Measuring International Skilled Migration:
New Estimates Controlling for Age of Entry[*]

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ABSTRACT

Recent data on international skilled migration define skilled migrants according to education level independently of whether education has been acquired in the home or in the host country. This leads to a potential over-estimation of the magnitude of the brain drain as well as to possible spurious cross-country variation in skilled emigration rates. In this paper we use immigrants' age of entry as a proxy for where education has been acquired. Data on age of entry are available from a subset of receiving countries which together represent more than three-quarters of total skilled immigration to the OECD. Using these data and a simple gravity model, we estimate the age-of-entry structure of skilled immigration to the other OECD countries. This allows us to propose alternative measures of the brain drain by defining skilled immigrants as those who left their home country after age 12, 18 or 22. The corrected skilled emigration rates are obviously lower than thoses calculated without age-of-entry restrictions. However, the correlation between the corrected and uncorrected rates is extremely high.

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1 Introduction

Recent datasets on international skilled migration (Carrington and Detragiache, 1998, Adams, 2003, Docquier and Marfouk, 2004, 2006, Dumont and Lemaitre, 2004) define skilled immigrants as foreign-born workers with university or post-secondary training. For example, Docquier and Marfouk (2006) collected Census and register information on immigrants aged 25 or more by country of birth and education level from all OECD countries. This allowed them to compute skilled emigration stocks and rates for virtually all sending countries. However, their (and others') definition does not account for whether education has been acquired in the home or in the host country and thus leads to a potential over-estimation of the intensity of the brain drain as well as to possible spurious cross-country variation in skilled emigration rates. As shown by Rosenzweig (2005) on the basis of US survey data, children migration can represent an important fraction of total immigration for certain countries as over 18 percent of permanent resident aliens immigrated to the US before age 18, and over 25 percent immigrated before age 20. Among those who arrived before age 18 or 20, some are highly-skilled today, having most likely acquired education once in the US. Should we include them as part of the "brain drain"?

As explained, existing brain drain data sets are built according to a broad definition in that they include all foreign-born workers with tertiary schooling; for example, Mexican-born individuals who arrived in the US at age 5 or 10 and then graduated from US high-education institutions later on are counted as highly-skilled Mexican immigrants. This can be seen as providing an upper bound to brain drain estimates. In contrast, Rosenzweig (2005) suggests that only people with home-country higher education should be considered as skilled immigrants. This must be considered as a lower-bound measure of the brain drain. Indeed, except for those arrived at very young age, most of the immigrants who then acquired host country tertiary education arrived with some level of home country pre-tertiary schooling. In addition, some of them would still have engaged in higher education in the home country in the absence of emigration prospects.[1]

In this paper we use immigrants' age of entry as a proxy for where education has been acquired. Data on age

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[1] Besides, some received home-country governments funds to pursue their studies abroad, which also induces a fiscal loss for the origin country.

of entry are available from a subset of receiving countries which together represent more than three-quarters of total skilled immigration to the OECD. Using these data and a simple gravity model, we estimate the age-of-entry structure of skilled immigration to the other OECD countries. This allows us to propose alternative measures of the brain drain by defining skilled immigrants as those who left their home country after age 12, 18 or 22, and to do so for both 1990 and 2000. These corrected skilled emigration rates, which can be seen as intermediate bounds to the brain drain estimates, are by construction lower than those computed without age-of-entry restrictions by Docquier and Marfouk (2006), which we take as our upper-bound brain drain measure.

Our results for the year 2000 show that on average, 68 percent of the global brain drain is accounted for by emigration of people aged 22 or more upon arrival (the figures are 78 percent and 87 percent for the 18 and 12 year old thresholds, respectively). For some countries there is indeed a substantial difference between the corrected and uncorrected rates, with a minimal ratio between the two equal to 51 percent. However, cross-country differences are globally maintained in the corrected data sets, resulting in extremely high correlation levels between the corrected and uncorrected rates.[2] Similar results were obtained for the year 1990.

The rest of this paper is organized as follows. Section 2 presents the data on age of entry collected in a subset of OECD countries. In Section 3, we use a gravity model to estimate the age-of-entry structure of immigration to countries where data on age of entry are not available. Section 4 gives the alternative rates of emigration of skilled workers for all world countries. Finally, Section 5 concludes.

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[2]The correlation coefficients between the upper bound and the intermediate bounds using the 12+, 18+ and 22+ thresholds are 99.7, 99.3 and 98.7 percent respectively.

2 Census data on age of entry

To estimate the structure of immigration by age of entry, we collect census and register data in a sample of countries where such information is available: the US 1990 and 2000 censuses, the Canadian 1991 and 2001 censuses, the French 1999 census, the Australian 1991 and 2001 censuses, the New-Zealand 1991 and 2001 censuses, the Danish 2000 register, the Greek 2001 census and the Belgian 1991 census. Together, the countries sampled resprepresent 77 percent of total skilled immigration to the OECD area. The sample is representative of the OECD in that it includes countries with different demographic sizes, regional locations, development levels and immigration policy and tradition.

We thus have bilateral information on immigrants' origin, age, education level and age of entry from 12 host countries' censuses distinguishing 192 sending countries. These 2304 observations allow us to compute the proportion of immigrants arrived before ages 12, 18 and 22 in the total stocks of immigrants aged 25+ estimated by Docquier and Marfouk (2006). Eliminating zeros and a few suspicious observations, we end up with 1580 observations for each age threshold.

Table 1 gives descriptive statistics on the estimated proportions of adult immigrants arrived before age J ($J = 12, 18$ and 22). The average shares vary across receiving countries. On the whole, the average shares are 85.7%, 78.2% and 69.1% for immigrants arrived before age 12, 18 or 22. They are usually higher for Belgium, Denmark and Greece. The lowest shares are observed in Australia, New Zealand and the United States. Canada and France are not far from the average distribution.

Obviously, an approach based on Census data is not perfect. As explained by Rosenzweig (2005, p. 9), "information on entry year... is based on answers to an ambiguous question - in the US Census the question is 'When did you first come to stay?' Immigrants might answer this question by providing the date when they received a permanent immigrant visa, not the date when they first came to the US, at which time they might not have intended to or been able to stay". Only surveys based on comprehensive migration history would provide

precise data about the location in which schooling was acquired. However, the Census is the only representative source of data available in many countries. In addition, extrapolating the entry age structure from surveys (such as NIS - 4% of immigrants - or NSIP - a sample of 150,000 persons out of more than 25,000,000 adult immigrants - for the US) can be misleading. The number of observations can be very small for countries with few emigrants; this is typically the case of small countries which, on the other hand, are precisely the ones most affected by the drain drain in relative terms.

