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Human Capital Flight: Stratification, Globalization, and the Challenges to Tertiary Education in Africa[1]

Benno J. Ndulu*

Abstract

Development efforts in Africa are greatly hampered by the flight of both financial capital and by human capital (brain drain). Even those professionals who remain frequently engage in less-skilled occupations because of weak national economies. The historic "push" factors of economic and demographic pressures are currently intensified by globalization, movement toward a knowledge-based economy, and global demographic trends. Given that a continuation of fast-paced loss of the region's talent is likely to continue for some time, the author urges the adoption of strategies to enhance the capacity of African nations for training, retaining skilled manpower, and reversing some brain drain. Tertiary education institutions are evolving to fill the quantity and quality deficiencies in the region, including the emergence of global education, new global knowledge-sharing mechanisms, information technology, networking, and parallel systems such as independent certification and knowledge intermediaries. The article concludes with several recommendations for squarely addressing the underlying push factors toward emigration.

Résumé

Les efforts de développement en Afrique sont considérablement entravés par la fuite du capital financier et humain (fuite des cerveaux). Ceci touche même les professionnels impliqués dans des activités moins qualifiées, à cause de la faiblesse des économies nationales. Les facteurs historiques en cause, notamment les pressions économiques et démographiques sont actuellement intensifiés par la mondialisation, les mouvements vers une économie basée sur

* Benno J. Ndulu is Sector Lead Specialist for Macro Economics, World Bank, P. O. Box 2054, Dar es Salaam, Tanzania; e-mail: Bndulu@Worldbank.org.

la connaissance, et par les tendances démographiques. Étant donné qu'il est fort possible que cette fuite rapide de talents régionaux se poursuive, l'auteur préconise l'adoption de stratégies destinées à améliorer la capacité des nations africaines, afin qu'elles puissent former, retenir la main-d'œuvre qualifiée et renverser cette tendance. Les institutions de l'éducation tertiaire sont en train de changer, pour pouvoir combler les déficits qualitatifs et quantitatifs de la région, ce qui implique l'émergence d'un enseignement, de nouveaux mécanismes globaux de partage de la connaissance, la technologie de l'information, la constitution de réseaux, et les systèmes parallèles, tels que les intermédiaires indépendants pour la certification et la connaissance. L'auteur termine en fournissant diverses recommandations destinées à faire face aux facteurs responsables de l'émigration.

Introduction: Why the Concern with Human Capital Flight from Africa?

A recent remark by the Geneva-based International Organization for Migration (IOM) captioned "African brain drain robs continent of future" captures the sentiment on the human capital outflow from the region. The remark asserts that the brain drain of highly skilled professionals from Africa to overseas opportunities is making economic growth and poverty alleviation an almost impossible task across the continent. Recent meetings of the Heads of State of the Southern African Development Community (SADC) and the meeting of the Association of African Central Banks (AACB) (August 2001) echoed similar sentiments.

Africa is a capital-scarce region, and the loss of this limited resource is widely considered to be detrimental to the prospects of sustained growth and development. The concerns about loss of African capital have to date largely focused on the flight of financial wealth from the region. Investment in Africa remains low, even by developing countries' standards, at the same time that private capital, estimated at nearly 40% of Africa's wealth, has left the continent in search of safer havens. Independent estimates show that, in 1990, Africans held up to $360 billion or 40% of their wealth outside the region. This was equivalent to the size of Africa's debt or 90% of GDP. This high capital flight compares unfavorably with just 6% of East Asian wealth and 10% of Latin American wealth being held outside of their respective regions (Collier, Hoeffler & Patillo 1999). Many of the factors that inhibit capital inflows also motivate capital flight from Africa. Human capital flight parallels this problem of financial capital flight.

Low levels of human capital, particularly skill deficiency, is a drag on investment and growth in Africa. Progress in overcoming shortages of skilled and trained manpower seems to be disappointingly slow, despite substantial resources devoted by both governments and donors to this effort during the last three decades (OED 1994). This deficiency is sustained at the same time that Africa is losing a very significant proportion of its skilled and professional manpower to other markets and is increasingly dependent on expatriates for many vital functions.

The problem of human capital in Africa is not solely due to low levels of education and training. The region has been unable to retain a large proportion of its skilled and professional personnel, an issue on which this paper will focus. To obtain a correct sense of proportion of the problem at hand, it is useful to place this component of African migration in the context of overall world migration. Approximately 150 million people, or 4% of the total world population, is composed of migrants. The International Organization for Migration (IOM) (2000) estimates that 50 million or one third of all world migrants are African. It is noteworthy that most African migration is intra-continental and that about half of the African migrants are either refugees (5 million) or displaced persons (20 million). My focus in this paper therefore concerns a very small proportion of migrants from the region—that is, skilled and professional Africans who emigrate to the rest of the world.

African international migration has grown faster than that from any other region in the last three decades, raising its share in the global total from 10.6% in 1965 to 13.4% in 1990 (Zeleza 1998). This rate exceeds Africa's share in the world population, which is approximately 10%. The estimated average number of skilled African emigrants rose from 1,800 per year between 1960 and 1975 to 23,000 between 1974 and 1987. (See Table 1.) Although Africa is comparatively the smallest source of immigration to the developed world, a high proportion of its migrants consists of highly skilled professionals. Emigration from Africa is therefore uncharacteristically skill intensive.

Table 1: Estimates of Brain Drain from Sub-Saharan Africa

Period	Total Emigration of Highly Skilled from Africa	Average Per Year
1960–1975	27,000	1,800
1975–1984	40,000	4,400
1974–1987	70,000	23,000
1986–1990	50,000–60,000 middle- and high-level managers emigrated from the continent.	
1960–1987	100,000 trained and qualified Africans abroad, 30% of its highly skilled manpower.	
1960s	More than half of the Africans who went overseas to study physics and chemistry never went back home.	

Source: Haque and Aziz (1998)

Although much of the evidence is sporadic and anecdotal, one can nevertheless obtain a good sense of the magnitude of the problem. It has been estimated that, for a number of African countries, more than 30% of its highly skilled professionals are lost to the OECD countries (Carrington & Detragiache 1998; Haque & Aziz 1998). Nearly 88% of adults who emigrate from Africa to the United States have a high school education or higher (Speer, cited by Zeleza, 1998). Apraku (1991) conducted a survey of African immigrants in the United States, finding that 58% of the respondents held either Ph.D. or had M.D. degrees and that a further 19% had master's degrees. Of these, 20% had previously been university professors in their home countries. This figure compares with 40% for all immigrants to the United States who had completed some form of tertiary education. (See Table 2.) A more systematic analysis of the 1990 U.S. Census shows that, out of 128,000 African immigrants over age 25, 95,000 were highly educated. More African scientists and engineers are working in the United States than there are in Africa. The emigration of technically skilled people has left only 20,000 scientists and engineers in Africa to provide services to 600 million people (IOM 2000).

Table 2: Foreign and National Adult Populations Classified by Level of Education in Selected OECD Countries, 1995–1998 Averages, in Percentages

Country	Lower Secondary		Upper Secondary		Third Level (Tertiary)	
	Foreigners	Nationals	Foreigners	Nationals	Foreigner	Nationals
USA	35.0	15.7	24.1	35.0	40.9	49.3
Germany	48.5	13.2	37.0	62.2	14.4	24.6
France	63.3	33.4	22.9	45.4	13.8	21.1
Italy	47.1	56.3	38.3	34.3	14.6	9.3
U.K.	65.1	43.9	14.7	32.5	20.2	23.7
Canada	22.2	23.1	54.9	60.3	22.9	16.6
Sweden	30.8	20.4	41.5	50.3	27.3	29.3

Source: Compiled from OECD, *Trends in International Migration* (various issues)

Regional averages mask the wide variation of the problem faced by individual countries. Table 3 shows the proportion of migrants from a sample of 24 African countries. The range across these countries varies from 44 to 90% of emigrants who have tertiary education. Anecdotal information, impressively compiled in the paper by Paul Zeleza (1998) and in the 1992 *Human Development Report* of the U.N. Development Program (UNDP), provides the flavor of variation across countries. It is estimated that more than 21,000 Nigerian doctors are practicing in the United States. About 60% of all locally trained Ghanaian doctors left the country in the 1980s. (UNDP 1992). In Sudan, 17% of doctors and dentists, 20% of university lecturers, 30% of engineers, and 45% of surveyors have gone to work abroad. South Africa has lost 25% of its graduates to the United States alone. Moreover, South Africans account for 9.7% of all international medical graduates practicing in Canada. Out of all the medical graduates produced by the University of Witwatersrand in the last 35 years, more than 45% (or 2,000 physicians), have left the country. South Africa's Bureau of Statistics estimates that between 1 million and 1.6 million people in skilled, professional, and managerial occupations have emigrated since 1994 and that, for every emigrant, 10 unskilled people lose their jobs. Gambia has lost almost 60% of its graduates to destinations abroad. In the 1980s, Zambia had 1,600 doctors in the country. The number has since plummeted to 400. The Human Resources Division of the Southern African Development Community estimates that at least 10,000 teachers have left SADC countries for greener pastures since 1996 (Integrated Regional 2001).

