

# Why Should We Worry About Brain Drain from Africa?

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Due mainly to the poor quality of international migration data, little research has been done to date to establish the impact of the African brain drain on source countries. In short, until recently the scope of skilled migration from Africa was unknown. The objective of this paper is to go a step further in filling this lacuna. Using two original datasets this paper gives a comprehensive picture of the high-skilled migration from Africa to developed countries and explores for the first time the magnitude of the intra-African brain drain.

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## 1. Introduction

### Human capital

It is fairly evident from the literature that nations better endowed in human capital grow more rapidly, all other things being equal; see among others Lucas (1988), Romer (1990), Azariadis and Drazen (1990), Mankiw, Romer and Weil (1992), and de La Fuente and Ciccone (2003). Stark (2004) argues that a deficiency in human capital is the major reason why poor countries remain poor. This claim is supported by a recent study which found that if South Asian countries could achieve the level of human capital that is enjoyed by the countries in the South East, they could improve their growth rate from 2.8 % to 5.1 %; Siddiqui (2006).

It is conventional wisdom that human capital also favours a country's ability to compete in the global economy through innovation and the adoption of new technologies. For example, the United Nations Conference on Trade and Development [UNCTD], 2007 p. XI, notes that "the human capital endowment of an economy is a fundamental determinant of its long-term growth performance, its absorptive capacity and its performance in technological learning. It is also a requirement for the effective working of trade, foreign direct investment [FDI], and licensing and other channels as means of technology diffusion". Similarly, the World Bank (2005) points out that "An educated and skilled workforce is one of the pillars of the knowledge-based economy. Increasingly, comparative advantages among nations come less from natural resources or cheap labour and more from technical innovations and the competitive use of knowledge".

### The continent is lagging far behind other regions

The African countries have devoted considerable resources to increasing human capital through investment in education. However, a number of indicators reveal that the continent is lagging far behind other regions in terms of its human capital endowment. More than one out of three adults could not read and write (38 %), to be compared to 1 % in developed countries. Today, almost 20 % or 153 million of the world adult illiterates live in Sub-Saharan Africa, UNESCO (2010). Despite significant progress in terms of the gross enrolment ratio at all levels of instruction, Africa continues to have the lowest participation in tertiary education, with a tertiary enrolment rate of 6 %, compared to a global average of 26 %, UNESCO (2010) and European University Association (2010).

Today, the continent needs more scientists, academics, teachers, physicians, nurses, engineers, entrepreneurs, IT specialists, and other skilled personnel. According to Chen *et al* (2004), reaching the millennium development health goals by 2015 would require 1 million extra health workers in Sub-Saharan Africa. Similarly a group of African scientists, the Network of African Science Academies, NASAC

(2009), estimates that Africa needs an additional one million researchers to address its critical needs<sup>1</sup>. While sustained efforts are needed to narrow the gap between Africa and the rest of the world in terms of human capital, many highly educated Africans nevertheless go abroad.

While there appears to be deep and indeed growing concern regarding the brain drain from Africa, lack of adequate data has not until recently allowed a comprehensive analysis of the magnitude of skilled migration from the continent and its impact on source countries. The objective of this paper is to go a step further in filling this lacuna. Using two original datasets this study shows that, contrary to popular belief, emigration from Africa is more and more a matter of the movement of high-skill persons and that a high proportion of Africans immigrants living in the OECD countries are well educated. Over the period 1990-2000, the number of high-skilled immigrants from Sub-Saharan Africa residing in OECD countries grew by 97 %, compared to only 37 % for low-skilled Sub-Saharan African-born migrants. As a result the proportion of the high-skilled among Sub-Saharan African immigrants living in OECD countries has increased from 40 % in 1990 to 44 % in 2000 (see table 3).

### **Concerns regarding the brain drain from Africa**

As a consequence of this large outflow of highly educated individuals, a number of African countries have experienced a considerable brain drain. Twelve African countries have lost more than 30 % of their tertiary educated labour force due to emigration to OECD member states, while in a number of countries, such as Cape Verde (82 %), Seychelles (77 %), Gambia (68 %), Sierra Leone (49 %), and Ghana (45 %), the brain drain has been massive (see table 4). The remainder of this paper is organised as follows. Section 2 discusses why we should worry about the Africa brain drain. The issue of skill creation in Africa (the “cost of producing a drain”) is analysed in section 3. Section 4 provides a comprehensive picture of the magnitude of the African brain drain. The final section summarises our conclusions.

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<sup>1</sup> Network of African Science Academies [NASAC]: Brain drain in Africa, <http://www.nationalacademies.org/includes/NASACbrainrain09.pdf>, accessed April 7, 2011.

**Investment in education  
reduces poverty and  
inequality**

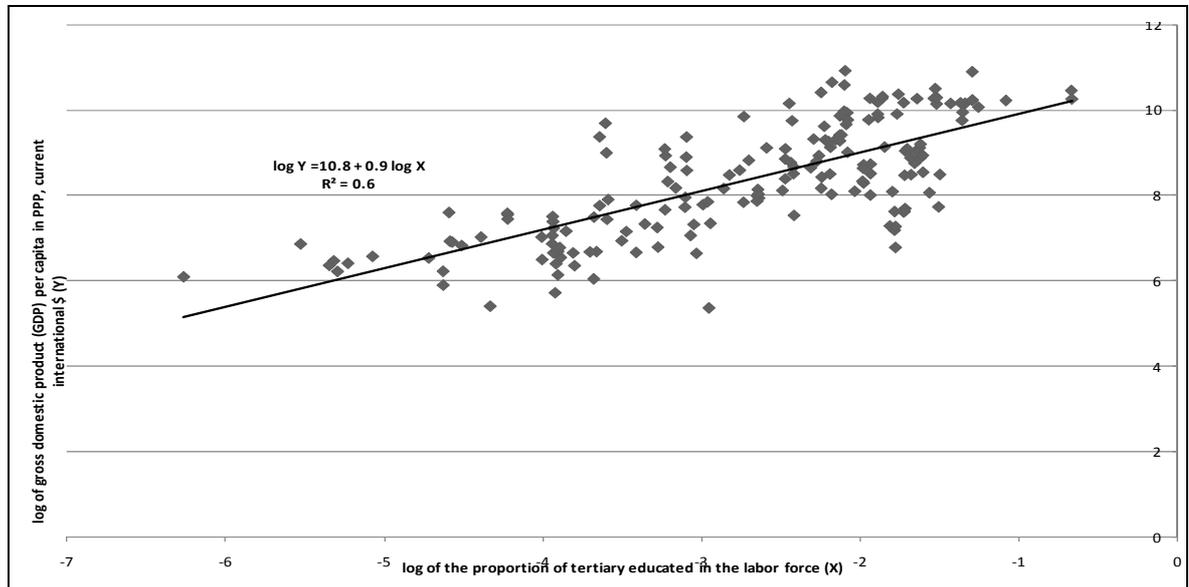
## **2. Why African brain drain matters?**

There is a strong consensus that investment in education has a positive influence on an individual's health, employability, earnings and living standards. Yet due to human capital positive externalities, education benefits the society as a whole (social return) more than individuals (private return). At national or regional levels investment in education reduces poverty and inequality, increases the human capital of the labour force, as well as its productivity, and contributes to the process of economic growth. A number of studies have emphasised that the accumulation of human capital through investment in education is an essential driving factor of economic growth and development<sup>2</sup>; see among others, Lucas (1988), Romer (1990), Azariadis and Drazen (1990), Mankiw, Romer and Weil (1992), and de La Fuente and Ciccone (2003). Long-term analyses, for example, Maddison (1995), confirm that the transition from economic stagnation to growth is preceded and accompanied by enormous increases in literacy and in the average level of schooling.