Table 1. Proportion of immigrants arrived after age J among immigrants aged 25+

Arrived after 12	Australia (2001)	Belgium (1991)	Canada (2001)	Denmark (2000)	France (1999)	Greece (2001)	New Zealand (2001)	United States (2000)	Total
Mean	0.728	0.906	0.884	0.978	0.827	0.966	0.781	0.858	0.857
Standard error	0.193	0.112	0.114	0.041	0.134	0.080	0.096	0.094	0.150
Min (Q0)	0.217	0.446	0.400	0.818	0.424	0.500	0.198	0.498	0.217
Quartile (Q25)	0.581	0.849	0.834	0.978	0.777	0.977	0.703	0.810	0.800
Median (Q50)	0.704	0.946	0.912	0.994	0.864	1.000	0.797	0.875	0.897
Quartile (Q75)	0.909	1.000	0.971	1.000	0.922	1.000	0.893	0.923	0.990
Max (Q100)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.984	1.000
Arrived after 18	Australia (2001)	Belgium (1991)	Canada (2001)	Denmark (2000)	France (1999)	Greece (2001)	New Zealand (2001)	United States (2000)	Total
Mean	0.678	0.871	0.814	0.961	0.777	0.947	0.734	0.744	0.782
Standard error	0.196	0.124	0.143	0.054	0.160	0.097	0.090	0.127	0.200
Min (Q0)	0.200	0.382	0.333	0.676	0.303	0.500	0.186	0.387	0.099
Quartile (Q25)	0.534	0.799	0.731	0.943	0.699	0.948	0.660	0.670	0.647
Median (Q50)	0.645	0.909	0.840	0.979	0.816	0.985	0.749	0.747	0.829
Quartile (Q75)	0.833	0.963	0.917	1.000	0.899	1.000	0.839	0.826	0.956
Max (Q100)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.960	1.000
Arrived after 22	Australia (2001)	Belgium (1991)	Canada (2001)	Denmark (2000)	France (1999)	Greece (2001)	New Zealand (2001)	United States (2000)	Total
Mean	0.598	0.785	0.720	0.910	0.667	0.883	0.633	0.613	0.691
Standard error	0.204	0.151	0.169	0.085	0.196	0.136	0.056	0.143	0.234
Min (Q0)	0.179	0.299	0.217	0.554	0.137	0.400	0.135	0.290	0.036
Quartile (Q25)	0.459	0.690	0.608	0.876	0.559	0.826	0.500	0.507	0.527
Median (Q50)	0.551	0.797	0.739	0.928	0.699	0.924	0.603	0.619	0.727
Quartile (Q75)	0.750	0.906	0.843	0.968	0.795	1.000	0.750	0.725	0.889
Max (Q100)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	0.926	1.000

3   Estimating the age-of-entry structure of immigration

In order to provide estimates of the age structure of immigration for receiving countries for which information on age of entry is missing, we conduct an econometric analysis using a simple gravity model of migration. More precisely, we aim at identifying the determinants of the proportion of migrants from country i to country f with tertiary education and arrived before age $J = 12, 18$ and 22. These bilateral proportions are denoted by σ_{if}^J where i is the sending country, f is the receiving country and J is the age of entry. Since the proportions of skilled migrants arrived before a given age lie between 0 and 1, it is appropriate to use a logistic transformation so that the dependent variable is defined on $(-\infty, +\infty)$. Therefore, we use $\theta_{if}^J = \ln \left[\frac{\sigma_{if}^J}{1 - \sigma_{if}^J} \right]$ as dependent variable. More precisely, we estimate the following equation:

$$\theta_{if}^J = \alpha + \sum_{k=1}^{n_{if}} \beta^{kJ} X_{if}^k + \sum_{k=1}^{n_i} \gamma^k Z_i^k + \sum_{k=1}^{n_f} \lambda^{kJ} W_f^k + \epsilon_{if}^J \tag{1}$$

where X_{if}^k $(k = 1, ..., n_{if})$ is a collection of n_{if} variables capturing proximity between origin and host countries, Z_i^k $(k = 1, ..., n_i)$ are origin countries characteristics and W_f^k $(k = 1, ..., n_j)$ are host countries characteristics. These variables can affect the age of entry structure through self-selection mechanisms as well as through out-selection mechanisms due to differences in host countries immigration policies.

Regarding the proximity variables included in X_{if}^k, we use:

- Economic distance, as measured by the ratio of GDP per capita. To the extent that host countries are more restrictive towards immigration from poor countries (for example, are tougher on family reunion and on granting permanent legal status due, e.g., to lower transferability of human capital), one may expect to see fewer children migrating with their parents as economic distance increases. On the other hand, it may also be the case that immigration policy is aimed primarily at asylum seekers, who tend to migrate with their family. Since asylum seekers generally originate from poor countries, the sign of this coefficient is a priori unclear. Data on GDP per capita are taken from the World Development Indicators (WDI, 2005).

- Geographic distance, as a proxy for migration costs. This is expected to have an ambiguous impact on family

migration as larger transportation costs can prevent emigration from entire families while on the other hand, geographic distance can make separation more painful and therefore provide additional incentives to migration with relatives. The data used to evaluate geographic distance is based on population-weighted bilateral distances between host and origin countries largest cities and are taken from the CEPII data set (Clair et al., 2004).

- Colonial links. By creating cultural proximities and providing better information and knowledge on the destination country (thus lowering migration costs), colonial links affect cultural distance between origin and host countries. We use a dummy variable equal to 1 if the countries of origin and destination share a colonial relationship and 0 otherwise. We expect colonial links to affect negatively the proportion of skilled migration arrived after age J. Data on colonial links are taken from the CEPII data set.

- Linguistic proximity. Linguistic proximity is likely to favor immigration with children as it will facilite their integration into the host country education system. Hence, we also expect of a negative sign for this coefficient. Data on linguistic proximity are also taken from the CEPII data set.

