite hypotheses suggesting that higher-educated migrants remit more due to their higher earnings, Faini (2003:2) finds that in fact “a higher skilled content of migration is found to be associated with a lower flow of remittances.” He interprets this observation “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.” (Faini, 2003:2) However, a more powerful hypothesis suggested by this paper relates to class. That is, almost by definition, highly-educated migrants are drawn disproportionately from the middle and upper middle class and as such are less likely to remit because the family back home is not in need of their financial support. This group is differentiated from those migrants drawn from the lower middle and underclass who do not have a tertiary education and who remit heavily to support dependent households in the sending

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<sup>12</sup> A second potential exception is investment of remitted funds into micro-business. However, the concern here from an industrial policy standpoint is that while micro-businesses are critical for supporting livelihoods, particularly for women and their households, they tend to be the result of ‘push factor’ entrepreneurship resulting from under- or unemployment (as opposed to the ‘pull factor’ of potentially dynamic growth and high profit associated with skill-intensive enterprises), they tend to employ few people outside of the family and they tend to be predominantly in low-technology, non-dynamic sectors and so do little to promote industrialisation and structural transformation, particularly since many are commercial rather than productive ventures. I should stress that this is a generalisation: anecdotal evidence suggests that there may be important exceptions to this assertion.

country.<sup>13</sup> Further, some have argued that remittances provide a disincentive to participate in gainful employment, particularly amongst young men.<sup>14</sup> Thus not only is there little to suggest that remittances reduce structural poverty, there may be some direct negative social effects associated with remittances as well. Even though remittances have some positive effects at the macroeconomic and household levels, remittances cannot be said to be mitigating the brain drain since for the most part those who make up the brain drain do not remit. Remittances mitigate migration generally but not for the highly skilled.

### ***Increased incentive for investment in education***

There is a relatively new strand of ‘brain gain’ literature based on partial equilibrium analysis that argues for the existence of a “brain-drain induced ‘brain gain.’” (Schiff, 2005:2) In this view brain drain may raise growth levels in the sending country by raising the perceived return to education, which then leads to higher investments in education as persons pursue education in the hope of migrating and taking advantage of higher wages overseas. The argument follows that this increased investment in education ultimately boosts growth in the home country. In sum this new line of thinking posits that:

- (i) “the brain drain raises the expected return on education [since it implies that a share of skilled persons will migrate and earn higher wages overseas];
- (ii) this induces additional investment in education (a brain gain);
- (iii) this may result in a ‘beneficial brain drain’ or *net* brain gain, i.e., in a brain gain that is larger than the brain drain; and
- (iv) a *net* brain gain raises welfare and growth.” (Schiff, 2005:2-3)

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<sup>13</sup> This argument can be taken a step further through appeal to the counterfactual. That is, if highly-skilled persons were not to have migrated and remained in the home country they would likely still command high wages relative to the rest of the workforce and so could still provide financial support to dependent relatives as needs be. This is particularly so in middle-income developing country where there is a market for their highly skills. It is the less-skilled who are more likely to be unemployed and unable to support dependent households, and thus it is their contribution that would be lost.

<sup>14</sup> Many observers argue that remittances have led to a culture of dependence in receiving countries, where some household members – young men in particular – opt to remain unemployed and wait for remitted funds and gifts from overseas relatives rather than enter the labour market at the reservation wage. (See Kapur, 2003, amongst others) Remittances in this view facilitate a (unsustainable) culture of high consumption (especially of luxury goods) that cannot be supported by unskilled local wages. One often hears this view in the Caribbean, particularly in the context of declining production and rising crime.

While there is some intuitive appeal to this line of reasoning, the theoretical underpinnings of the approach have been challenged and the limited empirical evidence reported in the literature remains ambiguous. Faini (2003:2) finds “little evidence suggesting that raising the skill composition of migration has a positive effect on the educational achievements in the home country.” He finds a negative correlation between the tertiary enrolment ratio in sending countries and the share of skilled labour in migration. Schiff’s (2005:6) theoretical critique suggests that a “‘beneficial brain drain’ cannot occur in the steady state [and further] a net brain *loss* is likely to hold during the transition.” He concludes that the concerns of the early contributors to the brain drain literature that skilled migration hurt the developmental prospects of sending countries “were probably close to the mark.”<sup>15</sup> (Ibid)

### ***Reverse brain drain and brain circulation***

The conventional argument against brain drain holds that “the large-scale departure of highly-educated workers from developing countries tends to depresses income levels and long-run economic growth rates in developing world.” (Adams and Page, 2003:1) However, the question of how growth is reduced is often couched in terms of fiscal leakages and somewhat abstract welfare losses. Development economists who adopt a more holistic view have long lamented the exodus of large groups of the highly educated, for which financial compensation through taxes and remittances provide little comfort. The assets that are lost – knowledge, skills and capabilities– are not easily recreated. The brain drain reduces technological capabilities and thus limits the potential for technological upgrading and entry to new high-technology sectors where specific skills and knowledge are required. This paper argues that an important strategy to recouping this loss is through tapping the Diaspora, as is later illustrated through the cases of Taiwan and Indian.