Thus societies better endowed in terms of human capital are more likely to have higher rates of economic growth and income, while economies that fail to invest adequately in education or that lose a high proportion of trained nationals through emigration may experience slower growth and reduced income. Figure 1, which represents simple cross-country correlation between GNP per capita and share of college graduates in the labour force (of course, correlation does not imply causation), shows a relatively strong positive association between human capital and the level of development, with elasticity around one.

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<sup>2</sup> For an analysis of the channels through which human capital can affect growth, see Barro and Sala-i-Martin (2003)



**Figure 1** Relationship between human capital (proportion of tertiary educated in labour force) and level of development (gross domestic product per capita)

**Notes:** The horizontal axis represents the proportion of tertiary educated workers in the origin countries' labour force, whereas the vertical axis represents the origin countries' level of development measured by their gross domestic product per capita at purchasing power parity (PPP). PPP takes into account the difference between nations in terms of their cost of living. Data refers to 2000.

**Source:** World Bank development indicator (2010) for the gross domestic product (GDP) per capita expressed in purchasing power parity (PPP) and Docquier, Lowell and Marfouk (2009) for the proportion of tertiary educated in the labour force.

African countries have devoted considerable resources to increasing their human capital through investment in education. This investment has paid off in terms of improved participation at all levels of instruction. However, despite this progress a number of indicators reveal that African countries are lagging far behind other nations in terms of their human capital endowment, measured by education levels, literacy rates, innovation indicators and healthcare professionals. Illiteracy rates remain high in the continent and the average years of schooling of the population is very low. In Africa more than one in three adults is illiterate (38%), compared to 6% worldwide and 1% in developed countries<sup>3</sup>. In eleven African countries 50% or more of the population aged 17 to 22 years have fewer than four years of education. Africa

**Increasing the human capital**

<sup>3</sup> The adult illiteracy rate exceeds 70% in four African countries and 50% in eight other countries.

continues to have the lowest participation in tertiary education<sup>4</sup>, with a tertiary enrolment of 6 %, compared to a global average of 26 %; see UNESCO (2010) and European University Association (2010).

#### **A need for more specialists**

Africa needs more scientists, academics, teachers, physicians, nurses, engineers, entrepreneurs, IT specialists, and other skilled personnel. According to World Health Organization [WHO] statistics (2009), the number of practising doctors in Sub-Saharan Africa (approximately 12 % of the world population) is estimated at 126,873 (1.5 % of the world physicians), compared to 207,277 physicians in France (62 million inhabitants) and 215,000 physicians in Italy (59 million inhabitants). In 27 African countries the density of physicians (i.e. number of physicians per 10,000 inhabitants) does not exceed 2, against a world average of 13, 34 for France, and 26 for the USA. According to the WHO estimates (2006), due to a critical shortage of health workers, 36 out of the 43 Sub-Saharan African countries face serious difficulties in delivering essential healthcare needs to their populations and are likely to fail to meet the millennium development goals for health. According to the same source, in absolute terms the estimated shortage of health workers (doctors, nurses and midwives) for Africa is 817,992. In relative terms the correction of the deficit would require a significant increase in health personnel (+139 %). Other studies confirm the critical need for more health workers in Africa. For example, Chen (2004) *et al* estimated that one million extra health workers would be required for Sub-Saharan Africa to reach the millennium development goals by 2015, while Kurowski *et al* (2003)<sup>5</sup> argue that “in the best case scenario for 2015 the supply of health workers would reach only 60 % of the estimated need in the United Republic of Tanzania and the need would be 300 % greater than the available supply in Chad”.

#### **Researchers engaged in R&D**

As shown in table 1 globally, in Africa (approximately 14 % of the world population) only 158,000 researchers were engaged in R&D (2.2 % of the world researchers), compared to United States (1.4 million), European Union (1.4 million) and Japan (710,000). Consequently, with 164 researchers per million inhabitants the continent lags far behind the other regions - Asia (746), North America (4,624) and European Union (2,936) and countries such China (1,071), United Kingdom (4,181), United States (4,663), and Japan (5,573). Based on the UNESCO Institute for Statistics data, if Africa were to reach 1,080 researchers per million inhabitants (the world average), it would need an additional 920,000 researchers. The magnitude of this gap is close to the estimate made by a group of African scientists. According to the Net-

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<sup>4</sup> Some African countries such as Central African Republic (1.1 %), Chad (1.2 %), Mozambique (1.5 %), Tanzania (1.5 %) and Burundi (1.9 %) have very low tertiary participation rates.

<sup>5</sup> See World Health Organization, world health report 2006: working together for health, p. 11.

work of African Science Academies, NASAC (2009), the continent needs an additional one million researchers to address its critical needs.

	<b>Researchers (thousands)</b>	<b>% World Researchers</b>	<b>Researchers per million inhabitants</b>
<b>World</b>	<b>7,209.7</b>	<b>100.0 %</b>	<b>1,080.8</b>
Developed countries	4,478.3	62.1 %	3,655.8
North America	1,579.8	21.9 %	4,624.4
Latin America & Caribbean	252.1	3.5 %	442.5
European Union	1,448.3	20.1 %	2,936.4
Africa	158.5	2.2 %	164.3
Sub-Saharan Africa	60.1	0.8 %	79.2
Asia	2,950.6	40.9 %	745.9
<b>Selected countries</b>			
China	1,423.4	19.7 %	1,070.9
Japan	710.0	9.8 %	5,573.0
United Kingdom	254.6	3.5 %	4 180.7
United States	1,425.6	20.0 %	4 663.3

**Table 1**                      **Research and Development researchers, 2007** (Source: UNESCO Institute for Statistics (UIS): <http://stats.uis.unesco.org/unesco/ReportFolders/ReportFolders.aspx> , accessed April 7, 2011.)