Table 3: Migration to the USA by Educational Attainment for Selected African Countries, 1990

Country of Origin	Schooling Level				Secondary Plus Tertiary	Secondary Plus Tertiary as a percent of Total	Tertiary as Percentage of Total
	Total	Primary	Secondary or Less	Tertiary			
Algeria	3904	60	1280	2564	3844	98	65.68
Benin	180	20	80	80	160	89	44.44
Cameroon	1694	60	200	1434	1634	96	84.65
Central African Republic	160	0	60	100	160	100	62.50
Congo	200	0	20	180	200	100	90.00
Egypt	53261	980	13020	39261	52281	98	73.71
Gambia	747	100	120	527	647	87	70.55
Ghana	12544	40	3400	9104	12504	100	72.58
Kenya	8372	40	1420	6912	8332	100	82.56
Lesotho	160	0	20	140	160	100	87.50
Malawi	381	0	120	261	381	100	68.50
Mali	220	0	100	120	220	100	54.55
Mauritius	1100	0	260	840	1100	100	76.36
Mozambique	920	80	280	560	840	91	60.87
Rwanda	200	0	20	180	200	100	90.00
Senegal	1370	180	420	770	1190	87	56.20
Sierra Leone	4155	80	1060	3015	4075	98	72.56

Table 3:Continued

Country of Origin	Schooling Level				Secondary Plus Tertiary	Secondary Plus Tertiary as a perent of Total	Tertiary as Percentage of Total
	Total	Primary	Secondary or Less	Tertiary			
South Africa	22678	200	4980	17498	22478	99	77.16
Sudan	2496	0	760	1736	2496	100	69.55
Togo	460	20	140	300	440	96	65.22
Tunisia	2816	60	1120	1636	2756	98	58.10
Uganda	5060	120	1000	3940	4940	98	77.87
Zambia	1613	0	340	1273	1613	100	78.92
Zimbabwe	3161	20	420	2721	3141	99	86.08
Total/Average	127852	2060	30640	95152	125792	98%	74.42%

Source: Carrington & Detragiache (1998), Table 1.

The problem also manifests itself in terms of those training abroad who do not return to the region. Pires, Kassimir, and Brhane (1999) conducted a survey on the rate of repatriation of 1,708 sub-Saharan African Ph.D. holders who were trained in a selected number of universities in the United States and Canada between 1986 and 1996. Their analysis indicates that 34% have not returned to Africa. (See Table 4.) Of African Ph.D. graduates in the United States over this period, 57% returned to their countries of origin, and 5% went to other African countries for a total return rate of 62%. Overall, 36% stayed in North America, and the remaining 2% went to Europe and elsewhere. Variations in rates of repatriation across countries were conditioned by a number of factors, including political instability, lack of job opportunities, weak or absent universities and independent research centers at home, and fear of professional atrophy.

Table 4: Return Status by Country of African Ph.D. Recipients in North America, 1986–1996

50% + Return Home	Return Rates (%)				
	Total PhDs	Home	Africa	In USA	Other
Benin	4	50		50	
Botswana	19	94	6		
Bukina Faso	25	79	13	8	
Burundi	14	57	43		
Cape Verde	2	100			
Chad		2	100		
Congo-Brazzaville	5	67	33		
Guinea	11	70	20	10	
Ivory Coast	42	59	4	37	
Kenya	155	65	5	28	2
Lesotho	12	90	10		
Madagascar	18	67	11	11	11
Malawi	39	81	8	11	
Mali	17	77		23	
Mauritania	7	50		25	25
Mozambique	6	80		20	
Namibia	2	100			
Níger	21	62		38	
Senegal	16	62		38	
South Africa	223	67		30	

Table 4: Continued

50% + Return Home		Return Rates (%)			
	Total PhDs	Home	Africa	In USA	Other
Swaziland	31	80	10	10	
Tanzania	58	79	2	19	
Togo	24	68	5	26	
Uganda	54	79	3	17	
Zambia	38	79	4	18	
Zimbabwe	51	83	7	10	
50% or Greater Stay		Return Rates (%)			
Angola	1	100			
Cameroon	62	33	5	60	3
Gambia	7	33	17	50	
Ghana	166	34	5	61	
Liberia	23	21	21	58	
Mauritius	8	40	60		
Nigeria	261	34	3	62	2
Sierra Leone	30	22	6	72	
Somalia	17	33	11	56	
Dispersed Location		Return Rates (%)			
Ethiopia	89	47	4	47	2
Rwanda	16	36	14	43	7
Sudan	92	48	5	35	11
Congo Dem. Rep	33	42	17	42	
Other		Return Rates (%)			
Guinea-Bissau	4				100

Source: Zeleza (1998)

Some cost estimates have been made on brain drain from Africa. Although they are unsystematic, they show that the main cost is the loss of investment in education. The U.N. High Commission for Refugees (2001) estimates that the educational capital embodied in highly skilled graduates who emigrated to the

United States in 1990 alone was $640 million. It concludes that emigration can represent a significant transfer of resources from poor countries to rich. The U.N. Commission on Trade and Development (UNCTAD), for its part, estimated the annual cash value of each African professional migrant, based on 1979 prices, at $184,000 (Oyowe, 1996). With an estimate of roughly 95,000 African professionals in the United States alone, this suggests that Africa is losing almost US$17.5 billion annually through brain drain, while receiving technical assistance of only about US$4 billion from all sources. These estimates do not necessarily represent the opportunity cost of the loss to African countries as it is not certain whether the skilled emigrants would have been gainfully engaged in their own professions at home. Furthermore, there are ample cases of internal brain drain, through which professionals engage in petty trade and other nonprofessional activities because they are unable to find sufficiently remunerative employment in their own line of work.

I began with highlighting the concern about human capital outflow from the region to set the stage for the rest of the paper, which will take up the issue from a developmental perspective. The paper is not about human capital flows in general. Rather it narrowly focuses on the high skill content of African emigration to industrial countries, its impact on development in the region, and the challenges faced by institutions of higher learning to help the region deal with this problem. Although tertiary education overall is rapidly expanding in Africa, higher education (accredited universities) is a shrinking proportion of it. African institutions of higher education address these challenges in two ways. One is by responding to the changing demand patterns for tertiary education at home; and the second is by adapting to emerging global arrangements for the production, utilization, and sharing of knowledge.

The rest of this paper deals with the issue of African brain drain in the context of relevant changes taking place internationally: globalization, movement toward a knowledge-based economy, and global demographic trends. The next section reviews the conceptual underpinnings of human capital flows from a developmental perspective, followed by a review of the evolution of tertiary education in Africa and its adaptation to the changing systems of knowledge generation and sharing in the global context. I then review possible actions for dealing with the impact of human capital flows, taking advantage of global knowledge sharing arrangements, and applying measures to reduce pressures for emigration. My conclusion is that control measures will not resolve these issues; instead it is necessary to squarely address the fundamental push factors.