While heterodox economists and other social scientists have long argued for the importance of knowledge and learning in industrialisation and development, mainstream

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<sup>15</sup> For an elaboration of this argument see Mountford (1997), Beine et al. (2001), Commander et al (2003), Stark (2004), and Docquier and Rapoport (2004). Faini (2003) and Schiff (2005) provide empirical and theoretical critiques.

economics had been less inclined to include these factors before the introduction of endogenous or ‘new’ growth theory.<sup>16</sup> With this development in mainstream economic thought, recognition of effects such as learning effects, externalities, scale economies, asymmetric information and human capital became central to most economic models. In the technology policy literature, the debate centred on the constraints to technological upgrading in developing countries. Textbook international trade theory had long held that technology transfer took place through international trade, for example through the import of capital goods. However, while this is no doubt an important conduit of technology flows, a critical assumption is that technology is freely available and costlessly assimilated. Stiglitz (1996) rejected these assumptions on the basis of imperfect information, suggesting that technological upgrading in fact comes with potentially significant costs. Acquisition of new technologies entails significant search costs, particularly for developing countries behind the technological frontier faced as they are with a wide array of technologies to choose from for a given economic activity. Further, given the tacit nature of technology, the assimilation of given technologies for productive use requires specific knowledge, adding greater costs learning new technologies. (Nelson and Winter, 1982; Nelson, 1987) Thus developing countries need to focus on acquiring the knowledge and technological capabilities necessary to facilitate technological upgrading and ultimately catch-up.

This paper suggests two viable options for tapping the potential of the Diaspora: reverse brain drain, which is the return option, and brain circulation, which entails the remote mobilization of skilled migrants through temporary or cyclical migration including short-term visits, use of ICTs and utilisation of sectoral networks and contacts that migrants have established in the industrialised countries. In this view the recovery of highly qualified professionals in the Diaspora is part of a comprehensive development strategy, with particular focus on (but certainly not limited to) high-technology and knowledge-intensive sectors. (Meyer, et al, 1997) This strategy is based on the assumption that knowledge and capabilities are a critical factors required for successful industrialisation

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<sup>16</sup> Romer (1986) and Lucas (1988) are perhaps the most often-cited articles in this new literature, with Arrow’s (1962) formulation being the classic work). Gary Becker’s work on human capital in the 1960s also provides a useful antecedent to the mainstream approach.

and development, and to the extent that they exist in the Diaspora they can be sourced from overseas migrants.

### ***Summary***

The challenge for developing countries is developing institutional frameworks that will facilitate the development of technological capabilities needed to boost dynamism in the productive sector. Anything less will see countries fall further behind as global inequality rises and North-South trade relations (as well as South-South in the case regional and bilateral agreements with the more advanced developing countries) ‘lock in’ the existing unequal hierarchy of the global production structure. The existence of technological know-how, skills and experience in the Diaspora presents an option for creative policymaking. As Kapur (2001) notes, “Just as Korea climbed up the technological ladder by importing capital equipment of recent vintage (which embody frontier technologies), diasporic networks embody technologies in human (rather than physical) capital.”<sup>17</sup> Just as immigration policy has become an explicit industrial policy tool in the North, so too do policies aimed at utilising the Diaspora need to become explicit elements of industrial policy in the South.

## **IV Brain Gain in Taiwan and India**

As previously discussed in the context of immigration policies in the AICs, in an increasingly competitive global economy recruiting and retaining talent is critical to developing – or maintaining – the ability to compete. Further, in the context of addressing the brain drain it should be noted that the desire to entice the return of highly-educated, highly-skilled migrants is not solely a developing country preoccupation. A recent OECD report from the Directorate for Science, Technology and Industry noted that “In 2000 the British government ...launched a five-year ... £20 million scheme to attract the *return* of Britain’s leading expatriate scientists and the migration of top young researchers to the United Kingdom.” Cervantes and Guillec (2002:1, my emphasis) They go on to note that

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<sup>17</sup> It should be noted, however, that a strategy of engaging Korean scientists and engineers trained in the United States was a critical element of the success in technological learning arising from the reverse engineering of imported capital goods that Kapur refers to.