While these selected indicators clearly show that sustained efforts will be needed to narrow the gap between African countries and the rest of world in terms of human capital, many highly educated Africans nevertheless go abroad. By lowering the average level of human capital in sending countries and reducing their pool of educated workers, the emigration of African professionals could have a negative impact on the continent's growth and development prospects. The best illustration of this argument can be found in the Network of African Science Academies statement on the "brain drain in Africa"<sup>6</sup>, which stressed that

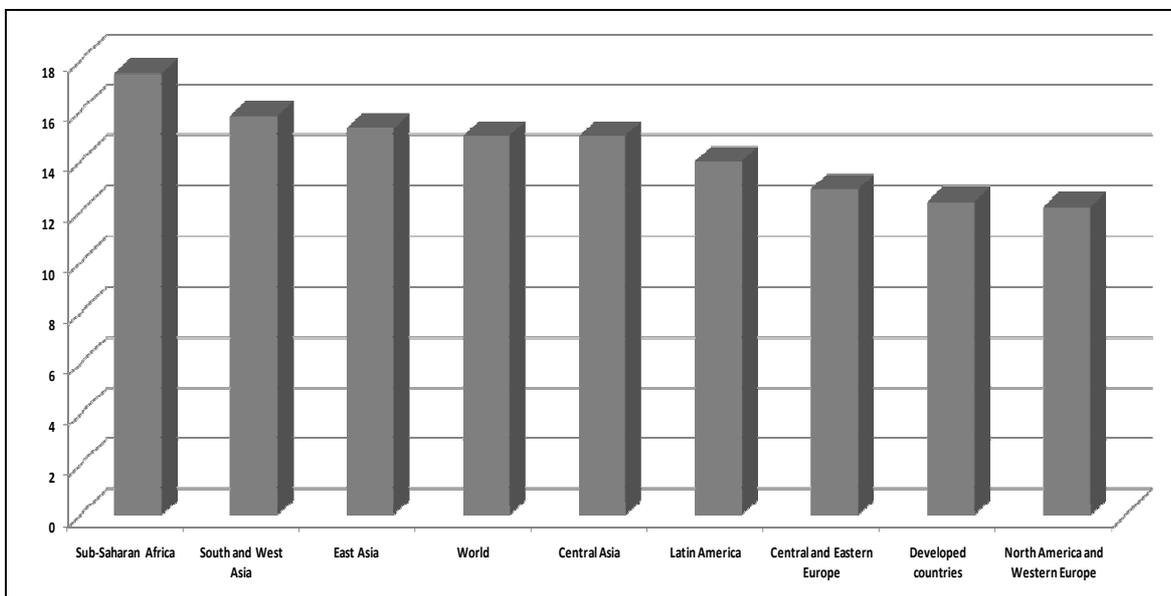
<sup>6</sup> The statement was formally presented to heads of state and government attending the G8+5 summit in Italy, in July 2009; for more details see:

“even the poorest nations need a critical mass of talented scientists and technologists” and the African brain drain “represents a significant loss of economic potential for the continent, especially in today’s global society where scientific and technological knowledge drive development”.

### 3. Skill creation in Africa: “cost of producing brain”

#### Education expenditures

Relative to the rest of the world, African countries spend a large share of their national resources on education. Over the period 2000-2007 education expenditures have averaged 17.5 % of total government expenditures in Sub-Saharan Africa, compared to 12.4 % in developed countries and 12.2 % in North America and Western Europe (figure 2). UNESCO statistics reveal that the proportion of government expenditure spent on education exceeds 20 % in countries such as Botswana (21 %), Djibouti (22.8 %), Ethiopia (23.3 %), Lesotho (29.8 %), Morocco (26.1 %), Mozambique (21 %), Senegal (26.3 %), and Swaziland (24.4 %). The equivalent proportion in the selected non-African countries varies between 9.5 % for Japan and 14.8 % for the United States.



**Figure 2** Total public spending on education as a percentage of total government expenditure, 2000 - 2007 (Source: UNESCO (2010) and authors’ calculations)

<http://www.nationalacademies.org/includes/NASACbraindrain09.pdf>, accessed April 7, 2011.

Focusing on tertiary education, on average, the public expenditure per student in tertiary education in Africa (US\$2,000) is respectively 2.3 and 5.7 times lower than world average (US\$4,600) and the corresponding amount spent by OECD countries (US\$11,500). But Africa spends more than double the amount spent by non-African developing countries (US\$875). A comparison of expenditure per student with gross domestic product (GDP) per capita reveals that skill creation in Africa, particularly in the low-income countries group, is very expensive (see last column of Table 2). On average, in Africa the expenditure per student in tertiary education represents approximately 293 % of the continent's gross domestic product, compared to only 32 % for non-African developing countries and 63 % for the OECD countries. In other words, the average cost per student in tertiary education in Africa is 4.7 times what it is in the OECD countries.

### The public expenditure per student

	Expenditure per student (in US\$)	Expenditure per student as percentage of GDP per capita
Africa	2,000	292.7
Low-income countries	1,330	356.1
Others	3,200	170.3
Non-African developing countries	875	31.8
OECD	11,500	63.2
World average	4,600	124.4

**Table 2** Average unit cost of tertiary education by region, 2006 (Source: World Bank (2010) and authors' calculations)

Aside from entailing a loss in the origin country's stock of human capital, the financial losses in investment directly associated with the training of skilled workers who emigrate permanently constitutes another source of concern voiced in the media and by scholars, policy makers and international and regional development agencies. For example, the General Director of WHO considered that "countries need their skilled workforce to stay, so that their professional expertise can benefit the population. When health workers leave to work elsewhere, there is a loss of hope and a loss of years of investment"<sup>7</sup>.

<sup>7</sup> World health organization, the world health report 2006: working together for health, p.xiii. Geneva, 2006.

### **Training cost of skilled African migrants**

No comprehensive data for the training costs of skilled African migrants exist, although information from different sources suggests that these costs are substantial. For example, UNCTD has estimated that each migrating African professional represents, on average, a loss of US\$184,000 to Africa; see Oyowe (1996), Pang, Lansang and Haines (2002), Eastwood *et al* (2005), Kirigia *et al* (2006), and Mugimu (2010), among others. Despite the fact that this estimate is widely cited, we should keep in mind that it has not been updated in more than 15 years. Consequently it should be considered as an approximation.

A number of case studies confirm that for each permanent skilled migrant from Africa the origin country loses public spending corresponding to his or her education, while the receiving country saves on training costs. For example, the financial cost due to the migration of 600 South African medical graduates to New Zealand was estimated at US\$37 million; Bundred and Levitt (2000), Eastwood *et al* (2005), Mugimu (2010). The total cost of education from primary to university of a non-specialist medical doctor in Malawi was estimated to be US\$ 56,947, Muula and Panulo (2007), and US\$ 65,997 for Kenya<sup>8</sup>, Kirigia *et al* (2006)<sup>9</sup>. By 2004 Ghana alone had lost approximately £35 million in training costs of health professionals who left the country for the UK. By contrast, through the recruitment of Ghanaian doctors, the UK saved about £65 million in training costs between 1998 and 2002; Mills *et al* (2008). From the point of view of the receiving countries, Saraladevi *et al* (2009), p. 62 note that in the United Kingdom “each qualifying doctor costs £200,000-£250,000 and 5-6 years to train, so in economic terms, every doctor arriving in the United Kingdom is appropriating human capital at zero cost for the use of the UK health services. And the effect is immediate rather than in 5 years’ time”.