Table 5: Scientists and Engineers Doing R&D in the United States (1993)

	Total		Education		Industry		Government	
	All Degree Levels	Ph.D.s	All Degree Levels	Ph.D.s	All Degree Levels	Ph.D.s	All Degree Levels	Ph.D.s
Total engaged in U.S. R&D	2,685,000	345,000	592,000	179,000	1,747,000	135,000	346,000	31,000
U.S.-born	2,254,000	244,000	470,000	128,000	1,477,000	90,000	307,000	26,000
Foreign-born	431,000	101,000	122,000	51,000	270,000	45,000	39,000	5,000
Location of S&E degree								
Foreign school	138,000	32,000	41,000	16,000	87,000	14,000	9,000	2,000
U.S. school*	293,000	70,000	81,000	35,000	183,000	31,000	29,000	4,000
Foreign-born in R&D as % of R&D total	16.1	29.3	20.7	28.5	15.5	33.2	11.2	17.3
U.S school as % of foreign-born in R&D	67.9	68.7	56.1	67.9	67.6	69.6	75.8	69.2

*Location of highest earned S&E degree.

Source: National Science Foundation, Division of Science Resources Studies, SESTAT database.

Human Capital Flows from a Developmental Perspective

Human capital is the stock of skills and productive knowledge embodied in people. Increasing yield or return to human capital investment involves enhancing a person's skills and earning power (private return) and in increasing overall economic efficiency through the complementary application of different skills and improved economic decision-making both within and outside of the market economy (developmental value). Adam Smith in *Wealth of Nations* identified the improvement of workers' skills as a fundamental source of economic progress and increasing human welfare (cited in Eatwell et al., 1996). These improvements are achieved not only through education and formal training but also through learning by doing. From an individual's perspective, investment in human capital is a lifelong process. Knowledge embodied in a person includes abilities for problem solving, command over relevant information, and technical, managerial, and entrepreneurial skills.

Human capital flow, although it is not recorded in the balance of payments among nations, entails an international transfer of resources in the form of human capabilities and skills. Although the flow of human capital has lagged behind that of commodities and financial capital, it has a significant effect on development as I will argue later. The pattern of human capital flows is changing as the source countries are diversifying; and skilled migration has assumed greater importance, both in terms of the actual population flows and in terms of the focus of migration policies more generally.

Human Capital Flows and Growth

From a developmental perspective, the main concerns about the outward flows of skilled people from Africa arise from the negative consequences on growth and income levels. This effect is in addition to the unaffordable loss of the considerable investment undertaken in generating these skills. The traditional position on this issue is that brain drain is a negative externality imposed on the population remaining behind, creating slower economic progress and living standards in poor countries (Bhagwati & Hamada 1974). Loss of jobs for semi- and unskilled workers and a reduction in production and incomes result from an inadequate supply of skilled and professional labor because it is a necessary complement to semi-skilled and unskilled labor in production (Miyagiwa 1991; Piketty 1997). Already poor source countries lose their potentially most enterprising and ambitious young population, stifling the development of a more dynamic private sector.

More recent research on growth has strengthened the traditional position by showing that brain drain from a skill-scarce poor country leads to a permanent loss in growth and income levels (Haque & Aziz 1998; Haque & Khan

1997). Brain drain reduces the growth rate of the effective human capital that remains behind in the economy and hence generates a permanent reduction in per capita income growth in the home country (Haque & Kim 1995). The findings build on results from research on endogenous growth and its extensions. Unlike the neoclassical growth literature in which long-run growth is determined by exogeneous rates of population increase and technological progress, the endogeneous growth literature suggests that the long-run rate of income growth is also influenced by public policies and public investment which in turn influence the rate of technological progress and productivity growth. The accumulation of human capital is an important part of this long-term development process and is influenced in important ways by public programs.

Although basic education is widely considered to be critical for poverty reduction, there is emerging evidence from cross-country growth studies that secondary and higher education are more significant in raising long-term growth rates and income levels (Barro 1998; Barro & Jong-Wha 1993).[3] In a recent paper, Barro (1998: 18) finds that school attainment at the secondary and higher levels for males aged 25 and over has a positive effect on the subsequent rate of economic growth.[4] The estimated impact for this category is such that an additional year of schooling raises the growth rate impact by 0.7% per year, a very large effect indeed for slow growers (Barro, 1998: 18). This impact is mediated predominantly through improved capabilities to absorb technological advances. Based on cross-country scores in international examinations, Hanushek and Kim (1995), emphasize that quality of schooling capital is more important for economic growth than years of educational attainment.

In a cross-country empirical study to determine the effect of foreign direct investment (FDI) on growth, Borensztein, DeGregorio, and Lee (1998) tested the effect of the flow of FDI from industrial countries to 69 developing countries. They found that FDI had a larger impact on growth than domestic investment, due to its higher productivity; however, this impact appears only when there is sufficient capability in the host country to absorb the complex technologies that come with FDI. The robust complementary effect between FDI and human capital results when the host country has reached a minimum threshold stock of human capital, namely, that men 25 years and over have at least 0.52 years of secondary schooling. This level of educational achievement is far above that of the majority of African countries.

The skills lost through brain drain are not easily replaced given the limited capacity of higher education and training capacity in developing countries and the paucity of the means for acquiring these elements elsewhere. In a dynamic sense, brain drain can reinforce the limited ability to generate needed skills in poorer countries as it reduces their capacity to train a new generation of pro-

fessionals (UNDP 1992). But as I will argue below, with globalization, the borders for the reproductive capacities of knowledge are softening.

The use of technical assistance through aid to fill capacity deficiencies in poor countries has often targeted short-term alleviation of capacity shortfalls. In this form, it often discouraged efforts to build and retain local capacity in government. Enclave project or program management systems, usually deployed with technical assistance to address capacity weaknesses in the public sector, have tended to engender psychological dependence on expatriate capabilities. This dependence has very often militated against capacity development for sustained self-management in these countries.

Recently, a strand of research on brain drain points to indirect beneficial effects from allowing migration. These effects arise from the fact that migration possibilities foster relatively higher investment in education, because of higher expected returns abroad to education (Beine, Docquier & Rapoport 1997).[5] It is argued that as long as this "brain gain" effect from migration possibilities dominates the ex post effect of actual out-migration, the average level of human capital of the remaining population would be higher. The empirical work of this strand confirms a strong positive effect of migration possibilities on human capital investment and that, for moderate levels of actual ex post migration, the net effect could indeed be beneficial. It is important to emphasize that the beneficial effect requires that ex post out-migration not be excessively high, a point that the traditionalists emphasize.

Main Causes of Voluntary Human Capital Flows

Economic and Demographic Pressures

The causes of "voluntary" emigration of professional skills are multifaceted and so are the theories explaining them. In this section, I first review the conceptual basis for pressures behind emigration and then draw lessons for the African situation from empirical work by Hatton and Williamson (2000) about the experience of 19th century European emigration.

Neoclassical micro theory of migration flows has tended to emphasize differentials between source and destination countries in the rates of return to investment in human capital (mainly a result of productivity differences) and employment rates (the underdeveloped private sector and an inefficient public sector, which limit opportunities for reasonable returns in Africa). The new economics of migration explains the flow primarily as a household strategy to mitigate risk in household income earning, which in turn is a consequence of missing insurance markets and a lack of compensatory income distribution policies in source countries. Official global remittances in 1990 were estimated

at $71 billion and represented a net transfer back to developing countries of $31 billion, equivalent to nearly three quarters of Overseas Development Assistance (ODA) (Russell 1998). The risk of professional marginalization and obsolescence reinforces these pressures, stemming from professional isolation, the absence of peer pressure and interaction, and the absence of complementary inputs for professional practice.

Dual labor market theory is demand based and underscores the drive by employers and governments in destination countries to source low-wage migrant workers as a way of avoiding structural inflation. Political instability and civil strife are the main reasons for refugee migration, reinforcing the push factors for migration. Hatton and Williamson (2000) analyze the driving forces behind mass migrations from poor countries in Europe in the late 19th century to draw lessons about the potential of future emigration from Africa to more developed economies. Their analysis indicates that economic and demographic fundamentals are the key drivers, and they conclude that these forces lead to projections of emigration from Africa of a far greater magnitude than was the case from 19th century Europe.