Regarding the variables on origin countries characteristics, Z_i^k, we include:

- Democracy. Democracy at home can affect children migration in a number of ways. One the one hand, absence of democracy is likely to provide additional incentives for migrants to emigrate with family or seek for family reunion; on the other hand, it may be more difficult to legally migrate out of a dictatorship, which can reduce children migration. We use the POLITY IV indicator of democracy, which ranges from -10 in dictatorial regimes to +10 in fully democratic countries.[3]

- Public education. We also include public expenditures in the source country, respectively for primary, secondary and tertiary education. The higher public education expenditures at origin, the lower the expected propensity to emigrate with children. We use the UNESCO data on public education expenditures per student as percent of the GDP per capita.

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[3] This indicator is available on http://www.cidcm.umd.edu/inscr/polity/

Regarding the variables on host countries characteristics, W_f^k, we include:

- Social expenditures as percent of GDP. As is well known, welfare magnets tend to raise the propensity to immigrate with children. However, receiving countries with more generous welfare systems tend to discourage family migration in an attempt to reduce the fiscal burden of immigration. We use OECD data on social expedenditures.

- Total education expenditures as percent of GDP. This variable is introduced to capture the characteristics of the education system at destination. We expect this variable to favor family migration but cannot exclude a potential role for a fiscal burden argument in the same spirit as above for social expenditures. We use OECD data.

- Immigrants as percent of the population. This variable captures the general openess of the receiving country to immigration and should therefore all else equal favor children migration. We use the data computed by Docquier and Marfouk (2006).

Tables 2, 3 and 4 report the OLS estimates. To correct for heteroskedasticity, we use White standard errors. To account for possible common trends in immigration policy we also add a time fixed effect for the year 2000 (the year 1990 is normalized to 0). Columns (1) to (3) compare alternative specifications with different measures of public education expenditures at origin. Column (4) gives the parcimonious specification after exclusion of the non-significant variables.

Our estimates are usuall highly significant, robust across specifications, and affect the structure by age of entry in a very intuitive way. The proportion of younger skilled migrants decreases in the economic and geographic distances between countries; it increases with colonial and linguistic links. Education expenditures favor family migration while social expenditures have the opposite effect. The higher the host country immigration rate, the higher the proportion of skilled migrants who arrived as children. Regarding origin-country characteristics, the democracy index has no significant effect, and public education expenditures are never significant at the 5-percent

threshold. Finally, the coefficient on the year dummy for 2000 is negative (except for $J = 12$).

Putting together the available census data on age-of-entry, which represent 77 percent of total immigration to the OECD, with the estimated structure computed from Column (4) of Tables 2 to 4 for the remaining 23 percent, the next section provides alternative measures of the brain drain from which skilled immigrants arrived before a given age are excluded.

Table 2. Explaining the proportion of skilled migrants arrived after age 12

Dependent variable, θ12	(1)	(2)	(3)	(4)
Ratio of GDP per capita	0.267***	0.257***	0.236***	0.242***
	(0.051)	(0.051)	(0.058)	(0.042)
Distance (in logs)	0.219***	0.217***	0.210***	0.199***
	(0.056)	(0.055)	(0.055)	(0.053)
Colonial link	-2.503***	-2.512***	-2.501***	-2.430***
	(0.211)	(0.214)	(0.211)	(0.208)
Linguistic proximity	-0.416***	-0.425***	-0.438***	-0.416***
	(0.096)	(0.097)	(0.099)	(0.093)
Social expenditures at dest. (in logs)	0.569***	0.556**	0.542**	0.532**
	(0.219)	(0.220)	(0.221)	(0.213)
Education expenditures at dest. (in logs)	-2.343***	-2.324***	-2.299***	-2.337***
	(0.274)	(0.275)	(0.276)	(0.263)
Immigration rate at dest.	-0.101***	-0.101***	-0.101***	-0.099***
	(0.010)	(0.010)	(0.010)	(0.010)
Democracy index at origin	0.175	0.199	0.193	-
	(0.153)	(0.153)	(0.153)	-
Public education exp. at origin - primary	0.075	-	-	-
	(0.076)	-	-	-
Public education exp. at origin - secondary	-	0.085	-	-
	-	(0.073)	-	-
Public education exp. at origin - tertiary	-	-	0.045	-
	-	-	(0.049)	-
Year 2000	-0.103	-0.101	-0.101	-
	(0.094)	(0.093)	(0.094)	-
Constant	4.617***	4.659***	4.537***	4.610***
	(1.161)	(1.161)	(1.150)	(1.077)
R2	0.241	0.242	0.241	0.247
Number of observations	1542	1542	1542	1579

Note: Estimation by OLS. White standard errors between parentheses.

* p-value lower than 10 percent; ** p-value lower than 5 percent; *** p-value lower than 1 percent

Table 3. Explaining the proportion of skilled migrants arrived after age 18

Dependent variable, θ18	(1)	(2)	(3)	(4)
Ratio of GDP per capita	0.255***	0.242***	0.237***	0.242***
	(0.054)	(0.054)	(0.060)	(0.041)
Distance (in logs)	0.181***	0.174***	0.167***	0.146***
	(0.052)	(0.052)	(0.052)	(0.050)
Colonial link	-2.474***	-2.479***	-2.464***	-2.408***
	(0.192)	(0.196)	(0.193)	(0.194)
Linguistic proximity	-0.447***	-0.459***	-0.461***	-0.459***
	(0.095)	(0.094)	(0.096)	(0.091)
Social expenditures at dest. (in logs)	0.546**	0.528**	0.526**	0.538**
	(0.215)	(0.215)	(0.216)	(0.211)
Education expenditures at dest. (in logs)	-2.908***	-2.880***	-2.875***	-2.843***
	(0.298)	(0.298)	(0.298)	(0.285)
Immigration rate at dest.	-0.116***	-0.116***	-0.115***	-0.109***
	(0.011)	(0.011)	(0.011)	(0.010)
Democracy index at origin	0.095	0.134	0.130	-
	(0.164)	(0.165)	(0.165)	-
Public education exp. at origin - primary	0.132*	-	-	-
	(0.078)	-	-	-
Public education exp. at origin - secondary	-	0.094	-	-
	-	(0.074)	-	-
Public education exp. at origin - tertiary	-	-	0.022	-
	-	-	(0.050)	-
Year 2000	-0.304***	-0.299***	-0.299***	-0.265***
	(0.091)	(0.091)	(0.091)	(0.080)
Constant	6.053***	5.921***	5.672***	5.469***
	(1.181)	(1.187)	(1.176)	(1.108)
R2	0.285	0.285	0.284	0.288
Number of observations	1526	1526	1526	1563

Note: Estimation by OLS. White standard errors between parentheses.