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<sup>8</sup> In comparison to gross national income per capita (GNI), these figures represent a huge investment. In 2008, the GNI per capita was estimated to be US\$280 for Malawi and US\$730 for Kenya; World Bank development indicators (2010).

<sup>9</sup> The authors estimate that, for every doctor who emigrates, the country loses about US\$ 517,931 in terms of returns from investment.

#### 4. How big is the African brain drain?

There is a fair amount of evidence suggesting that the brain drain from Africa is now much more extensive than in the past; see for example, Haque and Jahangir (1999), Docquier and Marfouk (2006). However, despite numerous case studies and much anecdotal evidence, until recently there has been surprisingly no systematic empirical assessment of the magnitude of skilled migration from Africa<sup>10</sup>. For example, Sako (2002) points out that “there is no systematic record of the number of skilled professionals that Africa has lost to the developed world”. Due to the lack of data a comprehensive analysis of the impact brain drain on source countries is therefore missing, as is underlined by nearly all the studies. A regional conference, held in Addis Ababa in 2000 at the initiative of the International Development Research Centre [IDRC], the International Organisation for Migration [IOM] and the United Nations United Commission for Africa [ECA], highlighted the lack of adequate data as a major problem for monitoring the scope and impact of brain drain in Africa. More recently, the European University Association, (2010)<sup>11</sup> p. 14, stated that “both in Africa and Europe there still seems to be a lack of awareness of the extent of brain drain and its impact at all levels, from academic to societal and economic”.

**No systematic empirical assessment exists**

The purpose of this section is to fill, at least partially, this information gap by providing a comprehensive and accurate picture of skilled migration from Africa. Our analysis builds on the new international migration data set developed by Docquier, Lowell and Marfouk (2007, 2009), which provides detailed information on migration by sex, educational attainment, countries of origin and destination – in absolute numbers and in terms of the percentage of the total labour force born in the sending country (emigration rate)<sup>12</sup>.

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<sup>10</sup> Due to the absence of harmonised international data on international migration by country of origin and by education level, the debate focusing on the impact of brain drain on source countries has remained almost exclusively theoretical. Surprisingly, the first comprehensive databases on migration to OECD countries have been developed only in very recent years: Docquier and Marfouk (2004) and Dumont and Lemaître (2004).

<sup>11</sup> The white paper results from the project Access to Success: Fostering Trust and Exchange between Europe and Africa, led by the European University Association and the Association of African Universities.

<sup>12</sup> Handout 1 provides a brief description of the database methodology. For more details see Docquier, Lowell and Marfouk (2007, 2009).

The database developed by Docquier, Lowell and Marfouk, which extends the work of Docquier and Marfouk (2004, 2006), relies on harmonised census and register data collected in receiving countries, where information about the country of birth, age, sex and educational attainment of the immigrants is available.

Docquier, Lowell and Marfouk collected data for two periods (1990 and 2000) from the 30 OECD member states with the highest level of detail on the country of birth.

Three levels of schooling are identified:  $s = l$  for immigrants with primary education (low-skilled: including lower-secondary, primary and no school);  $s = m$  for those with high school diploma (medium-skilled), and  $s = h$  for those with tertiary education (high-skilled).

Skilled migration is defined as the migration of tertiary educated workers. DLM counts as migrants all working-age (25+) foreign-born individuals living in an OECD country. Considering the population aged 25+ maximises the comparability of the immigration population with data on educational attainment in the source countries. It also excludes a large number of students who temporarily emigrate to complete their education.

Let  $M_{j,s,t}^i$  denote the stock of adults aged 25+ born in country  $i$  and residing in country  $j$  with skill level  $s$  at time  $t$ . Aggregating these numbers over the destination countries  $j$  gives the stock of emigrants from source country  $i$ :

$$M_{j,s,t}^i = \sum_j M_{j,s,t}^i$$

Skilled emigration rates are obtained by comparing the emigration stocks to the total number of people born in the source country and belonging to the same educational category. Calculating the brain drain as a proportion of the total educated labour force is more appropriate to evaluate the pressure imposed on the local labour market. The pressure exerted by 151,451 Egyptian high-skilled emigrants (4.7 % of the educated total labour force) is less important on the national economy than the pressure exerted by 7,558 high-skilled emigrants from Cape Verde (82.4 % of the national educated labour force).

$$m_{j,s,t}^i = \frac{M_{j,s,t}^i}{N_{s,t}^i + M_{j,s,t}^i}$$

Where  $i$ ,  $j$ ,  $s$  and  $t$  respectively mean country of origin, destination country, immigrants' education level and time;

$M_{j,s,t}^i$  is the number of migrants with skill level  $s$  from country of origin  $i$  residing in country  $j$  and

**Fehler! Es ist nicht möglich, durch die Bearbeitung von Feldfunktionen Objekte zu erstellen.** is the country of origin resident population.

This database has the great advantage of providing a realistic picture of the magnitude and structure of South-North and North-North international migration. Nonetheless it suffers from a number of shortcomings. First, the set of receiving countries is restricted to the OECD. Consequently, by disregarding non-OECD immigration countries the data set underestimates the brain drain for many African countries that sent a significant proportion of their emigrants to non-OECD destinations. This study presents some very preliminary estimates of South-South migration by taking into consideration the migration flows to 15 African countries for which data were made available. Secondly, because census data is only collected with low frequency; for the majority of countries the latest point in time is 2000. Thus, recent migration flows cannot be captured.

#### Handout 1

#### The Docquier, Lowell and Marfouk database: a brief description of the methodology

Table 3, which provides a descriptive overview of the distribution of OECD immigrants, aged 25 and over, by educational attainment, region of origin and destination, clearly shows that contrary to popular belief emigration from Africa more and more concerns the movement of high-skill persons and that a high proportion of Africans immigrants are well educated. By 2000, African-born immigrants represented 4.5 million or 7.6 % of the total immigrants (6.9 % in 1990) in OECD countries; 1.4 million of them were tertiary educated. Over the period 1990-2000, the total OECD foreign-born population increased by around 40 %, while the number of high skilled immigrants grew by 64 %. In comparison, the stock of well-educated immigrants from Africa grew by approximately 66,500 individuals a year or 90 % (53 % of the total). The Docquier, Lowell and Marfouk dataset reveals that during the same period the number of low-skilled Africans immigrants increased at a lower rate (24 %).