this occurred in the same year that, “under greater media coverage, the US Congress announced it was raising the annual cap on the number of temporary work visas granted to highly skilled professionals under its H1B visa programme, from 115 000 to 195 000 per year until 2003.” (Ibid) They conclude that this effort on the part of the British government “dispels a myth: that the problem only affects developing and transition economies.”<sup>18</sup> (Cervantes and Guillec, 2002:1)

The data in the previous section has illustrated that the brain drain is a real phenomenon in many developing countries. However, in considering appropriate responses policymakers inevitably confront the question of whether ‘brain gain’ solutions really exist. Certainly many countries have had discouraging experiences in trying to attract lost talent so one cannot be faulted for being sceptical. However, the cases of Taiwan and India below illustrate successful attempts at engaging the Diaspora in the development of high-technology sectors and should be a challenge and a source of optimism to other developing countries.<sup>19</sup> These cases were chosen because they illustrate two different types of high-technology sector (manufacturing and services) currently at different stages of development, different sequencing of policies and hence evolution of approaches and ultimately different degrees of success. However, the common thread is that in both cases the value of the Diaspora was recognised from the outset, and strategies to engage and involve the Diaspora were included in the formulation of industrial policy and were pursued throughout the various stages of implementation and sectoral development.

### **Taiwan**

The Taiwanese high-technology sector is today one of the most advanced in the world. It is the leader in manufacturing of high-tech components including silicon chips and, along with South Korea, is very close to the technological frontier in a number of other key

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<sup>18</sup> As an interesting aside, they go on to state that “In fact, the British Royal Society first coined the expression ‘brain drain’ to describe the outflow of scientists and technologists to the United States and Canada in the 1950s and early 1960s.” (Cervantes and Guillec, 2002:1)

<sup>19</sup> Israel, Ireland, Singapore and Korea are other frequently cited examples of successful ‘brain gain’ strategies. China is increasingly likely to join this group.

areas, trailing only the United States and Japan in technological superiority.<sup>20</sup> Many accounts of the Taiwan success story point to government intervention via extensive industrial policies. (Wade, 1989)<sup>21</sup> However, a less well-known aspect of the Taiwanese ‘miracle’ is the influence and impact of overseas Taiwanese on the country’s rapid growth, particularly in the semiconductor industry. Saxenian summarises the factors underlying the initial the emergence of Taiwan’s dynamic electronics manufacturing sector in the early 1980s as “FDI and public investments in education and research capabilities initially, and later, policies to develop and transfer technology to the private sector and to support new industrial entrants, *combined with growing ties to the Overseas Chinese community in Silicon Valley*. (Saxenian, 2001:4-5, my emphasis)

### ***Tapping the Diaspora***

This section shows how Taiwanese officials relied on expertise existing in the Diaspora from the very beginning of their quest to establish Taiwan as a technological leader. Well before the electronics revolution, Taiwanese officials (motivated as they were by political imperatives that made rapid development a must) sought industrial policy advice from the Taiwanese Diaspora. “Taiwanese officials began traveling to Silicon Valley in the 1960s and 1970s, long before most of the world was aware of its existence. Senior economic ministers studied the Silicon Valley experience and *institutionalized mechanisms for eliciting advice on technology and industrial policy from the region's community of US-educated Taiwanese engineers*” (Ibid, my emphasis) Indeed, under the advice of their Silicon Valley based Diaspora, Taiwanese policymakers attempted to mimic many other aspects of the Silicon Valley model, including links between industry and public research institutions and the creation of venture capital industry to provide the financial support necessary for an inherently high-risk industry. Mathews (1997:27) also cites the “close relations with the California business and educational system” that ultimately led to the

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<sup>20</sup> It is worth noting that while there were similarities in the developmental state approach taken by Korea and Taiwan (both modelled on Japanese success a generation before), there were important differences in their development strategies such as the focus on large, vertically integrated, oligopolistic *chaebol* in Korea and small, highly competitive firms in Taiwan (many of which developed from subsidiaries of Japanese and American multinational firms). Use of the Diaspora in catching up to the technological frontier was, however, a strategy employed by both. See Yoon (1992) for an elaboration of successful South Korean policies to reverse the brain drain.

<sup>21</sup> World Bank (1993) presents a different point of view.

development of the Hsinchu Science Park – now known as the ‘Silicon Valley of the East’ - in the 1980s. Hsinchu was designed to provide world-class technological infrastructure for the growing industry as well as to bring together the various players including research institutes and venture capitalists to take advantage of the clustering effects that are often cited as one of the critical elements of Silicon Valley’s success. The relationship between policymakers and overseas Taiwanese did not end with Hsinchu’s development. The Diaspora continued to play a crucial role, for example with facilitating critical commercial ventures with small but advanced Chinese-American firms operating in Silicon Valley when the Taiwanese semiconductor industry faced the threat of falling behind the US, Japan and Korea during the ‘chip wars’ of the 1980s. Mathews (1997:36)