* p-value lower than 10 percent; ** p-value lower than 5 percent; *** p-value lower than 1 percent

Table 4. Explaining the proportion of skilled migrants arrived after age 22

Dependent variable, θ22	(1)	(2)	(3)	(4)
Ratio of GDP per capita	0.220***	0.212***	0.243***	0.190***
	(0.054)	(0.053)	(0.058)	(0.041)
Distance (in logs)	0.212***	0.205***	0.202***	0.175***
	(0.050)	(0.050)	(0.050)	(0.049)
Colonial link	-2.316***	-2.316***	-2.302***	-2.265***
	(0.179)	(0.181)	(0.179)	(0.177)
Linguistic proximity	-0.455***	-0.464***	-0.441***	-0.467***
	(0.090)	(0.090)	(0.092)	(0.086)
Social expenditures at dest. (in logs)	0.233	0.220	0.246	-
	(0.205)	(0.205)	(0.206)	-
Education expenditures at dest. (in logs)	-2.719***	-2.670***	-2.741***	-2.666***
	(0.323)	(0.323)	(0.321)	(0.299)
Immigration rate at dest.	-0.114***	-0.114***	-0.113***	-0.112***
	(0.010)	(0.010)	(0.010)	(0.008)
Democracy index at origin	0.221	0.248	0.251	-
	(0.164)	(0.166)	(0.165)	-
Public education exp. at origin - primary	0.099	-	-	-
	(0.074)	-	-	-
Public education exp. at origin - secondary	-	0.055	-	-
	-	(0.073)	-	-
Public education exp. at origin - tertiary	-	-	0.043	-
	-	-	(0.050)	-
Year 2000	-0.405***	-0.402***	-0.402***	-0.399***
	(0.086)	(0.086)	(0.086)	(0.080)
Constant	5.525***	5.537***	4.992***	5.896***
	(1.197)	(1.204)	(1.190)	(0.599)
R2	0.258	0.258	0.258	0.255
Number of observations	1508	1508	1508	1544

Note: Estimation by OLS. White standard errors between parentheses.

* p-value lower than 10 percent; ** p-value lower than 5 percent; *** p-value lower than 1 percent

4   Alernative brain drain estimates

The Docquier and Marfouk (2006) data set gives the total number of skilled emigrants from a given origin country i to host country f (denoted by M_{if}). It also gives the number of skilled residents in the home country (denoted by N_i). The skilled emigration rate is then defined as the ratio of skilled emigrants to the total number of skilled natives (residents + emigrants). Our method here consists of multiplying M_{if} by the estimated proportions of skilled migrants who left their home country after age J ($J = 12, 18, 22$). The corrected skilled emigration rates are then given by

$$m_i^J = \frac{\sum_f \pi_{if}^J M_{if}}{N_i + \sum_f \pi_{if}^J M_{if}}$$

where π_{if}^J is the proportion of skilled emigrants who left after age J according to our computations. The Docquier-Marfouk measures correspond to the special case where $J = 0$ or $\pi_{if}^0 = 1$. We use them as an upper bound of the intensity of the brain drain. As π_{if}^J decreases with J, the corrected rates for $J = 12, 18, 22$ are by construction lower than m_{if}^0.

Let us first concentrate on the ratio between m_{if}^J and m_{if}^0 for $J = 12, 18, 22$. For the 192 sending countries in our sample, the m_{if}^{12}/m_{if}^0 ratio ranges from 74.8 to 98.6 percent, the m_{if}^{18}/m_{if}^0 ratio ranges from 59.4 to 97.9 percent, and the m_{if}^{22}/m_{if}^0 ratio ranges from 48.5 to 95.0 percent. Figure 1 describes the country values of the m_{if}^J/m_{if}^0 ratios (by decreasing order of the m_{if}^{22}/m_{if}^0 ratio). Table 5 lists the 25 countries with the highest/lowest values of m_{if}^{22}/m_{if}^0. Among the highest ratios (i.e., with a low proportion of skilled migrants arrived at a young age), we note the presence of many Eastern European countries and of middle-income African countries. Among the lowest ratios (i.e., relatively high proportion of skilled migrants arrived at a young age), one finds many industrialized countries such as Canada, Italy or Germany as well as developing countries which tend to be relatively poor (e.g., the poorest African countries), small (e.g., the Pacific Islands), and located predominantly in Central and South America.