An interesting indicator is given by the proportion of high-skilled among the total emigrants “selection rate”. On average, the proportion of tertiary educated workers among immigrants to OECD countries represented 35 % in 2000 (30 % in 1990). These proportions corresponded respectively to 32% and 44% for Africa and Sub-Saharan Africa, compared to 32 % for immigrants from European countries. From the same table we can see that the proportion of highly skilled among African emigrants increased by 7 percentage points over the

**The proportion of tertiary educated workers among immigrants**

last decade. This trend is related to the improvement of the level of schooling in African countries, but it reflects also the increasingly selectivity of the OECD countries' immigration policies<sup>13</sup>.

**The educational level of migrants**

Comparing the educational level of migrants with the population in the region of origin reveals that in general immigrants are better educated than those left behind. By 2000, the proportion of high-skilled workers among emigrants (35 %) is much higher worldwide than the proportion observed among the resident labour force (11 %). This skill gap is particularly wide for Africa in general (28 percentage points) and Sub-Saharan Africa in particular (41 percentage points).

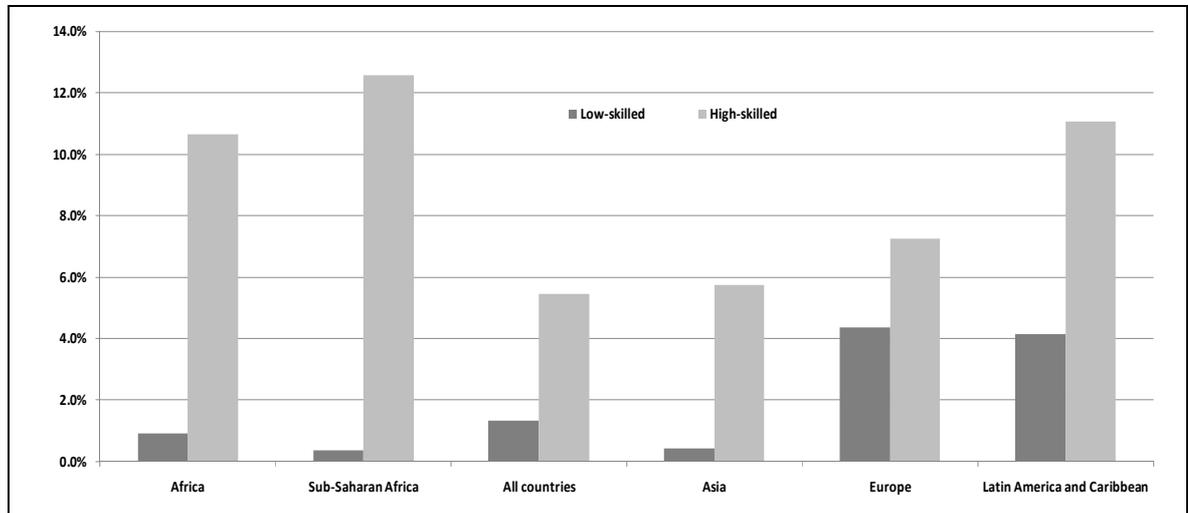
**Emigration rates**

Regarding emigration rates (the proportion of nationals living abroad), in general the low-skilled workers' emigration rates are moderate while the high-skilled emigration rates are much higher (Figure 3). In 2000, the high-skilled workers' emigration rate worldwide was 5.1 %, compared to 1.3 % for low-skilled. Disaggregated data confirm that that this is true for every region of origin. For Africa, the average high-skilled emigration rate (10.6 %)<sup>14</sup> is approximately 12 times higher than the low-skilled emigration rate (0.9 %). The high/low skilled migration gap is particularly wide for Sub-Saharan Africa where the propensity to move among highly skilled workers (12.6 %) is 32 times larger than among the low-skilled (0.4 %). Figure 3 shows also that Sub-Saharan Africa is the region the most severely affected by the brain drain phenomena captured by high-skilled workers' emigration rates (the proportion of high-skilled workers living abroad). More than one of every 8 high-skilled nationals was living in the OECD; this corresponded to approximately 960,000 tertiary educated workers (see Table 3).

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<sup>13</sup> The share of high-skilled workers in the African resident population increased from 2.5 % in 1990 to 3.9 % in 2000; see table 3.

<sup>14</sup> The African countries' unweighted average of high-skilled emigration rates is much higher (20 %).



**Figure 3** Emigration rates by educational level and region of origin, situation in 2000

**Notes:** emigrants correspond to individuals aged 25 or older.

**Source:** Authors' calculation based on Docquier, Lowell and Marfouk (2009).

Table 4 depicts the situation of the African countries most affected by the emigration of high-skilled nationals. The brain drain intensity differs if it is measured in absolute or relative terms. In absolute values, unsurprisingly, the largest countries are obviously strongly affected by the exodus of highly skilled workers. The top eight sending countries were South Africa (173,411), followed by Morocco (155,994), Egypt (151,451), Nigeria (148,780), Algeria (87,777), Kenya (80,287), and Ghana (67,105). As a proportion of the national educated labour force, small countries suffered a massive brain drain. The emigration rate exceeded 55% in Cape Verde (82%), Seychelles (77%), Gambia (68%) and Mauritius (56%). Lowell (2000) argues that, while some level of skilled migration is necessary for developing nations to integrate into the global economy, a large outflow of skilled persons can be unfavourable for growth and development.

**African countries most affected by emigration**

The last two columns of table 4 give the 25 highest and lowest selection rates (proportion of high-skilled persons among emigrants). The highest selection rates are observed in countries such as South Africa (65%), Nigeria (64%), Liberia (58%), and Zimbabwe (56%). In contrast, the proportion of the high-skilled among emigrants is very low in São Tome and Príncipe (9%), Guinea-Bissau (10%), Mali (11%), Cape Verde (11%), Morocco (14%), Algeria (14%) or Mauritania (15%). It is important to note that African countries with high selection rates may exhibit relatively low high-skilled workers' emigration rates (e.g. Egypt and Gabon). On the other hand, several countries such as Senegal, Gambia, Morocco, and Mozambique exhibit relatively low selection rates and a substantial brain drain.