### ***Reverse Brain Drain***

While the utilisation of the significant technical knowledge base in the Diaspora was critical to Taiwanese strategy in the early stages, “the most significant change [came with] the ‘reversal’ of the brain drain in the early 1990s, when thousands of Chinese engineers who had been educated and worked in the US returned to Taiwan either to start companies or work for start-ups or established companies...While the Hsinchu Science Park attracted less than ten returnees a year in the early 1980s, more than 2,500 returnees began working in the Park during the 1990s, or some 350 per year.” (Saxenian, 2001:9) This development was strongly influenced by the completion of the park, and was a logical progression from policies in the preceding period when overseas Taiwanese played a critical role of advisors to domestic policy-makers. By the 1990s 40% of these returnees were in the managerial ranks where they were able to leverage their technical skill, organizational and managerial knowledge, entrepreneurial experience, and international connections, all of which were critical elements of Taiwan’s successful catch-up strategy.<sup>22</sup> (Ibid) Today Taiwan is well known for its high capacity to absorb highly educated returnees, with some analysts claiming that postgraduate returnees in Hsinchu account for as much as 78% of its total labour force.<sup>23</sup> (Stalker, 2000; Iredale

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<sup>22</sup> In fact, Saxenian (2001:10) goes as far to suggest that returnees may have been even more important to the success of the Taiwanese high-tech sector than the Science Park itself.

<sup>23</sup> What is interesting to note, however, is that while highly-skilled migrants comprised a slight majority of returnees, 46% had only a secondary education or lower. (Iredale and Guo, 2001:7) This is an important

and Guo, 2001:7) Their contribution to Taiwan's industrial development makes them a highly valued group and the government of Taiwan has made significant efforts to attract them home and provide support through a series of policies and programs.<sup>24</sup>

It is important to note that the conditions that existed prior to the heavy influx of returnees. Taiwan had an established base of low-cost electronic manufacturing and the government had signaled its support for continued upgrading of the sector through the development of the Hsinchu Science Park. While there a significant number of Taiwanese returned in the 1980s, the heavy flow of returnees occurred in the 1990s but critically, coincided with the sectors highest period of growth and critically, its rapid closing in on the technological frontier. What is important to note is that while there never is a magic formula, overseas Taiwanese played critical roles throughout the entire process dating back to the 1960s and continued to play a central role throughout the 1990s to the present.

This experience has not gone unnoticed by policymakers outside of Taiwan. Saxenian (2001:36) notes that "the Chinese (PR) government, aware of the Taiwanese experience, is aggressively recruiting engineers to return from the US, while increasing investments in science and technology education and research, and in the telecommunications and physical infrastructure--including hundreds of high technology zones, parks, and incubators."<sup>25</sup> The same is true of other countries including Israel, Ireland and, as well

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fact for developing country policymakers to note i.e. even in a high-flying economy like Taiwan not all returnees who contributed were highly-educated. However, as managers and technological leaders they local firms benefited significantly from their knowledge and experience.

<sup>24</sup> Policy efforts included travel subsidies for returnees and their family, job search assistance, business investment assistance, facilitation of academic visits and expert consultations, recruitment programs which included competitive salaries (though many returnees seemed happy to take pay cuts of up to 30%) and generally improved working conditions. (See Ireland and Guo)

<sup>25</sup> While the creation of science parks alone will not automatically lead to rapid industrial growth, the creation of industrial parks with high quality technological infrastructure, support services and policy incentives offers a potentially easier transition for overseas scientists and engineers. (Saxenian, 2001:36) This is critical given that individual evaluations of professional opportunities are central to the decision-making process. (Ibid; Kapur 2001) Mathews (1997:28) concurs noting that "The superb infrastructure attracted scores of companies. [Hsinchu's] housing and educational facilities and generally pleasant environment have attracted back Chinese-American engineers, both to work in the high-tech firms and to start their own ventures." Further, it should be noted that while much of the research and data on Taiwanese industry and returnees focuses on the Hsinchu park – which is primarily a semiconductor cluster –

shall see below, India. There is no good reason why other developing countries, particularly those with large, highly-educated Diasporas, should not do the same.

### ***Brain Circulation***

The Taiwanese case also illustrates the significant scope for ‘brain circulation’, which over the last 10 years has emerged as a critical new dynamic, particularly for high-flying engineers and entrepreneurs. This refers to émigrés involvement in activities in the home country while still residing overseas. This involvement can either occur through frequent travel to the home country ‘astronauts’ in Saxenian’s parlance, or indeed remotely through use of information and communication technologies.<sup>26</sup> This option has been made increasingly feasible by the developments in information and communications technologies (ICTs) and the decreased time and cost of international travel. It is a lower risk (for the émigré), lower cost method of utilising talent that exists in the Diaspora, and it is one that has been increasingly important in Taiwan. It also carries some potential benefits for the home country. As Saxenian (2001:30) notes “As engineers travel between the two regions they carry technical knowledge as well as contacts, capital, and information about new opportunities and new markets.” This is a more active, more modern version of the interactions that took place between Taiwanese policymakers and the Diaspora in the 1960s and 1970s.