In the European experience, these forces worked themselves through three key channels. First, the real wage advantage of destination over source countries raised emigration by 1.27 per thousand. Second, demographic pressures (and transition) drove emigration with a long-term estimate suggesting that half of excess births in source countries compared to destination countries ended up emigrating 20 years later. This impact was dominated by the changing share of population (or work force) aged 15–29, which is the group most likely to move. Third, the stock of migrants and the past migration rate had a chain effect on the current emigration rate, leading to persistence in emigration streams. For example, nearly a third of African immigrants arriving in the USA during the late 1990s were classified as close relatives of U.S. citizens. A combination of these factors over the long term propelled an inverted U-pattern of emigration. First, it rose as the youthfulness of the demographic structure and increasing real wages at home made the cost of emigration more affordable. After it peaked, it then declined in the catch-up phase as the real wage differential closed and the population structure became more mature.

Hatton and Williamson (2000) also assess the relevance of the European experience for potential African emigration. The real wage gap between Africa and developed countries is enormous and is unlikely to shrink in the near future given the slow growth of the region. The huge incentive to emigrate from the region will therefore persist for the foreseeable future. Although Africa is unlikely to catch up with destination countries in the near future, it will continue to experience some improvement in real wages and standards of living,

thus making the cost of emigration more affordable. The proportion of youth in the total population is rising fast, even after adjusting for the impacts of AIDS. This category of the population is projected to grow at 2.9% per annum between 1995 and 2025 for Africa as a whole. This rate increases to 3.4% if one excludes North Africa (Hatton & Williamson 2000).

The demographic pressure from an explosive increase of the economically active population in the developing countries is exacerbated by nonreplacement population growth in key migration destinations.[6] Replacement migration strategies are likely to attract international migration to offset declines of total and particularly aging populations in developed countries. In his paper published in this issue, Kenneth Prewitt observes that the USA is already adjusting its immigration policy in that direction and that Europe may not be able to withstand the pressure from population decline and dislocation of economic activity without following suit. As already noted, international migration has increasingly tended to favor skilled migrants. Thus, there is likely to be mounting pressure for the emigration of young skilled persons from poor developing countries to developed ones.

Globalization, the Knowledge-based Economy, and the Intensification of Human Capital Flows

The world systems theory explains voluntary international migration largely through the process of globalization of production and trade. Such flows are facilitated by a significant reduction in barriers to trade, production sharing arrangements, and the reduced cost of movement. Globalization offers opportunities for the amelioration of the pace of brain drain and creates sources of additional pressures for emigration of skilled manpower from poor developing countries.

Globalization has enhanced the mobility of all forms of capital, accelerated the standardization of knowledge and increased production by multinationals, and increased the scope for private sector growth. The phenomenal growth and easier mobility of private capital opens up opportunities for engaging professionals in their home countries and providing higher returns based on increased productivity. This is by no means trivial, particularly for countries in Africa, where most professionals have been engaged in the public sector at typically very low wages.[7] Global knowledge-sharing arrangements, through partnerships and networking, are also expanding the scope and capacity available to poor countries for production and more effective application of knowledge.

The global production system creates production-sharing arrangements across countries by multinationals. Such arrangements currently account for over 30% of global production (Lindbaek 1997). Although such arrangements

are still predominantly found in industrial countries, developing countries are increasingly participating in them, based on their low-wage comparative advantage, and thus raising opportunities to use skilled local workers. The comparative advantage of low wages in developing countries, however, can be nullified by low productivity, in part due to the scarcity of complementary professional skills. Although wages per hour may be low, wages per unit of output could be high due to low productivity. Surveys of investors show that labor is not cheap where productivity is low. Productivity, in turn, is influenced not only by the quantity and quality of capital stock, but also by the quality and quantity of knowledge. (Lindbaek 1997).

The emergence of a knowledge economy opens new windows of opportunities for latecomers to achieve faster productivity-based growth. This is partly because new technologies allow "leap frogging" for those countries that are not hampered by inertia from the previous industrial structure (Perez 1985). It has been shown that, as major technological revolutions take place, developing countries that have positioned themselves to benefit from the "underlying technology" of the next long wave can catch up with rich countries, while those who lock themselves into dinosaur technologies fall behind (Brundenius 1996). The challenge to developing countries, however, relates to the fact that two key elements of the knowledge economy, information and micro-electronics, aid human mental effort. To meet this challenge, poor countries have to position themselves within this technological revolution. Opportunities for "leap frogging" and threats of marginalization are strong motivators for seeking and retaining knowledge.

The Evolving African Knowledge System in the Global Context and the Brain Drain Challenge

We start with the premise that Africa will continue to experience emigration of skilled and professional personnel to the developed world for the foreseeable future. Based on pressures from globalization and demographic trends in the sending and receiving countries reviewed above, I foresee a continuation of fast-paced loss of the region's talent for some time to come. For the long term, Africa needs to devise strategies to enhance its capacity for training, retaining skilled manpower, and reversing some brain drain. In this section, I examine how tertiary education institutions are evolving to fill the quantity and quality deficiencies in the region. This assessment takes into account the global evolution of the education system and new opportunities from global knowledge-sharing mechanisms facilitated by developments in information technology and networking. I also look at the emergence of systems to generate and share outside of the tertiary education system.

Tertiary Education in Africa

The tertiary education system is hard pressed to keep pace with increasing and diverse local demands for knowledge, in addition to coping with the consequences of the brain drain from the region. While other supply-side solutions are emerging, such as the global knowledge-sharing arrangements and networking discussed below, the African tertiary education system will have to carry the bulk of the burden.

Africa, like the rest of the world, is currently undergoing a major transition from the traditional university-based higher education to a more utilitarian and diverse tertiary education system. The influence and pressure from the evolution of the global education system, treated in some detail by Kenneth Prewitt (2001) is evident here. Multi-faceted delivery systems for higher education are emerging to challenge the traditional monolithic system dominated by universities. This same development is slowly occurring in Africa as well, vindicated by the emergence of a range of specialist higher education institutions and centers performing tasks once considered the preserve of the "do-it-all" universities.

The evolution is marked by a proliferation of professional schools, industry-specific training institutes (for example, for banking and other sector-specific units offering on-the-job training), and private universities with program structures tilted toward professional courses. This development is amplified by the emergence of more cost-effective delivery systems, such as correspondence education, part-time higher education programs such as open universities, and multiple streaming of programs to accommodate part-time students in conventional universities. Electronic communication is creating "virtual universities" with no national or regional boundaries. At this point, there is an apparent incoherence and some degree of waste in the evolving system, reflecting the process of transition and the desperate quest for institutional survival.

These important developments prompt or support the ongoing changes in the organization and delivery of tertiary education in Africa.

The Utilitarian Nature of Tertiary Education

Tertiary education in Africa, including higher education, is becoming much more utilitarian, a development occurring in tandem with the rising dominance of market-oriented approaches to organizing and providing education services worldwide. The effectiveness of the education system is assessed on the grounds of its ability to provide relevant and effective skills for dealing with specific tasks. This change places far greater pressures on the higher education system to be responsive to the perceived needs of the society which it seeks to serve.

The rapid change is prompted by increasingly more exacting demands regarding "returns to investment" in education from both the private and public service sectors. From the private cost-benefit perspective, those committing resources in education or knowledge investment assess income earning capabilities and mobility across employment in local and international firms. The ability of tertiary education institutions to provide relevant and effective skills for dealing with specific tasks is a major criterion by which particular modalities of delivery of tertiary education are judged.

From the social cost-benefit view, functionality and more recently, meritocracy are increasingly determining the way tertiary education is assessed by those in the public sector. This perspective is based on the growing view that improved governance through, *inter alia,* deployment of better human capital in the public sector will strengthen the capacity for improved economic management and public service delivery. Most second-generation public service reform programs in Africa aim to achieve this goal. Professionals and those with technical skills are necessary for the development of civil society. They serve as watchdogs of prudent public policy and the application of good governance (Haque & Aziz 1998). Deployment of better human capital in public service and the domestic presence of professionally competent civil society as agents of restraint engender improved governance and can induce increased private investment and higher productivity of the private sector.