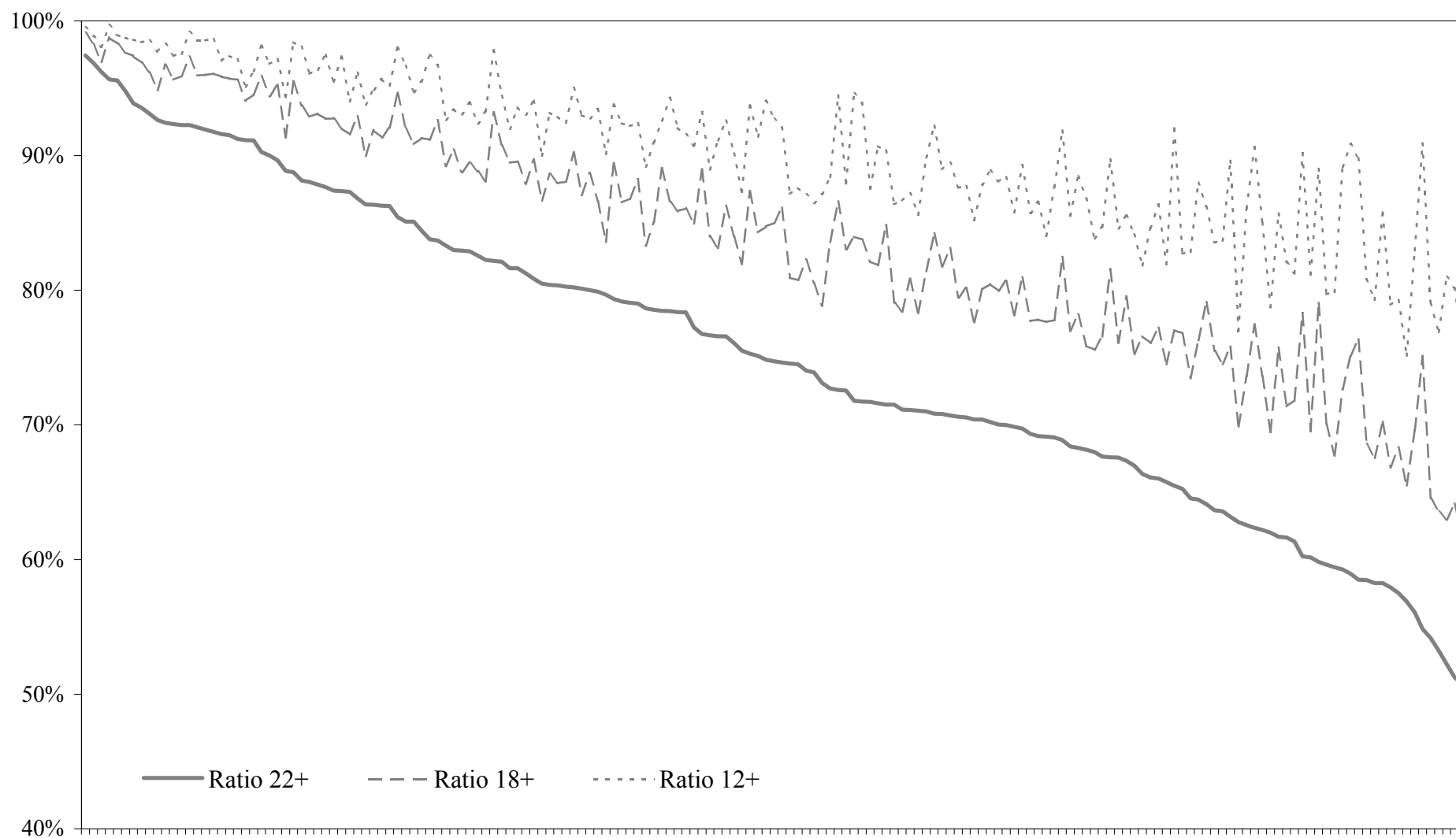Figure 1. Ratio of "brain drain J+" to "brain drain 0+"

Ratio 22+   Ratio 18+   Ratio 12+

Table 5. Ratio of brain drain *J+* to brain drain 0+ (population above 0.25 million)

Highest ratios	12+	18+	22+	Lowest ratios	12+	18+	22+
Mongolia	*99.5%*	*99.1%*	*97.4%*	*Korea*	*78.7%*	*69.5%*	*62.0%*
Mozambique	*98.9%*	*98.3%*	*96.9%*	*Malaysia*	*85.7%*	*75.7%*	*61.7%*
Malawi	*98.1%*	*96.9%*	*96.2%*	*Italy*	*82.1%*	*71.4%*	*61.6%*
Bhutan	*99.7%*	*98.8%*	*95.7%*	*Germany*	*81.3%*	*71.8%*	*61.3%*
Gambia, The	*98.9%*	*98.3%*	*95.6%*	*Jordan*	*90.2%*	*78.3%*	*60.2%*
Kyrgyzstan	*98.7%*	*97.7%*	*94.8%*	*Papua New Guinea*	*81.2%*	*69.5%*	*60.2%*
Tajikistan	*98.6%*	*97.4%*	*93.9%*	*Comoros*	*89.0%*	*79.1%*	*59.8%*
Georgia	*98.4%*	*96.9%*	*93.6%*	*Israel*	*79.7%*	*70.0%*	*59.6%*
Azerbaijan	*98.5%*	*96.2%*	*93.1%*	*Cuba*	*79.9%*	*67.7%*	*59.4%*
Oman	*97.7%*	*94.8%*	*92.6%*	*Dominican Republic*	*89.2%*	*72.6%*	*59.3%*
Albania	*98.3%*	*96.7%*	*92.4%*	*El Salvador*	*90.9%*	*75.2%*	*58.9%*
Rwanda	*97.4%*	*95.6%*	*92.4%*	*Guatemala*	*89.8%*	*76.4%*	*58.5%*
Kazakhstan	*97.5%*	*95.9%*	*92.3%*	*Laos*	*80.8%*	*68.6%*	*58.5%*
Sierra Leone	*99.2%*	*97.3%*	*92.3%*	*Madagascar*	*79.3%*	*67.5%*	*58.2%*
Guyana	*98.5%*	*96.0%*	*92.1%*	*Vietnam*	*85.8%*	*70.2%*	*58.2%*
Uzbekistan	*98.6%*	*96.0%*	*91.9%*	*Central African Republic*	*78.9%*	*66.9%*	*57.9%*
Somalia	*98.7%*	*96.1%*	*91.8%*	*Gabon*	*79.3%*	*68.3%*	*57.5%*
Bosnia and Herzegovina	*97.1%*	*95.9%*	*91.6%*	*Canada*	*75.1%*	*65.5%*	*56.9%*
Moldova	*97.4%*	*95.7%*	*91.5%*	*Costa Rica*	*83.0%*	*69.6%*	*56.1%*
Bulgaria	*97.2%*	*95.6%*	*91.2%*	*Kuwait*	*90.9%*	*75.1%*	*54.8%*
Lesotho	*95.1%*	*94.1%*	*91.2%*	*Solomon Islands*	*79.0%*	*64.5%*	*54.2%*
Turkmenistan	*96.3%*	*94.5%*	*91.1%*	*Panama*	*76.9%*	*63.6%*	*53.2%*
Ghana	*98.2%*	*95.9%*	*90.3%*	*Cambodia*	*81.0%*	*63.0%*	*52.2%*
Serbia and Montenegro	*96.8%*	*94.4%*	*90.0%*	*Mexico*	*80.2%*	*64.2%*	*51.3%*
Belarus	*97.2%*	*95.2%*	*89.6%*	*East Timor*	*75.5%*	*61.6%*	*50.7%*