### **India**

The growth of the Indian information technology (IT) sector is one of the most discussed issues in academia, business circles and the media.<sup>27</sup> The latter has been primarily responsible for the relatively high level of awareness of this sector in the American public. While most media attention has (perhaps unfortunately) focused on outsourcing and the effect on American jobs, some attention has also been paid to the influx of

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Taiwanese authorities have also created industries in aerospace, new materials and pharmaceuticals amongst others. (Mathews, 1997:28)

<sup>26</sup> The UN Digital Diaspora Network initiative provides a useful example. For examples in Africa and the Caribbean see <http://www.unicttaskforce.org/ddnc/> and <http://www.ddn-africa.org/>.

<sup>27</sup> The emerging pharmaceutical and biotechnology sectors which receive less attention are perhaps even more interesting in terms of their rapid growth, emphasis on R&D and hence closer distance from the technological frontier than the IT industry that still focuses primarily on low value-added activities.

highly-skilled Indian migrants under H1B visas primarily to work in Silicon Valley's software sector. Much less however is known about the complexities of these migrant flows and critically for this paper, the impact on the domestic IT sector in India. As with the preceding section on Taiwan, history provides a useful backdrop to the discussion.

### ***Tapping the Diaspora***

The flow of skilled Indian migrants to the United States goes back at least a generation to the 1970s, when there was a heavy influx of doctors and engineers. In fact, this flow was one of the main observations upon which Bhagwati's analysis was based. While this brain drain was a very visible dynamic in both countries, a less well-known process taking place involved the Indian government. India's attempts to tap the Diaspora during this early phase of US migration does not appear to have been as coherent or successful as that in Taiwan, particularly when considering the outputs of such contact (e.g. Hsinchu provides a very tangible result, as do the Taiwanese public research institutions). However, this is not to suggest that early attempts were fruitless. India's attempts to connect with its Diaspora can be traced back to at least the 1950s with the first national effort to identify and trace overseas skills.<sup>28</sup> The government "opened an 'Indians abroad' section in the National Register of Scientific and Technical Personnel with the purpose of gathering information about qualified Indians in foreign countries." (Meyer, et al 1997:4) However, Meyer et al (1997) note that this was used as a method of locating potential appointees to posts in India rather than for influencing industrial policy as in the Taiwanese case.<sup>29</sup>

As with the Taiwanese electronics and semiconductor industry, overseas Indians have had a central role in the development of India's software industry from the outset. Chadhuri (2003) cites evidence linking the origins of the IT sector to Indian computer programmers who worked for early California-based computer firms like Sperry Rand

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<sup>28</sup> This coincided with emergence of India's investment in training in science and technology and the development of domestic R&D capabilities. (Cervantes and Guillec, 2002:3) The timing of these efforts in the immediate decolonization period should not be surprising given the intense focus on national development.

<sup>29</sup> This approach was repeated in the 1970s when the Council of Scientific and Industrial Research instituted a scheme for offering short-term research associates or visiting scientists appointments to Indians abroad. (Meyer et al, 1997:5)

(now Unisys) in the 1970s. Similarly Saxenian (2002b:7) notes that “senior Indian engineers in large US companies were among the first to outsource software services to India, thereby helping to establish the reputation and credibility of producers in regions like Bangalore.” Kapur (2001) also stresses the importance of Indian Diasporic networks in establishing credibility and signaling quality of India-based firms. More recently there has been much greater interaction between government and the Diaspora in determining policy to support the IT sector. The government now makes explicit policy statements concerning engagement with the Diaspora, citing the need to create “the institutional mechanisms which will facilitate their coming to India and interacting with scientists and industry specialists” both physically and “intellectually” (referring to ‘brain circulation’). (Chidambaram, 2004) This has already been taking place. Members of the Indian Diaspora have been critical contributors to the formulation of IT policies, and venture capital and in the services sector, especially IT-enabled services. A high profile example is the Chandrasekhar Report on Venture Capital to the Indian Securities and Exchange Board.<sup>30</sup> Thus Kapur (2001:275) argues that India’s success in the software industry “can at least in part be explained by the strategic role played by [the] Diaspora.” He cites the importance of the “informational role” given the position of many of its members in global IT production networks.