Within the public sector, rewards to higher education may be based on the relevance and effectiveness of the knowledge gained in the process of education. Governments as major employers typically apply this distinction across disciplines in setting pay scales and professional progression. After nearly three decades of wage compression for egalitarian reasons, governments in reforming countries are decompressing wages and salaries, increasing differences in pay across skill levels. The private sector is even more discriminating in these terms. Within the system of higher education itself, secondary sources of earnings among staff are largely determined by the differences in the marketability of their skills and disciplines to clients.

Independent Certification

There is a growing influence of independent quality certification of the products of tertiary education in Africa. Independent certification reduces the risks faced by employers who must otherwise engage graduates of unknown quality. It thus helps to deal with the problem of information asymmetry between producers and users of products from the growing number and wide variety of tertiary education institutions. Independent certification is the primary instrument of accountability for the sector. Professional associations and registration

boards for practicing professionals play a central role in ensuring adherence to standards and minimum requirements for professional certification. These institutions cover most professional studies, including engineers, medical practitioners, lawyers, and accountants. Increasingly some graduates also seek international standard certification by enrolling for similar examinations abroad to expand their opportunities for employment in international firms at home and abroad.

The accountability system is considerably weaker for most of the "nonprofessional" products, including the liberal arts, social sciences, and pure sciences. Nevertheless, two types of arrangements are being used to certify these categories of higher education. One approach is through collaboration with reputable institutions abroad through twinning arrangements. This approach has entailed issuing certificates to local students from the more reputable partner institution abroad. The second approach is through regional or subregional collaborative graduate programs, such as the one supported by the African Economic Research Consortium (AERC) or CIEREA. This approach utilizes a collective quality assurance mechanism applied through (a) peer pressure for adherence to commonly agreed high-quality curriculum, (b) selectivity in designating certifying institutions from among the collaborating institutions based on adequacy of capacity to offer core courses of agreed quality, and (c) subjecting student and program performance to external international review. Both programs run a joint facility for electives. In addition to pooling quality staff and expanding the menu of specializations, the facilities also indirectly act as a quality controllers for core courses offered by the designated universities.

Knowledge Intermediaries

The presence and role of knowledge intermediaries between producers and users of knowledge outside the formal tertiary education system are increasing. These intermediaries raise the demand for knowledge in the public policy sphere. There is no doubt that most African countries urgently need to strengthen their policy-making resources. Outside of government, capacity for policy analysis resides in universities, academically oriented research institutes, and more recently, national policy institutes. A 1994 study conducted by AERC in eight sub-Saharan African countries found that most communities, parliaments, and nongovernmental organizations did not possess their own in-house capacity for policy analysis, relying instead on the institutions mentioned above.

A more worrying finding from the study, perhaps, is the fact that research and analysis performed in academic institutions is rarely available to either government or nongovernment users due to poor dissemination. Until very recently, no intermediate institutions, such as national policy institutes, existed

to make complex analyses available in formats intelligible to a variety of audiences. However, the study did find that the barriers between the two groups are coming down in many of the countries studied, as researchers have gained credibility by producing more policy-oriented research and presenting their recommendations in practical formats. Policy institutes and policy research networks have recently launched a wide range of initiatives to meet these challenges. All these initiatives aim to augment the pool of analysts, enhance skills and professionalism, and promote the application of research in the policy context (Ndulu 1996).

During the past five years, national policy institutes have emerged, funded by regional and international donors, governments, the private sector, and by their own resources from specific consulting or fee-based tasks requested by their wide clientele. As knowledge intermediaries at the local level, national policy institutes play a particularly useful function in enhancing access to global and local knowledge. At the same time, they provide feedback to shape the agenda of knowledge producers. The better institutes have built strong credibility with both sides—suppliers and users of knowledge—and serve as honest brokers in dialogues involving competing interest groups. The institutes also respond to requests for policy analysis by mobilizing local talent to carry out necessary research. In many cases, these institutes operate knowledge-access systems including Websites for users and researchers. By maintaining a forward-looking research agenda, national policy institutes seek to proactively influence the policy agenda.

Intermediation efforts are not confined to national levels. Regional or subregional policy research networks are also emerging across several disciplines and specializations. These are networks of individuals and institutions across countries. The most prominent example is a network of economists engaged in policy-oriented macroeconomic research, coordinated and supported by the AERC. Other examples include the East Africa Environmental Economics Network, the Council for Development of Social Science Research in Africa, and a francophone network dealing with industrial policy. Policy seminars organized by these networks can bridge the gap of suspicion between academics and policy makers. Not only do they provide a showcase for local talent in policy analysis, but they also foster important dialogue on policy issues. Joint initiatives between public and private researchers have also proved to be an effective way of cultivating close relations.

Making Use of Global Knowledge Sharing

Arrangements to Supplement Local Capacity

Globalization is softening the boundaries of learning, knowledge-generation and knowledge-application, widening the scope for ameliorating the impact of brain drain, and strengthening local capacity. Indeed, national or regional boundaries for knowledge generation and knowledge application are increasingly becoming superfluous as a basis for assessing an individual country's capacity for education and training. Information technology has opened up the scope for accessing and exchanging global knowledge and for distance learning. Virtual tertiary institutions, networking among higher education institutions and professional associations, international certification, and standardization of achievements are some of the major vehicles which integrate the global knowledge system across countries.

There is a growing consensus in the international development community that knowledge sharing is a global public good. Globalization has made the prosperity and welfare of the world much more interdependent, with stronger channels for contagion effects (good or bad). It is also widely recognized that poverty is the weakest link in the concerted efforts by the international development community to make the world safer, healthier, and more prosperous. Development based on knowledge can indeed make a difference in the pace and extent of improvement in livelihoods and the quality of life of the people in the developing world. Countries and people differ in their capacity for acquiring, absorbing, and using knowledge. Evidence suggests that these knowledge gaps—the distribution of knowledge between rich and poor countries and within countries between rich and poor people—are widening. Knowledge sharing is, therefore, one effective way for closing knowledge gaps in the context of global interdependence.

There is some scope for global exchange of knowledge, for mutual benefit even among unequals, by linking locally specific and global knowledge. There is also a growing appreciation for location-specific knowledge in a rapidly evolving global knowledge system. This is clear from the recent prominence of learning from country or region-specific situations whether in the forms of "miracles" or "crises." The world thus continuously learns from "best practices," "disasters," and "exceptions to received wisdom" to augment the knowledge base. For this to happen, effective international mechanisms for knowledge exchange and global learning need to be in place. Such mechanisms should also ensure relevance from contextual research and excellence through global peer pressure and through access to the international frontier of knowledge.

For poorer countries to effectively engage in this form of exchange, it is necessary to develop local capacities for knowledge generation and absorption. The tertiary education system is one important conduit for such exchange, but not the only one. Intermediaries for global knowledge are emerging in Africa outside the formal tertiary education system. Prominent among these include national research institutes, regional networks, and centers of excellence. As a group, these institutions play a facilitative role in availing global knowledge to African societies more broadly. They also help enhance the interaction between the tertiary education institutions and the global knowledge system. Albeit at a very early stage, African countries have also begun to exploit opportunities offered through global knowledge sharing arrangements as a means of supplementing and strengthening their capacity to deliver tertiary education, knowledge acquisition, and application.

Even as national higher education institutions reverse their previous state of decay, regional networks will continue to play a desirable and effective role in supporting and sustaining national knowledge generation and absorption in five important ways.