Region of origin	Emigration structure			High-skilled emigrants by destination (in %)			Low-skilled emigrants by destination (in %)			Structure of labour force in regions of origin
	Total Emigrants (in thousands)	High-Skilled emigrants (in thousands)	Share of high-skilled among emigrants (in %)	Selective countries	European Union	Rest of OECD	Selective countries	European Union	Rest of OECD	Share of high-skilled (in %)
<b>All countries</b>	<b>58,619</b>	<b>20,523</b>	<b>35 %</b>	<b>73 %</b>	<b>23 %</b>	<b>4 %</b>	<b>48 %</b>	<b>45 %</b>	<b>7 %</b>	<b>11.1 %</b>
<b>From selected regions</b>										
From Africa	4,465	1,407	32 %	52 %	47 %	1 %	7 %	92 %	1 %	3.9 %
From Sub-Saharan Africa	2,194	960	44 %	56 %	43 %	1 %	15 %	82 %	3 %	2.8 %
From Asia	15,255	7,014	46 %	81 %	15 %	4 %	39 %	54 %	7 %	6.0 %
From Europe	21,364	6,696	31 %	61 %	33 %	6 %	27 %	63 %	10 %	17.7 %
From Latin America & Caribbean	13,966	3,684	26 %	89 %	9 %	2 %	92 %	6 %	2 %	11.8 %
<b>All countries</b>	<b>41,996</b>	<b>12,546</b>	<b>30 %</b>	<b>77 %</b>	<b>19 %</b>	<b>4 %</b>	<b>42 %</b>	<b>51 %</b>	<b>7 %</b>	<b>9.1 %</b>
<b>From selected regions</b>										
From Africa	2,914	742	25 %	55 %	43 %	2 %	4 %	95 %	1 %	2.5 %
From Sub-Saharan Africa	1,222	488	40 %	61 %	38 %	1 %	10 %	88 %	2 %	1.8 %
From Asia	9,435	3,766	40 %	82 %	14 %	4 %	34 %	58 %	8 %	4.7 %
From Europe	19,492	4,890	25 %	70 %	25 %	5 %	33 %	58 %	9 %	13.8 %
From Latin America & Caribbean	7,019	1,926	27 %	90 %	9 %	1 %	88 %	11 %	1 %	8.9 %

**Table 3** Descriptive statistics by country groups (1990 - 2000)

**Notes:** emigrants correspond to individuals aged 25 or older. Selective countries refer to Australia, Canada, New Zealand and United States and European Union to the 19 countries member states of the OECD.

**Source:** Author's calculations based on Docquier, Lowell and Marfouk (2009).

Country of origin	High-skilled (in thousands)	Country of origin	High-skilled emigration rate	Country of origin	High selection rate	Country of origin	Relatively low selection rate
South Africa	173,411	Cape Verde	82 %	South Africa	65 %	Eritrea	41 %
Morocco	155,994	Seychelles	77 %	Nigeria	64 %	Congo Rep.	39 %
Egypt	151,451	Gambia	68 %	Egypt	59 %	Central African Rep.	38 %
Nigeria	148,780	Mauritius	56 %	Liberia	58 %	Togo	37 %
Algeria	87,777	Sierra Leone	49 %	Zimbabwe	56 %	Côte d'Ivoire	35 %
Kenya	80,287	Ghana	45 %	Botswana	53 %	Djibouti	33 %
Ghana	67,105	Liberia	44 %	Namibia	52 %	Seychelles	31 %
Ethiopia	52,538	Kenya	39 %	Tanzania	51 %	Mozambique	29 %
Tunisia	40,226	Uganda	36 %	Burundi	51 %	Mauritius	29 %
Congo Dem. Rep.	38,017	Eritrea	35 %	Sudan	51 %	Somalia	28 %
Uganda	35,921	Somalia	35 %	Gabon	51 %	Burkina Faso	28 %
Zimbabwe	34,017	Rwanda	32 %	Cameroon	50 %	Gambia, The	27 %
Tanzania	33,125	Congo Rep.	28 %	Lesotho	50 %	Guinea	21 %
Somalia	26,758	Guinea-Bissau	28 %	Ethiopia	49 %	Equatorial Guinea	19 %
Mauritius	23,185	São Tome and Principe	27 %	Libya	49 %	Senegal	17 %
Cameroon	22,148	Mozambique	23 %	Rwanda	49 %	Angola	17 %
Congo Rep	20,426	Comoros	21 %	Zambia	48 %	Mauritania	15 %
Liberia	20,347	Equatorial Guinea	21 %	Chad	48 %	Tunisia	15 %
Sudan	18,341	Malawi	21 %	Sierra Leone	46 %	Algeria	14 %
Sierra Leone	16,647	Morocco	19 %	Uganda	46 %	Morocco	14 %
Senegal	15,844	Cameroon	17 %	Kenya	45 %	Comoros	13 %
Zambia	14,019	Senegal	17 %	Swaziland	44 %	Mali	11 %
Côte d'Ivoire	13,674	Togo	17 %	Benin	44 %	Cape Verde	11 %
Eritrea	12,939	Zambia	16 %	Madagascar	43 %	Guinea-Bissau	10 %
Madagascar	12,506	Congo Dem. Rep.	15 %	Congo Dem. Rep.	43 %	São Tome and Principe	9 %

**Table 4** Emigration from Africa to OECD by countries of origin; top25 ranked by the authors in decreasing order, situation in 2000

**Notes:** emigrants correspond to individuals aged 25 or older. Selection rate refer to the proportion of high-skilled persons among emigrants.

**Source:** Authors' calculations based on Docquier, Lowell and Marfouk (2009).

#### 4.1 European Union: a major pole of attraction for high-skilled Africans

##### **The European Union is the favourite destination**

Compared to other OECD countries, the European Union is the favourite destination of African low-skilled workers. By 2000, more than nine of every ten low-skilled African migrants (92 %) had chosen the EU<sup>15</sup> as destination, while only 7 % were living in the so-called “traditional immigrant-receiving countries”: Australia, Canada, New Zealand and United States. The location choice of high-skilled African migrants shows a different picture. The EU was the destination of 47 % of them, compared with 52 % in Australia, Canada, New Zealand, and United States, all countries with selective immigration policies (see Table 3)<sup>16</sup>.

##### **A low average skill level**

These numbers indicate that the average skill level of African immigrants to the EU is relatively low. Figure 4, which compares the proportion of tertiary educated among African migrants by destination, shows that in 2000 75 % of Africans in Canada were of tertiary education level. This proportion is 70 % in the United States and 61 % in Australia. By contrast, only 20 % of the immigrants from Africa in the EU are tertiary educated. However, it is interesting to note that the share of high-skilled workers in the total the stock of African immigrants increased significantly between 1990 and 2000 (+7 percentage points, from 25% in 1990 to 32% in 2000). A second observation is that the EU average hides huge heterogeneity between different Member States. For example, while only 10 % of Africans born in Spain are tertiary educated, the equivalent proportion in the UK is 40 %.

##### **The EU plays a major role in the continent's brain drain debate**

More importantly, by attracting a significant proportion of high-skilled African migrants, the EU plays a major role in the continent's brain drain debate. Figure 5 illustrates that the EU is the main destination for high-skilled migration from many African countries. The vertical axis represents country high-skilled (individuals who hold a tertiary degree) emigration rates to the OECD area. The horizontal axis is the share of the EU in different countries' high-skilled emigration. We observe that the EU contribution is high (in excess of 50 %) in 30 cases, and very high (above 70 %) in 18 cases. Some of these countries are strongly affected by brain drain (Guinea-Bissau, Congo Rep., Comoros, Rwanda, Uganda, and Mauritius). In a study focusing on the role of the EU in the international mobility of skilled workers, Docquier, Lohest and Marfouk (2005) showed that the European countries suffer a large brain drain to Australia, Canada and the United States, which is compensated by importing human capital from developing countries.