### ***Reverse Brain Drain***

Overseas Indians certainly are well placed to play a critical role in the development of the domestic IT sector. In 1998 Silicon Valley based Indian engineers were running more than 775 technology companies accounting for 16,600 jobs and \$3.6 billion in sales. By 2000 these figures had grown to 972 firms, 25,811 jobs and \$5 billion in sales. (Saxenian 1999a; 2002b) Despite this significant presence she goes laments that “the connections between these Non-Resident Indians (NRIs) and their home country rarely extended beyond holiday visits.” (Ibid) While India has had some success in encouraging return migration much more can be done. Cervantes and Guillec (2002:3) note that “While there are often media reports of successful Indian entrepreneurs in the United States who establish branches or even firms in India only a small number actually return; in 2000, it

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<sup>30</sup> See [www.sebi.gov.in](http://www.sebi.gov.in)

was estimated that some 1,500 highly qualified Indians returned from the United States.” While this is certainly a large number in absolute terms, it is contextualised by the fact that “more than 30 times that number depart each year” as well as by the sheer size of India with over a billion people. Data from recent National Science Foundation studies reveal that in 1995 79% of 1990-91 US doctoral recipients in science and technology from India and 88% of those from China were still working in the United States in 1995 as compared to 11% of Koreans and 15% of Japanese. Another study showed that 87% of Chinese and 84% of Indian PhD students planned to stay in the US following graduation as compared to only 48% of Taiwanese. (Cervantes and Guillec, 2002; Saxenian, 2002b)

It is important to note that many of these high-profile returnees have started firms that have had a tremendous impact on the IT industry.<sup>31</sup> This suggests that while it is certainly desirable it is not necessary to have a majority of émigrés return in order to reap significant benefits from the Diaspora (even in the case of Taiwan it is estimated that most migrants do not return, yet the developmental impact of those who have is unquestionable). What is at least as important is encouraging the return of migrants who are entrepreneurial and who bring with them the contacts necessary to launch and maintain successful enterprises in an increasingly competitive global economy. However, expansion of the Indian IT sector from a niche industry to one having more wide spread impact on employment and development will require policy aimed at making the sector more dynamic and encouraging new entrepreneurs. Encouraging the return of more skilled IT specialists in the Diaspora is an important strategy to achieving this goal.

### ***Brain Circulation***

As in the case of Taiwan, brain circulation is an increasingly important dimension of the engagement of the Indian Diaspora in the domestic IT sector. Kapur (2001) cites an interesting example of this phenomenon in India, an institutionalized networking group of Indian entrepreneurs and IT professionals, known as the IndUS Entrepreneur (TiE). The

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<sup>31</sup> The Indian BPO (Business Process Outsourcing) giant Wipro provides a good example even though its modern founder Azim Premji took over the then fledgling hydrogenated cooking oil firm as a 21 year old Stanford graduate. At least one of the co-founders of the other Indian BPO giant Infosys was also educated in the US.

group is based around a number of angel investors and venture capitalists who seek to identify and fund various start-up companies in the US and India. While core members of the group seem to be based in the US, membership in the group spans several other countries where Indian IT professionals operate. The group facilitates knowledge diffusion through a mentoring, thus facilitating the development of new enterprises via a new Diaspora-centric business model.

However, a strong dynamic of brain circulation as exists in Taiwan does not seem to be at work in India. Saxenian (2002b) offers a very interesting explanation where high rents in low value-added activities in the software sector have proved to be a disincentive to moving up the value chain or spanning dynamic entrepreneurship. As such the industry remains dominated by a few large players focused on export markets and serving as an important node in global production chains. She concludes that unlike in the Taiwanese case there are few US-based Indian engineers that operate in both locales and might drive the technological upgrading necessary to transform the Indian IT sector.

## **Section V Conclusions and Further Research**

This paper has taken the view of the ‘traditional’ approach to brain drain insofar that it holds that loss of skills through migration constrains long-term economic growth, specifically due to the loss of knowledge and skills necessary for dynamic industrial development. However, it finds little consolation in the policy suggestions focussing on taxation of migratory flows and remittances made in much of the literature. Despite their importance (or potential importance in the case of taxation of migrant flows), they do not address the core issue of loss of knowledge, skills and capabilities necessary for structural transformation. Instead this paper has focused on two issues: ‘reverse brain drain’ and ‘brain circulation’ the former which has long been discussed in the brain drain literature and the latter which is a relatively new line of thought based on observations of recent dynamics in international skilled migration.

The concern is with tapping the developmental potential of highly-educated migrants in the Diaspora to promote transformation in the home country predicated on the ‘capabilities’ approach which focuses on the importance of knowledge in dynamic industrial development. Empirical evidence has been presented that documents the existence of the brain drain as well as the developmental impact of the Taiwanese and Indian Diasporas on high-technology sectors in their home country. While there are interesting and important differences in the pace and dynamic of brain gain in both cases, it is clear that in both the impact of the Diaspora was significant in catalysing the development of high-technology sectors and further, government policy was critical in facilitating the Diaspora’s involvement.