- Regional networks will continue to provide a critical mass of professional peer review not available at the national level, thus sustaining peer pressure for learning and excellence as well as alleviating professional isolation.
- Regional networks provide an effective mechanism for keeping in touch with the rapidly changing frontier of knowledge through contact with the rest of the world and information sharing.
- Networks provide a medium of exchange of experiences in a comparative mode and a mechanism for gleaning best practices from specific policy contexts thus making them an important resource for collective knowledge.
- Networks provide a cost-effective means for specialized training and skill formation often not viable at the national level, given the paucity of resources and time availability of specialist trainers.
- Networks constitute an effective approach to projecting a professional image through pooling to gain attention and profile. The collective ability of participants to garner recognition enhances professional credibility, thereby attracting additional opportunities for professional engagements and providing credible inputs from Africa into global learning systems.

Addressing Human Capital Flight from Africa

The strategies for addressing the consequences of the large emigration of skilled manpower from Africa should include both the demand-side and supply-side weaknesses. In the long term, higher and sustained growth holds the answer. To recap, the region is losing its talent because it cannot remunerate, preserve, and utilize it effectively. Low productivity in the economy and sluggish growth in employment opportunities explain the low rates of return to education. In the absence of a vibrant private sector to absorb the talent in African economies, demand for it will remain low and rates of returns in the local market are likely to stagnate at the current low levels. Political risks and civil unrest are factors militating against the retention of those trained locally or the repatriation of those trained abroad. The fact that the largest loss of skilled manpower occurs from troubled countries attests to this fact. To preserve and sustain acquired knowledge requires maintaining contact with peers and having access to tools necessary for its effective application. The paucity of both generates exit pressures.

African countries cannot contain the problem of brain drain by erecting hurdles to contain emigration. As we have learned in the case of financial capital, the region could not arrest the flight of its financial wealth through similar means. Success in reversing capital flight has begun in those countries that have created a conducive investment climate and expanded the scope of opportunities for investment. An appropriate strategy to contain human capital flight and, in some cases, achieve reversal would require addressing the push factors identified above and scaling up local demand for skilled manpower. There is an additional dimension of the strategy which we highlight below, the use of African talent in the diaspora to support development initiatives in the region.

While individual countries may take measures to reverse human capital flight, a collective initiative that includes easier labor mobility within the region would likely broaden the scope for retention of skilled personnel within Africa. With expanding growth opportunities at home and easier interaction with peers through professional networks, such efforts could be even more successful.

Raising Demand for Knowledge at Home

Private Sector Growth and Development

Talent will flee from locales in which it finds no gainful use. Raising the demand for skilled manpower in the region is part of any lasting solution to the brain drain problem. In a virtuous circle, better skills lead to higher growth;

and in turn, higher growth leads to increased demand for skills. There is no doubt about the need for skilled labor to spur growth and development, but this need must be backed by effective demand for it. The two main sources for expanding opportunities for gainful application of skills are private sector growth and professionalization of the public sector. As pointed out earlier, the ongoing transition toward a market-oriented economy led by the private sector augurs well for shifting the incentive structure in favor of scarce talent.

FDI can play an important role in raising productivity and returns to investment in education. FDI by multinational corporations is a major source of access to advanced technology by developing countries. It increases the rate of technical progress in the host country through a "contagion" effect from the more advanced technology and management practices used by foreign firms (Findlay, 1978). The complementarity between FDI and human capital in the process of productivity growth and technical progress provides the link to increased demand for skilled manpower. If African countries exploit the opportunities from the phenomenal growth in global FDZ, as they have been exploited in the other developing regions, the likelihood of retaining and reversing the drain of talent will be higher.

At 29%, the risk-unadjusted return to investment in Africa was estimated to be the highest among all regions of the world in 1999 (UN CTAD 1999). Yet Africa attracted only a miniscule share of the vast private capital flows. Higher risks, particularly for much-needed private investment in infrastructure, and low utilization of risk-mitigation instruments, such as investment guarantees, pose serious impediments to investment growth (Ndulu 2001). The most critical factors limiting investment include political risk of confiscation and expropriation, inability to transfer mobile assets or proceeds out, risk of contract repudiation, and asset losses due to episodes of political violence.

The success of African countries in attracting larger and more diversified foreign private capital depends also on the collective reputation of the continent and its ability to enlarge the market through enhanced connectivity. Spillover or contagion effects from wars, civil instability, and poor investment environments (policy, institutions, and regulations) dent the overall reputation. Individual countries cannot choose their neighbors, making it both imperative and urgent to reduce the perception of high investor risk in the region. Such improvements need to occur in a significant number of African countries to counter the legacy of negative perceptions regarding Africa.

Professionalizing the Public Sector

Globalization, the rising importance of information technology for enhancing productivity, the shift toward market-oriented economic policies, and more

democratic governance are combining to raise the demand for skills and informed public policy decisions. These changes raise the pressure on governments to implement policies that will pave the way to prosperity. The rapid improvement in information technology and knowledge-sharing arrangements through partnerships and networks makes it possible to meet such demands.

To improve public services and policy dialogue, some African countries are pursuing reforms to professionalize the public service. As discussed earlier, second-generation civil service reforms aim to reintroduce meritocracy in public service, to restructure incentives in favor of a professional cadre, and to pursue institutional rationalization to enhance the functionality and cost-effectiveness of public service delivery. These may have two positive effects on the demand for skilled and professional employees. First, direct effect will be a rise in the demand for professionals, increased educational standards for entry into public service, and further training on the job. A second effect is indirect, through the beneficial impact of improved governance of private investment. Excessive bureaucracy and nontransparent governance typically raise a firm's managerial and risk costs. Their reduction should augur well for private investment.

There is a slow but robust process of liberalizing political systems underway in Africa, albeit with teething difficulties. Pressure is also mounting for devolving authority to subnational governance entities. Both developments will raise the pressures for greater inclusiveness across stakeholders in designing development programs and will fundamentally change the accountability systems to fit more open governance structures. A strong civil society will enhance the demand for informed participation in shaping the development agenda. As pointed out earlier, the growth of a robust civil society depends on the domestic presence of professions and technical skills to engage in the development dialogue and enhance its role as a watchdog of prudent public policy and the application of good governance.

Adapting the Tertiary Education System to the Challenge of Containing Human Capital Flight

The ongoing evolution of the tertiary education system in Africa is geared toward meeting market needs. In this respect it augurs well for boosting and meeting the local demand for skilled personnel. However, the sheer magnitude of the capacity gaps to be filled and the wide range of required specialists makes this task daunting both in terms of the financial costs and the expansion of the scope to meet the wide range of specializations now emerging in the context of the knowledge economy. Public funding can support high-quality tertiary education only when the system is relatively small and hence inevita-

bly elitist (Barr 1998). Therefore, the transition to the provision of large-scale and varied tertiary education entails significant supplementary resources from the clients, the development of curricula that are responsive to the needs of clients, and the harnessing of global knowledge systems for enhancing quality and filling gaps in local faculty expertise.

To meet these goals, the main challenges to African institutions of higher learning revolve around five main areas of action.

1. Higher education must respond more rapidly to social needs. Traditional universities in Africa need to sharpen their responsiveness to the rapidly changing needs of the societies they serve and subject their programs to global pressures for excellence. Public universities in Africa, in particular, face a daunting task in moving away from the elitist model and the associated rigidities of tradition for managing their affairs. Makerere University in Uganda offers an innovative example of a traditional university in Africa that is pursuing a transition from an elitist and predominantly public-financed institution to a more market-oriented approach funded largely by private resources. In the past six years, Makerere University has taken a number of interrelated measures to secure alternative financing, introduce demand-driven courses, and set up new management structures consistent with the new approach (Court, 2001). The success of these initiatives is paying off in terms of doubling enrollment, raising the proportion of privately sponsored students to over 50% of total enrolment and 80% of admissions, and increasing the motivation and salary of faculty. "Practical and professional career purpose (of courses offered) suggests that an estimate of demand rather than a prescription of supply is influencing the academic curriculum" (Court 2001: 7). Makerere's experience suggests that a transition is both feasible and desirable.
2. Rationalization of the tertiary education system is necessary to weed out dead wood and make the capital in these institutions available to alternative uses within the education sector. Private universities and other private tertiary education institutions, many of them set up after the new approach to tertiary education began taking root, are geared toward meeting the increasing demands for nonconventional and nonacademic courses for local needs and employment opportunities. As Court (2001) notes, these universities have proved themselves to be flexible, unencumbered by a particular tradition, creative, experimental, responsive, and inclusive. A number of public tertiary education institutions were set up to target very specific public enterprise or service needs such as

the leather or sugar industry. Often these institutions do not have adequate demand to justify overheads nor are they sufficiently flexible to train people in other skills. The problem has grown more acute with the demise or privatization of a number of these public enterprises, prompting rationalization measures.