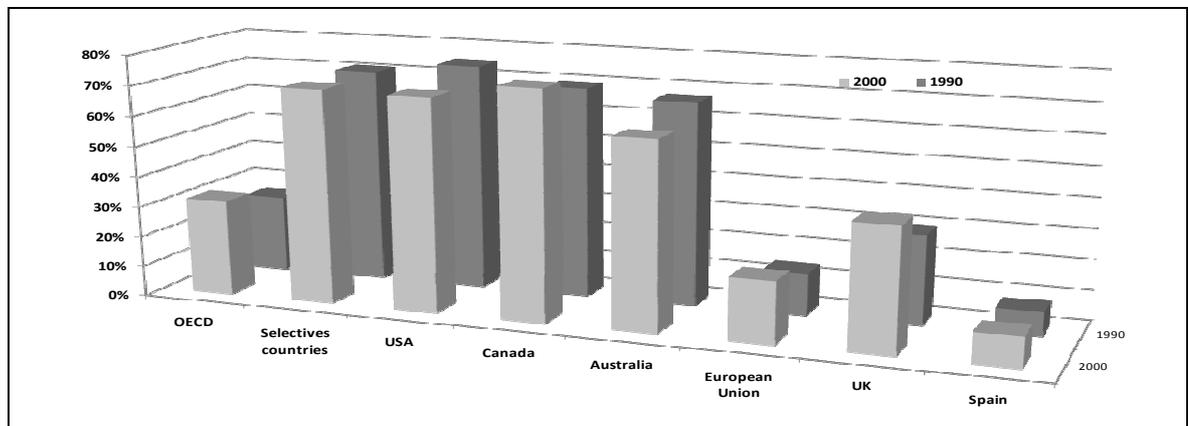
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<sup>15</sup> The EU corresponds to the 19 member states of the OECD.

<sup>16</sup> The remaining 1 % were living in the other OECD countries.

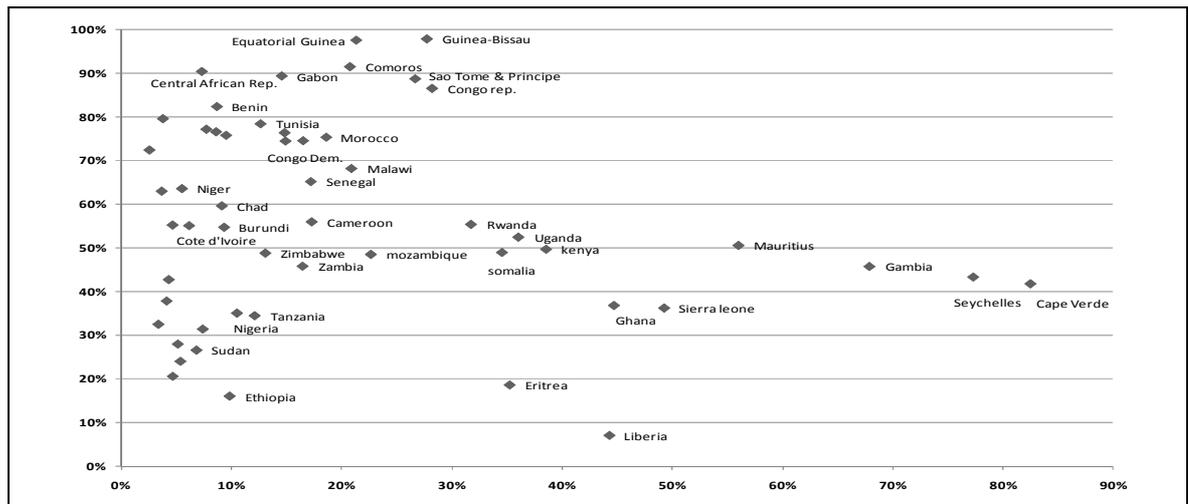
Today, the selection of immigrants from outside the EU is an issue of intense and rising debate in many European countries. There is no doubt that the shift of the immigration policies towards increasingly selective immigration systems, more liberal for high-skilled workers and very restrictive for low-skilled flows, especially those coming from developing world, will intensify the African brain drain. Defoort and Docquier (2007) confirm that the adoption by France of a selective immigration policy similar to that of Canada would amplify the African brain drain. For example, they evaluated the loss in terms of share of graduates in the origin countries' labour force to 1.4 percentage points for Mauritius, 1.3 for Comoros and 1.2 for Morocco.

**The shift of immigration policies**



**Figure 4** Proportion of high-skilled among the African emigrants by destination, 1990 - 2000

Source: Authors' calculations based on Docquier, Lowell and Marfouk (2009)



**Figure 5** Role of the European Union in African countries' brain drain, situation in 2000

Source: Authors' calculations based on Docquier, Lowell and Marfouk (2009)

## 4.2 Intra-African brain drain: what do we know?

### **The magnitude of South-North skilled migration**

Until recently, the set of receiving countries in the existing databases on the structure of international migration by educational level has been restricted to the OECD member states. Focusing on the OECD provides a clear picture of the magnitude of South-North skilled migration, in particular from Africa. Nonetheless, disregarding non-OECD immigration countries underestimates the brain drain for many African countries that send a large proportion of their emigrants to non-OECD destinations. According to the United Nations database, the OECD hosts 47 % of international migrants and available estimates reveal that South-South migration is almost as large as South-North.

### **Intra-African brain drain is a reality**

Ratha and Shaw (2007) point out that 40 % of migrants from developing countries live in the OECD high-income countries, against 47 % in other developing countries. Focusing on Africa, this study found that more than two out every three (69 %) African international migrants from Sub-Saharan Africa migrate to developing countries. These elements suggest that intra-African brain drain is a reality. Unfortunately, data on African immigration by skill level and origin countries is extremely scarce. This section uses the data on international migration by education level in non-OECD destinations collected recently by Docquier, Marfouk, Ozden and Parsons (2010).

Integrating the migration flows to 15 African countries for which data are available<sup>17</sup> increased the stock of African high-skilled emigrants by nearly 159,000 or 11 % in 2000. On average the continent high-skilled emigration rate rose by 1.1 %, from 10.6 % to 11.7 %. Nevertheless, as shown in Figure 6, the brain drain is largely underestimated in many Sub-Saharan African countries, such as Namibia, Lesotho, Burkina Faso, Swaziland, Niger and Mali<sup>18</sup>. Our estimates should be considered as a lower-band measure of intra-African skilled migration. Due to the lack of adequate data we took into consideration only migration to 15 African countries. According to the United Nations database "Trends in International Migrant Stock: the 2008 Revision"<sup>19</sup>, this represents 48 % of the total stock of international migrants living in Africa. A comprehensive picture of intra-continental brain drain requires further effort in terms of data collection.