The lesson to be learned for other developing countries is that while different approaches can be taken to facilitate beneficial engagement with overseas nationals, engagement with the Diaspora is of critical importance, particularly in the early stages of formulating technology and industrial policy. In a rapidly changing and increasingly competitive global economy overseas nationals will generally have greater technical knowledge of their sector as well as better information about current and future trends. As a next step, the development of research facilities and high-technology centres in the relevant sectors are critical for attracting highly-skilled overseas nationals. However, resource constrained developing countries have to be careful in ensuring that efforts towards creating the conditions for innovation and high-technology entrepreneurship are in line with market trends. Engagement with the Diaspora among other sectoral experts is an important approach to ensuring this outcome.

The three-prong typology of tapping the Diaspora, reverse brain drain and brain circulation used in the cases of Taiwan and India provided useful analytic distinctions, but from a policy standpoint they certainly do not have to be rigidly adhered to, particularly if it is not the most useful of appropriate based on the individual country context. They remain simply an illustration of a successful approach. In fact, in Jamaica it might be prudent for policymakers to take advantage of the close geographic proximity to the US by encouraging ‘circulation’ (along with return) from the outset, as this might

serve to reduce the risk of return for many aspiring émigrés as they can test the waters before making a more difficult decision. This is particularly so given concerns within the Diaspora of high crime that act as powerful deterrents to the return option. Jamaica has had recent success in attracting the return.

The next step in this research entails the design of a survey instrument to identify the specific stock of knowledge, skills and experience that currently exist in the Jamaican Diaspora, particularly in the context of two technology-intensive sectors identified by the Jamaican government in their industrial policy plans – IT and biotechnology. The survey will also attempt to ascertain attitudes towards involvement in industrial development back home with a view to informing policies aimed at engagement, return and circulation. This will facilitate the identification and involvement of the skilled Diaspora in industrial policy and entrepreneurship. Jamaican government's renewed interest in the Diaspora – and in turn, the Diaspora's efforts to engage the government through various civil society entities – suggests great potential for productive interaction between policymakers and highly-skilled overseas Jamaicans. However, effort will be required to specifically link skills abroad with industrial policy efforts at home in order to maximize the Diaspora effect.

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**Table 2 Migration rates to the United States by level of educational attainment**

Country	Total Immigrants	Educational level			Total Immigrants	Educational level		
		Primary or less	Secondary	Tertiary		Primary or less	Secondary	Tertiary
<b>East Asia</b>								
China, PR	846,780	173,545	217,185	456,050	0.1	0.1	0.2	2.2
Indonesia	53,170	1,460	12,065	39,645	0.1	0.1	0.1	0.7
Phillipines	1,163,555	90,200	228,955	844,400	3.6	0.6	2.2	11.7
<b>South Asia</b>								
Bangladesh	69,180	6,000	20,095	43,085	0.1	0.1	0.3	2.3
India	836,780	41,185	127,540	668,055	0.2	0.1	0.2	2.8
Pakistan	165,425	11,630	43,365	110,430	0.3	0.1	0.5	6.4
Sri Lanka	21,820	495	5,695	15,630	0.2	0.1	0.1	5.6
<b>Central Asia</b>								
Croatia	35,455	6,725	14,350	14,380	1.2	0.4	1.2	4.7
Turkey	64,780	8,905	18,090	37,785	0.2	0.1	0.4	1.3
<b>Latin America &amp; Caribbean</b>								
Brazil	154,250	14,005	56,010	84,235	0.2	0.1	0.5	1.1
Columbia	402,935	53,485	163,415	186,035	2.1	0.4	4.0	9.9
Dominican Republic	527,520	155,685	226,270	145,565	12.9	5.3	42.4	24.8
El Salvador	619,185	255,170	257,455	106,560	24.3	12.4	114.8	39.5
Guatemala	341,590	145,515	127,860	67,215	7.6	3.8	29.9	25.8
Jamaica	449,795	36,430	209,710	203,665	33.3	4.7	40.9	367.6
Mexico	6,374,825	3,081,310	2,398,000	895,515	13.3	10.8	17.2	16.5
Peru	220,815	16,965	87,085	116,765	1.8	0.3	2.5	4.2
<b>North Africa &amp; Middle East</b>								
Egypt	96,660	3,480	18,010	75,170	0.3	0.1	0.2	2.3
Morocco	29,670	1,625	8,900	191,145				
Tunisia	5,555	390	1,625	3,540	0.1	0.1	0.2	1.3
<b>Sub-Sharan Africa</b>								
Nigeria	109,160	2,630	15,910	90,620				
Kenya								
South Africa								
Tanzania								
Sudan	12,730	960	3,715	8,055	0.1	0.1	0.3	3.4

Source: Adams, 2003, Tables 4 & 5.