3. Quality control and independent certification are critical for a rapidly evolving tertiary education system. As shown above, independent postgraduation certification is playing that role in the case of professional courses and training in specific skills. Apart from embedding this accountability instrument systematically in the larger knowledge certification system, a progressive movement toward applying international standards in the certification process would ensure a beneficial effect in the quality of training programs.

   Furthermore, as multinationals relocate to the region, a pool of skills meeting international standards would help sustain such a relocation and raise returns to the graduates. The problem of accountability for nonprofessional courses is harder to tackle. External examination, collaboration with foreign institutions of repute, and networking have been identified as mechanisms that are now emerging to facilitate quality control. More systematic incorporation of these arrangements, especially in the university education systems, could be facilitated by new actors, such as the Association of African Universities and the Association for the Development of African Education.

4. Regional or subregional collaboration in the African context, where a critical mass of professional peer pressure within national confines is largely wanting, is desirable to exploit complementarities in strengths and capabilities and to project a strong professional visibility of the region on a global scale. Networking also helps to sustain the quality of higher education and to prevent the atrophy of skills, given that it provides opportunities for professional interaction well beyond boundaries and helps create a professional ethos and *esprit de corps* on a larger scale.

   More specifically, effort and resources should be channeled to support and sustain the emerging regional and subregional research and training networks. They are attractive because they are a cost-effective means to build the capacity of national institutions and provide a platform for professional peer pressure. A key target will be to reduce professional isolation and the resultant atrophy of acquired skills. Graduate training networks allow the pooling and sharing of scarce quality faculty, apply peer pressure in enforcing standards in curricula, and help in exchanging experiences across participating institutions. Efforts should be made

to promote the role of these networks as intermediaries to access frontier knowledge in a cost-effective manner by providing current literature and arranging the involvement of world-class resource persons in the research process. Furthermore, regional networks can serve as building blocks for global partnership arrangements.

Some networks have successfully attracted the involvement of highly qualified Africans from the diaspora in the development dialogue and initiative. This objective should be pursued more vigorously in conjunction with the broader scheme of the involvement of African professionals abroad discussed below.

5. Cost-effectiveness in the delivery of tertiary education is necessary to survive strong local and world-wide competition. The advent of information technology has widened the scope of competition through lower-cost access to alternatives abroad and a tendency toward unified global knowledge standards. Cultivating innovative and entrepreneurial attitudes among the managers of these institutions is of prime importance. Public universities need to be given the space and autonomy to innovate. Tertiary higher education institutions should also exploit the potential advantages of product differentiation based on area-specific needs.

Strategies for Reversing Brain Drain

Here I consider three possibilities for permanent or temporary repatriation of qualified Africans abroad: assisted permanent return, the use of African talent in the diaspora, and the use of qualified African emigrants in technical assistance schemes.

Repatriation Programs

Between 1993 and 1999, the International Organization for Migration (IOM) in partnership with the U.N. Economic Commission for Africa (UNECA), ran a program for the repatriation of qualified African emigrants. The Return of Qualified African Nationals (ROQAN) program matched particular needs for skills by governments, academic and research institutions, and private sector employers in African countries, with candidates who were willing to return home and then provided financial support for their resettlement. The program succeeded in repatriating 2,000 African emigrant experts to six countries. The high cost of repatriation goes a long way in explaining the moderate success of this program.

Involving Africans in the Diaspora

Since many of the migrants may not return, African countries and the migrants themselves need to devise creative strategies to turn these professionals into assets for Africa. To achieve this goal, it is important to design a scheme that allows skilled Africans working abroad to contribute to the development of their home countries without giving up the higher wages and better living standards afforded by their residence abroad. This approach will also enable the large number of African intellectuals and intellectual communities abroad to participate more actively in strengthening the capacity for quality education and training in the region.

While plans are underway to continue with the ROQAN, the IOM has proposed a new initiative entitled "Migration for Development" which involves three types of interventions: "temporary return," "virtual return," and "economic return." The initiative targets the involvement of qualified Africans in the diaspora to participate in development activities in the region for limited periods of time.

Under the temporary return arrangement, a qualified doctor, for example, would be assisted to return home to teach, perform operations, and share skills for a limited time period. A virtual return program would involve skill sharing, teaching, mentoring, and even marking exam papers via the Internet and video conferencing. This approach is considered particularly attractive because of its cost effectiveness. The economic return program would encourage African professionals with adequate capital or access to it, to invest in their home countries or the region. The program would provide information on investment opportunities and facilities for channeling capital to the region.

Utilizing African Emigrants for Technical Assistance

It has been estimated that 100,000 foreign experts are deployed annually in African countries at a cost of nearly $4 billion per year. The policies for this deployment largely preclude the use of nationals, even if they are qualified. Haque and Aziz (1998) explore the cost and skill profile of technical assistance if national emigrants were deployed under technical assistance programs. A key premise of their argument is that, for each skill category, the emigrant would be willing to accept a much smaller premium to return and perform the required task than would a foreign national. This premise is particularly consistent with the observation by the IOM (2000) that most African migrants maintain social and cultural links with their home countries. They would therefore likely be more willing to "suffer" a premium reduction than their foreign counterparts.

In their analysis, Haque and Aziz conclude that deploying emigrants for technical assistance would raise the overall quality of the skills deployed on account of the differential premiums. Furthermore, the total cost of providing the same level of technical assistance would be lower or the total level of technical assistance could be raised substantially within the current budgets. This is an option worth exploring.

Conclusion

African brain drain is a problem and manifests itself predominantly in terms of a rising level of higher skilled emigrants. This phenomenon leaves the region without the expertise necessary to support higher growth and to reduce poverty. The primary cause of the human capital outflow appears to be a combination of relatively lower returns to investments in tertiary education, risks of professional atrophy due to lack of interaction with peers and the professional frontier, and the absence of the necessary tools for professional engagement, particularly among the highly specialized professions. Political instability affects emigration of both skilled and nonskilled Africans.

The problem is set to intensify in the foreseeable future due to the intensification of the globalization process, reduced costs of movement, and demographic pressures. Rapid expansion of the economically active population in developing countries, particularly in Africa, and the pressures for young replacement immigration in the developed world combine to exacerbate the consequences of easier mobility.

Globalization, on the other hand, has raised the potential for relocating jobs to Africa through foreign direct investment. In combination with the ongoing reforms to professionalize the public service and the beneficial role of knowledge intermediaries, the potential for raising the demand for skills and productivity at home are real. Higher growth resulting from increased utilization of skills, in turn, sets off a virtuous cycle of interaction between growth and improved human capital in the region. Furthermore, globalization has strengthened the rationale for knowledge sharing in a more interdependent world.

To meet potentially higher demand requires a more market-oriented approach in the delivery of tertiary education in the region. Although encouraging changes are taking place within private tertiary education institutions, the bigger challenge is for traditional public-funded universities to be responsive to the changing needs of their clientele by fostering cost-efficiency in the delivery of education and by rationalizing the use of other public-sector tertiary education institutions. Many of the latter category have become obsolete and cannot adjust to the changing demand patterns.

A fundamental requirement for ensuring better quality of the range of institutions and products is to strengthen the sector's accountability system. For the professional courses, this will be best achieved by strengthening the system of independent post-graduation certification. For nonprofessional courses, however, the method is to embed the external examination system and apply peer pressure for maintaining quality through collaborative arrangements and networking amongst unequals, within and outside of the region. Linking the local certification systems to the global standard system will improve the overall reputation of the tertiary education system in Africa.