The detailed brain drain estimates for the 192 countries in our sample for 1990 and 2000 are given in the appendix Table A1. Figures 2.1 to 2.3 plot the uncorrected and corrected skilled emigration rates. The correlations between the corrected and the uncorrected measures are extremely high. Simple OLS regressions results gives an R^2 comprised between 97.75 and 99.66 percent:

$$m_i^{12} = 0.9613 \times m_i^0 - 0.0068 \quad (R^2 = 0.9966)$$

$$m_i^{18} = 0.9093 \times m_i^0 - 0.0089 \quad (R^2 = 0.9895)$$

$$m_i^{22} = 0.8386 \times m_i^0 - 0.0111 \quad (R^2 = 0.9775)$$

Finally, Table 6 focuses on the countries most affected by the brain drain (in relative terms, or brain drain intensity). The left panel reports the results for countries with population above .25 million while the right panel reports results for countries with population above 4 million. The brain drain appears to be very strong in small countries, with emigration rates as high as 80 percent in some Pacific or Carribean islands. Controlling for age of entry does not significantly affect the rankings, as may be seen from Table 6.
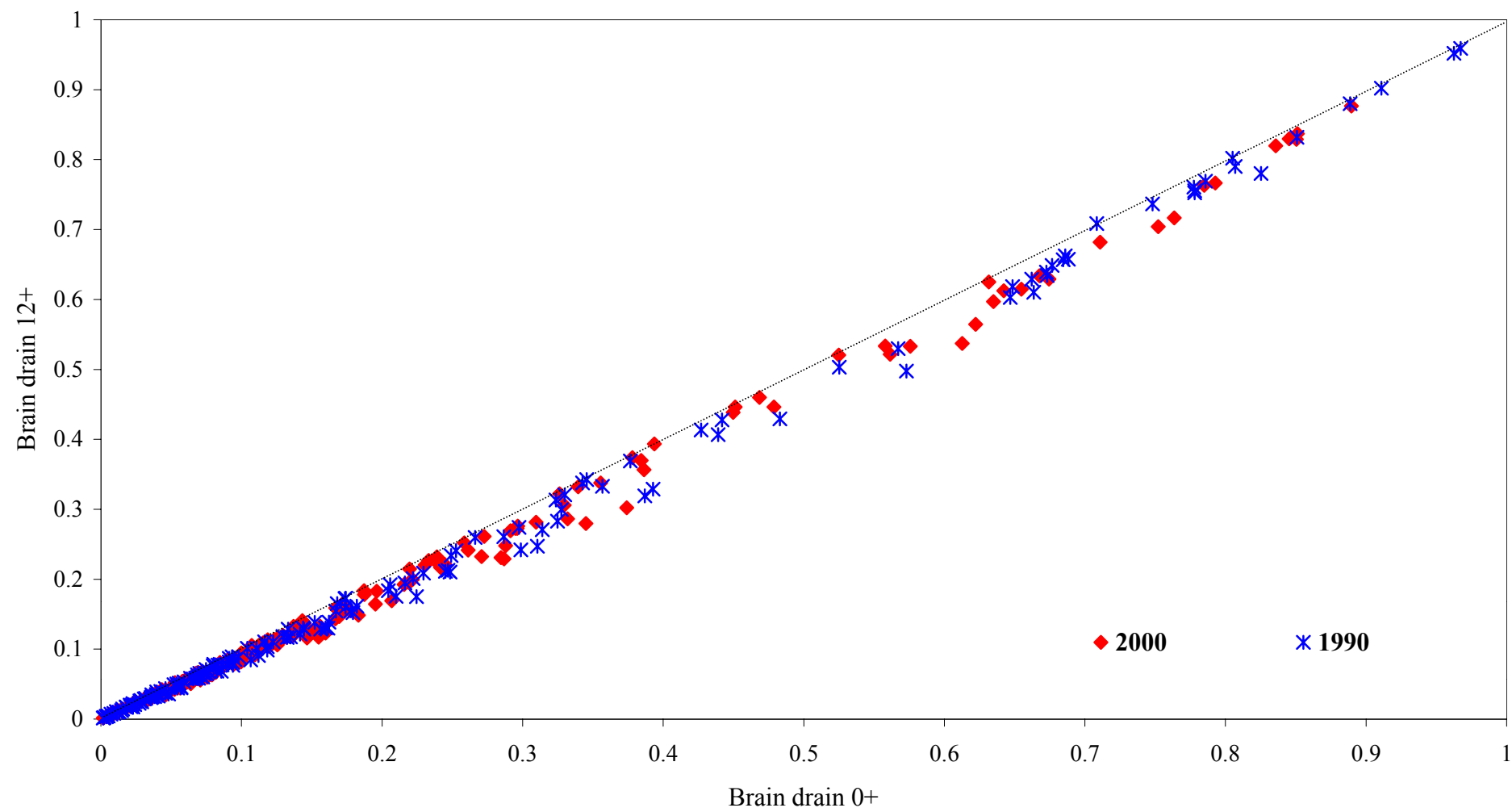
Figure 2.1. Brain drain 0+ and 12+