**Table 2 Official Worker Remittances, 1981-2000 (in millions of US\$, Real terms)**

Region/Country	1981	1985	1990	1995	1996	1997	1998	1999	2000	Growth (%)
<b>East Asia</b>	<b>360</b>	<b>498</b>	<b>644</b>	<b>1,433</b>	<b>2,949</b>	<b>5,889</b>	<b>1,316</b>	<b>1,458</b>	<b>1,656</b>	<b>3.7</b>
China, PR	-	255	145	350	1,624	4,198	230	351	492	-3.9
Indonesia	-	86	194	651	773	688	896	1,014	1,053	27.9
Phillipines	360	157	305	432	552	1,003	190	93	111	-130.0
<b>South Asia</b>	<b>7,201</b>	<b>8,195</b>	<b>6,447</b>	<b>9,843</b>	<b>11,573</b>	<b>13,718</b>	<b>12,363</b>	<b>13,580</b>	<b>11,687</b>	<b>2.3</b>
Bangladesh	549	711	908	1,202	1,306	1,448	1,495	1,643	1,732	5.1
India	3,260	3,494	2,743	6,139	8,212	9,775	8,837	10,064	7,994	5.4
Pakistan	2,923	3,575	2,329	1,712	1,247	1,620	1,095	911	951	-7.5
Sri Lanka	469	415	467	790	808	875	936	962	1,010	4.5
<b>Central Asia &amp; Eastern Europe</b>	<b>3,540</b>	<b>2,427</b>	<b>3,785</b>	<b>4,230</b>	<b>4,522</b>	<b>4,742</b>	<b>5,924</b>	<b>4,898</b>	<b>4,988</b>	<b>3.5</b>
Croatia	-	-	-	506	585	497	486	415	470	-
Turkey	3,540	2,427	3,785	3,327	3,441	3,984	5,007	4,143	4,035	2.4
<b>Latin America &amp; Caribbean</b>	<b>1,510</b>	<b>1,424</b>	<b>5,664</b>	<b>10,699</b>	<b>10,035</b>	<b>10,269</b>	<b>10,750</b>	<b>11,644</b>	<b>12,644</b>	<b>13.5</b>
Brazil	409	164	833	2,891	1,813	1,257	900	1,088	985	8.2
Columbia	140	149	569	739	617	624	451	839	989	12.0
Dominican Republic	259	342	367	795	888	1,033	1,239	1,389	1,494	10.1
El Salvador	70	178	417	1,061	1,053	1,138	1,250	1,256	1,549.0	15.8
Guatemala	129	27	125	358	364	387	427	426	498	10.1
Jamaica	89	130	159	582	618	609	618	627	698	12.7
Mexico	183	245	2,906	3,673	4,103	4,618	5,260	5,405	5,816	22.7
Peru	231	189	288	600	579	603	605	614	635	5.2
<b>North Africa &amp; Middle East</b>	<b>5,048</b>	<b>6,300</b>	<b>9,427</b>	<b>5,876</b>	<b>5,836</b>	<b>5,956</b>	<b>5,700</b>	<b>5,427</b>	<b>5,054</b>	<b>-0.7</b>
Egypt	3,101	4,548	6,446	3,226	3,018	3,509	33,150	2,959	2,523	-2.2
Morocco	1,440	1,369	2,339	1,970	2,103	1,797	1,879	1,772	1,912	2.0
Tunisia	507	383	642	680	715	650	671	696	619	1.5
<b>Sub-Sharan Africa</b>	<b>11</b>	<b>383</b>	<b>84</b>	<b>1,150</b>	<b>1,134</b>	<b>2,216</b>	<b>2,113</b>	<b>1,805</b>	<b>564</b>	<b>11.8</b>
Nigeria	11	14	12	804	920	1,822	1,471	1,198	-	30.7
Kenya	-	-	-	-	-	-	-	-	-	-
South Africa	-	-	-	-	-	-	-	-	-	-
Tanzania	-	-	-	-	-	-	-	-	-	-
Sudan	-	369	72	346	214	394	642	607	564	3.9
<b>WORLD</b>	<b>17,670</b>	<b>19,227</b>	<b>26,051</b>	<b>33,231</b>	<b>36,049</b>	<b>42,790</b>	<b>38,166</b>	<b>38,812</b>	<b>36,613</b>	<b>3.9</b>

Source: Adapted from Adams (2003), Tables 1 & 2.