Finally, there are ongoing measures to reverse brain drain and make use of qualified Africans in the diaspora. Repatriation programs have had modest success but are limited by associated high costs. A new initiative is being contemplated between the IOM and African countries that is focused on making use of African talent wherever it may be. The three components of this initiative are the African's temporary return to perform tasks and train others, a virtual return using information technology, and an economic return through encouraging investment at home by Africans abroad. The first two components of this initiative would also strengthen the capacity of the tertiary education system to deliver better and more useful products.

Notes

1 The views expressed in this paper are attributable solely to the author and not the World Bank for which the author works. He wishes to acknowledge the able assistance of Prosper Chale, a research assistant to the Macroeconomic Unit at the World Bank Country Office in Dar-es-Salaam.

2 Barro (1998) actually shows that while secondary and higher levels of education are positively correlated with growth, primary education often does not significantly correlate with growth or has the wrong sign. The latter insignificant impact is obtained more widely in the endogenous growth empirical research.

3 Barro (1998) finds that female schooling in the same education and age category does not have a significant impact on growth, most probably due to discriminatory practices in the labor market.

4 This is a fairly recent strand of research, which began with Mountford's (1997) work and has been subsequently followed by a small group of research papers by Galor and Tsiddon (1997), Docquier and Rapoport (1997), and Vidal (1998).

5 The economically active population in developing countries increased by 59% between 1970 and 1990 due to young age structure, namely, high fertility and declining infant/child mortality (Russell 1998).

6 Heller and Tait (1984) showed that, during the late 1970s and early 1980s, the ratio of public wages to private wages in developing countries was lower than in industrial countries, despite the reverse expectation, since governments in poor countries

with an insignificant private sector would usually employ a relatively higher proportion of quality human capital. In the case of Africa, the experience has been not only of an annual 9% trend decline in real wages over the 1970s and 1980s but also a 6% decline per year of public sector wages as a ratio to private sector wages.

References

Apraku, K. K. (1991). *African Emigrés in the United States: A Missing Link in Africa's Social and Economic Development.* New York: Praeger.

Bhagwati, J. N., & Hamada, K. (1974). The brain drain, international integration of markets for professionals and unemployment: A theoretical analysis. *Journal of Development Economics, 1*(1), 19-42.

Barr, N. (1998, December). *Market Forces and Education.* Report of a presentation made at the World Bank.

Barro, R. J. (1998, October). *Human Capital and Growth in Cross Country Regressions.* Cambridge, MA: Harvard University.

Barro, R. J., & Jong-Wha, L. (1993). International comparison of educational attainment. *Journal of Monetary Economics, 32,* 363-94.

Beine, M., Docquier, F., & Rapoport, H. (1997). Brain drain and economic development: Theory and Evidence. *Journal of Economic Literature, 64,* 275-289.

Borensztein, E., DeGregorio, J., & Lee, J-W. (1998). How does foreign direct investment affect economic growth? *Journal of International Economics, 45,* 115-135.

Brundenius, C. (1996). How painful is the transition? Reflections on patterns of economic growth, long waves and the ICT revolution. In M. Lundhal & B. J. Ndulu, *New Directions in development economics: Growth, environmental concerns, and government in the 1990s.* London: Routledge.

Carrington, W. J., & Detragiache, E. (1998). *How big is the brain drain?* (IMF Working Paper, No. 102.) Washington, DC: International Monetary Fund.

Collier, P., Hoeffler, A., & Patillo, C. (1999). *Flight capital as a portfolio choice* (Policy Research Working Paper 2066). Washington, DC: World Bank.

Court, D. (2001). Financing Higher Education in Africa: Makerere, the Quiet revolution. Mimeo. Washington, DC: World Bank.

Docquier, R. N., & Rapoport, H. (1997, September). *La fuite des cerveaux: Une chance pour les pays en developpement?* Paper presented at the annual meeting of the French Economic Association, Paris, France.

Eatwell, J., Milgate, M., & Newmann, P. (1996). *New Palgrave Dictionary of Economics* (p. 2,682). London: MacMillan Press.

Findlay, R. (1978). Relative backwardness, direct foreign investment, and the transfer of technology: A simple dynamic model. *Quarterly Journal of Economics, 92,* 1-16.

Galor, O., & Tsiddon, D. (1997). The distribution of human capital and economic growth. *Journal of Economic Growth, 2*(1), 93-124.

Hanushek, E., & Kim, D. (1995, September). Schooling, labor force quality, and economic growth (Working Paper No. 411). Rochester Center for Economic Research.

Haque, U. N., & Aziz, J. (1998). *The quality of governance: "Second generation" civil service reform in Africa.* (IMF Working Paper, No. 164). Washington, DC: International Monetary Fund.

Haque, U. N., & Khan, A. (1997). *Institutional development: Skill transference through a reversal of "human capital flight" or technical assistance.* (IMF Working Paper, No. 89.) Washington, DC: International Monetary Fund.

Haque, U. N., & Kim, S.-J. (1995). Human capital flight: Impact of migration on income and growth. *IMF Staff Papers, 42*(3), 377-607.

Hatton, T. J., & Williamson, J. G. (2000, May). *Out of Africa? Using the past to project future African demand for emigration.* Paper presented at a conference on Globalization: Trade, Financial and Political Economy Aspects, Delphi, Greece.

Heller, P., & Tait, A. (1984). *Government employment and pay: International comparisons.* (IMF Occasional Papers, No. 24.) Washington DC: International Monetary Fund.

Integrated Regional Information Networks (2001). *Southern Africa: New initiative to tackle brain drain: A bulletin.* Retrieved October 2001 from www.queensu.ca/samp/publications/ pressarticles/2001/tackle.htm.

International Organization for Migration (2000, October). *Migration in Africa: Globalization and Addis Ababa, Ethiopia: 10M.*

Lindbaek, J. (1997, October). *Emerging economies: How long will the low-wage advantage last?* Background paper for a speech by IFC Executive Vice President at the APPI Meeting, Helsinki, Finland.

Miyagiwa, K. (1991). Scale economies in education and the brain drain problem. *International Economic Review, 32*(3), 743-759.

Mountford, A. (1997). Can brain drain be good for growth in the source economy? *Journal of Development Economics, 53*(2), 287-303.

Ndulu, B. J. (1996). Africa's new realities challenge policy institutes. Building Democratic Institutions through Market-oriented Reforms. Center for International Private Enterprise, Report No. 3, 1996. Washington DC: CIPE.

Ndulu, B. J. (2001, August). *From vision to reality of African economic integration: Priority actions and the institutional framework for the way forward.* Paper presented to the Conference of the Association of African Central Banks, Johannesburg, South Africa.

OED (1994). *The World Bank's role in human resource development in sub-Saharan Africa: Education. training and technical assistance.* (Sector Study No. 13449). Washington, DC: World Bank.

Oyowe, A. (1996). Brain drain: Colossal loss of investment for developing countries. *Europe's Forum on International Cooperation.* Article No. 159.

Piketty, T. (1997). Immigration et justice sociale. *Revue Economique, 48*(5), 1291-1309.

Pires, M. J., Kassimir, R., & Brhane, M. (1999). *Investing in return: Rates of return of African Ph.D.s trained in North America.* New York: Social Science Research Council.

Prewitt, K. (2001, October). *Higher education, society and government: Changing dynamics.* Paper for Yale Center for International and Area Studies, African Studies and Economic Growth Center Conference on International Higher Education and African Development, New Haven, CT; also published in this issue.

Russell, S. (1998). Migrants, remittances, and development. *International Migration: Quarterly Review, 30,* 267-287.

United Nations Commission for Trade and Development. (1999). *Trade and Development Report.* Geneva, Switzerland: UNCTD.

United Nations Development Program (1992). *Human Development Report.* New York: United Nations.

United Nations High Commission on Refugees (2001). *A bulletin: Key findings, refugees and migration.* New York: United Nations.

Vidal, J. P. (1998). The effect of emigration on human capital formation. *Journal of Population Economics, 11*(4), 589-600.

Zeleza, P. T. (1998). *African labor and intellectual migrations to the north: Building new transatlantic bridges.* Urbana: Center for the Studies of African Studies, University of Illinois at Urbana-Champaign.