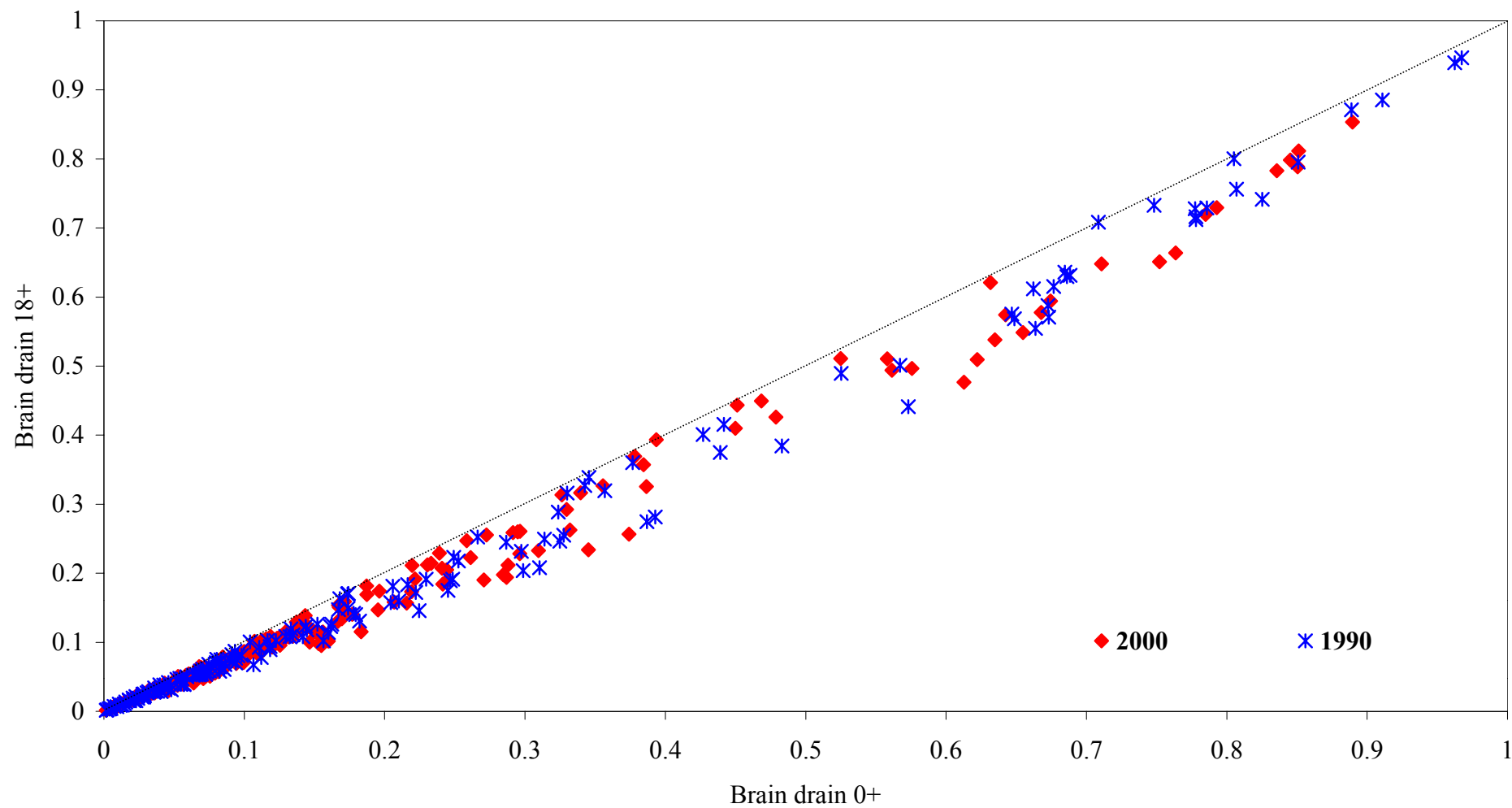Figure 2.2. Brain drain 0+ and 18+
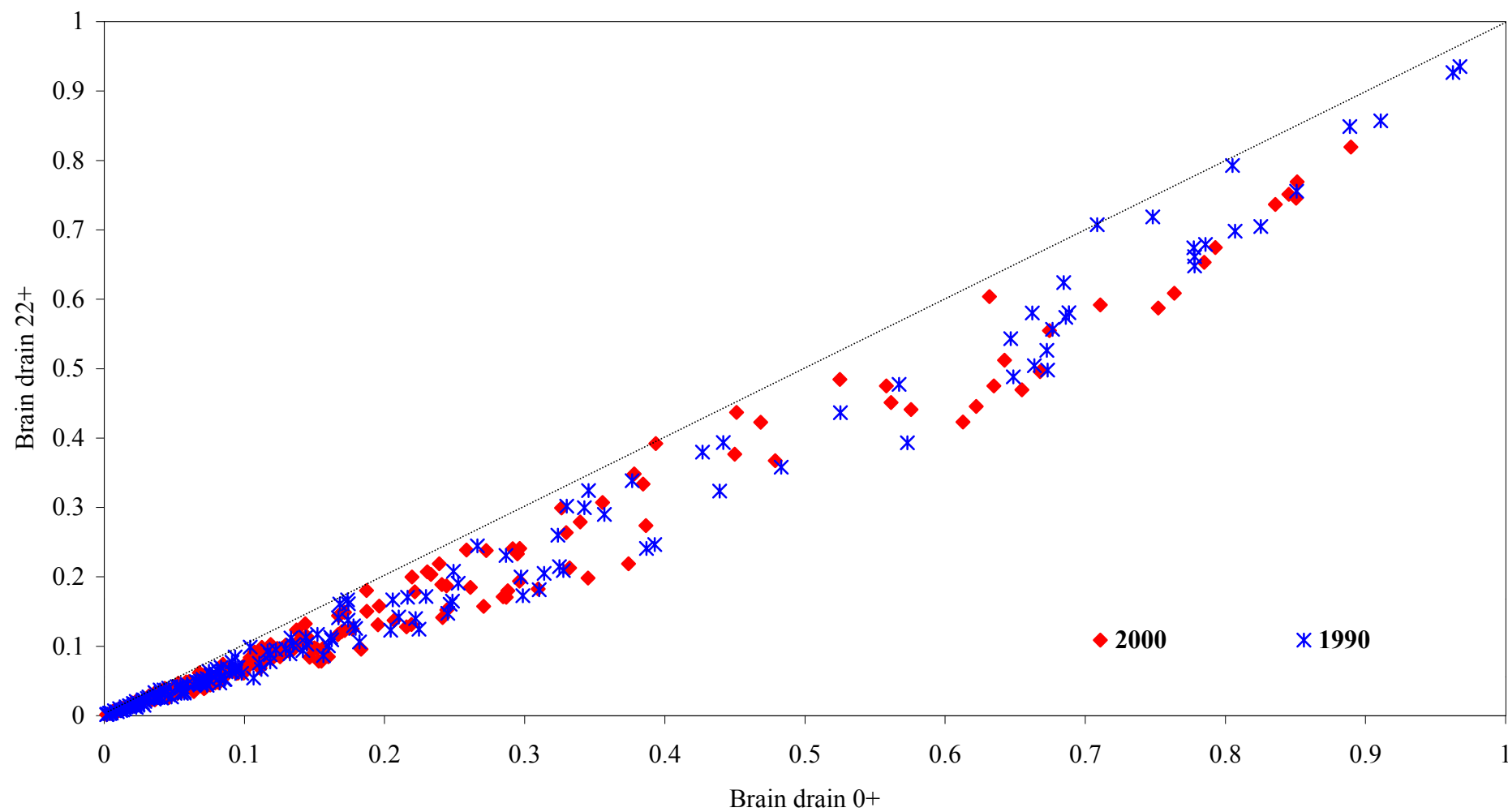
Figure 2.3. Brain drain 0+ and 22+