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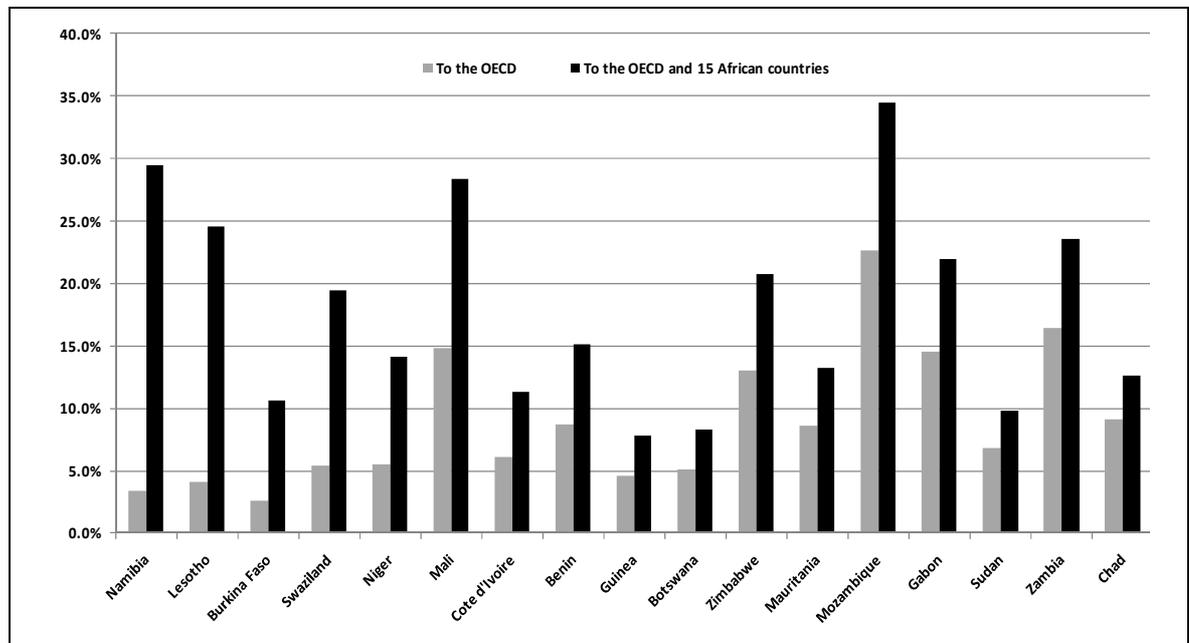
<sup>17</sup> Benin, Burkina Faso, Côte d'Ivoire, Gambia, Guinea, Kenya, Mali, Mauritius, Morocco, Rwanda, Senegal, Seychelles, Tanzania, South Africa and Uganda.

<sup>18</sup> We are aware that a brain drain is evident outside the OECD area and Africa. A significant proportion of skilled migration from countries such as Sudan or Egypt is direct to the Gulf Countries (Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates).

<sup>19</sup> <http://esa.un.org/migration/index.asp?panel=1>, accessed April 7, 2011.

**A major source of concern**

Case studies confirm that the intra-African brain drain especially in the university sector is a major source of concern. Hatungimana (2007) reported that the University of Burundi lost a significant proportion of its qualified staff during recent years. As an indication, in January 2007, instead of the 319 full-time PhD-holding lecturers that should normally have been in post, there were only 169. Universities in Rwanda had recruited 35 members of the academic staff. The situation is more dramatic in the Faculty of Medicine: “in 1985-1986, the Faculty had 39 medical professors; today it has barely 14 qualified lecturers, with some major departments having no tenured lecturers at all”; Luhanga (2007, p. 3). The flight of this human capital results from multiple possible causes, which can be addressed by source country policy makers, such as improved working environments and careers prospects, living standards<sup>20</sup>, institutional quality, and armed conflict.



**Figure 6 High-skilled workers emigration rates to the OECD and to selected African countries**

<sup>20</sup> Disparities in terms of salary of the African academic staff is well illustrated by Barclay (2002): “The University of Liberia’s annual salary for a professor (\$856) is only 37.8 percent of a Ghanaian professor’s salary, 18.9 percent of a Kenyan professor’s, 5.6 percent of a Zimbabwean professor’s, and 4.5 percent of a South African professor’s salary”. For the Burundi-Rwanda case, see Hatungimana (2007). The real cost of living in these countries could not explain all these wage gaps.

**Notes:** The grey bars represent high-skilled workers' emigration rates to the OECD countries, whereas the black bars represent emigration rates to the OECD countries plus 15 African countries (Benin, Burkina Faso, Côte d'Ivoire, Gambia, Guinea, Kenya, Mali, Mauritius, Morocco, Rwanda, Senegal, Seychelles, Tanzania, South Africa and Uganda).

**Source:** Authors' calculations based on Docquier, Lowell and Marfouk (2009), and Docquier, Marfouk, Ozden and Parsons (2010) datasets.

## 5. Conclusion

**There is little research on the impact of skilled migration on source countries**

While there appears to be deep and growing concern over the African brain drain, the poor quality of international migration data has meant that little research has been done to date to establish the impact of skilled migration on source countries. This paper reveals that, contrary to popular belief, a high proportion of African immigrants in the OECD area are well educated. On average, 44 % of Sub-Saharan African migrants are tertiary educated. Today emigration from Africa is increasingly a question of the mobility of high-skill persons. Over the period 1990-2000, the number of high-skilled African-born workers in the OECD grew by 90 %. As a consequence of this large outflow of highly educated individuals, a number of African countries experienced considerable brain drain. Our analysis reveals also that, as a major pole of attraction for skilled Africans, the European Union plays an important role in the continental brain drain debate.

Until recently the set of receiving countries in the existing databases on the structure of international migration by educational level was restricted to the OECD destinations. This means that an important piece of data on the international mobility of skilled Africans has until now been missing. When one takes into account the migration flows to 15 African countries, for which data are now available, the reality of the intra-African brain drain is unmistakable.

**A negative effect on the continent's economic performance and growth prospects**

Aside from the loss of public investment in the education of the migrants, many observers consider that by depriving African countries of one of their scarcest resources – human capital – the brain drain has a negative effect on the continent's economic performance and growth prospects. Yet a recent wave of theoretical and empirical studies has highlighted the fact that a limited but positive high-skilled emigration rate can be beneficial for sending countries, thanks to their Diaspora. The channels through which the Diaspora positively affect the origin economies are many and varied, ranging from return migration with additional skills acquired abroad, flows of remittances, tourism revenues, technology transfers, creation of business and trade networks, stimulation of human capital formation at origin<sup>21</sup>. The African Union

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<sup>21</sup> A survey of this literature can be found in Docquier and Marfouk (2006).

[AU], the Association of African Universities [AUU], and the New Partnership for African's Development [NEPAD] have formally recognised the African Diaspora as a key player in the development agenda of the continent. However, understanding and measuring the effect of the brain drain on the African countries requires further empirical research. The collection and dissemination of data on skilled migration from Africa and the evaluation of the magnitude of brain drain in African universities and other key sectors is the first step in the right direction.

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