Table 6. Most affected countries - Various definitions

Population above 0.25 million				Population above 4 million							
Country	m0+	Country	m22+	Country	m0+	Country	m12+	Country	m18+	Country	m22+
Guyana	89.0%	Guyana	81.9%	Haiti	83.6%	Haiti	82.0%	Haiti	78.3%	Haiti	73.7%
Jamaica	85.1%	Jamaica	74.6%	Sierra Leone	52.5%	Sierra Leone	52.1%	Sierra Leone	51.1%	Sierra Leone	48.4%
Haiti	83.6%	Haiti	73.7%	Ghana	46.8%	Ghana	46.0%	Ghana	44.9%	Mozambique	43.7%
Trinidad and Tobago	79.3%	Trinidad and Tobago	67.5%	Mozambique	45.1%	Mozambique	44.6%	Mozambique	44.4%	Ghana	42.3%
Cape Verde	67.4%	Gambia	60.4%	Kenya	38.4%	Kenya	37.0%	Kenya	35.7%	Kenya	33.4%
Barbados	63.5%	Cape Verde	55.5%	Laos	37.4%	Uganda	33.7%	Uganda	32.7%	Uganda	30.7%
Gambia, The	63.2%	Sierra Leone	48.4%	Uganda	35.6%	Somalia	32.2%	Somalia	31.4%	Somalia	29.9%
Fiji	62.2%	Barbados	47.5%	Angola	33.0%	Angola	30.6%	Angola	29.2%	Angola	26.4%
Bahamas	61.3%	Mauritius	45.1%	Somalia	32.6%	Laos	30.2%	Sri Lanka	26.1%	Sri Lanka	24.1%
Malta	57.6%	Fiji	44.5%	El Salvador	31.0%	El Salvador	28.1%	Laos	25.7%	Rwanda	23.9%
Mauritius	56.1%	Malta	44.1%	Sri Lanka	29.6%	Sri Lanka	27.6%	Rwanda	24.7%	Laos	21.9%
Sierra Leone	52.5%	Mozambique	43.7%	Nicaragua	29.6%	Nicaragua	27.3%	El Salvador	23.3%	Afghanistan	20.4%
Suriname	47.9%	Bahamas	42.3%	Hong Kong	28.8%	Rwanda	25.2%	Nicaragua	22.8%	Nicaragua	19.4%
Ghana	46.8%	Ghana	42.3%	Cuba	28.7%	Hong Kong	24.8%	Afghanistan	21.5%	Croatia	18.9%
Mozambique	45.1%	Liberia	37.7%	Papua New Guinea	28.5%	Vietnam	23.2%	Hong Kong	21.2%	El Salvador	18.3%
Liberia	45.0%	Suriname	36.7%	Vietnam	27.1%	Papua New Guinea	23.1%	Croatia	20.7%	Malawi	18.0%
Lebanon	38.6%	Kenya	33.4%	Rwanda	25.8%	Cuba	22.9%	Papua New Guinea	19.8%	Hong Kong	18.0%
Kenya	38.4%	Uganda	30.7%	Honduras	24.4%	Afghanistan	22.7%	Cuba	19.4%	Papua New Guinea	17.1%
Laos	37.4%	Somalia	29.9%	Guatemala	24.2%	Honduras	22.2%	Vietnam	19.0%	Cuba	17.0%
Uganda	35.6%	Eritrea	27.9%	Croatia	24.1%	Croatia	22.1%	Honduras	18.9%	Vietnam	15.8%
Eritrea	34.0%	Lebanon	27.4%	Afghanistan	23.3%	Guatemala	21.7%	Guatemala	18.4%	Honduras	15.2%
Cyprus	33.2%	Angola	26.4%	Dominican Republic	21.6%	Dominican Republic	19.2%	Malawi	18.2%	Togo	15.0%
Angola	33.0%	Sri Lanka	24.1%	Portugal	19.5%	Malawi	18.4%	Togo	16.9%	Zambia	14.5%
Somalia	32.6%	Macedonia	24.1%	Togo	18.7%	Togo	17.8%	Dominican Republic	15.7%	Slovakia	14.4%
El Salvador	31.0%	Rwanda	23.9%	Malawi	18.7%	Portugal	16.4%	Slovakia	15.4%	Guatemala	14.1%
Sri Lanka	29.6%	Ireland	23.3%	Cambodia	18.3%	Slovakia	15.9%	Zambia	15.1%	Portugal	13.1%
Nicaragua	29.6%	Bosnia Herzegovina	21.9%	Senegal	17.7%	Zambia	15.7%	Portugal	14.7%	Dominican Republic	12.8%
Ireland	29.5%	Laos	21.9%	Cameroon	17.2%	Cameroon	15.5%	Cameroon	14.6%	Senegal	12.5%
Macedonia	29.1%	Cyprus	21.3%	Morocco	17.0%	Senegal	15.5%	Senegal	14.1%	Serbia Montenegro	12.3%
Hong Kong	28.8%	Afghanistan	20.4%	Zambia	16.8%	Cambodia	14.8%	Morocco	13.4%	Cameroon	12.3%

5   Concluding remarks

Recent data sets on international skilled migration define skilled migrants according to education level independently of whether education has been acquired in the home or in the host country. This leads to evaluations of the magnitude of the brain drain that must be seen as upper bound estimates as well as to possible spurious cross-country variation in skilled emigration rates. In this paper we use immigrants' age of entry as a proxy for where education has been acquired. Data on age of entry are available from a subset of receiving countries which together represent more than three-quarters of total skilled immigration to the OECD. Using these data and a simple gravity model, we estimate the age-of-entry structure of skilled immigration to the other OECD countries. This allows us to propose alternative measures of the brain drain by defining skilled immigrants as those who left their home country after age 12, 18 or 22. The corrected skilled emigration rates are obviously lower than thoses calculated without age-of-entry restrictions. However, the correlation between the corrected and uncorrected rates is extremely high and the rankings of the countries with the highest brain drain intensities are very similar with and without correction for age of entry. This should mitigate concerns about children migration possibly leading to cross-sectional biases in the brain drain estimates and, consequently, about potential biases in the estimation of the growth effects of the brain drain using uncorrected data (Beine et al., 2006).

6   References

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7   Appendix

Table A1 gives 4 alternatives measures of the brain drain for 192 countries in 1990 and 2000. The columns "brain drain 0+" are taken from Docquier and Marfouk (2006). The other columns correct for emigrants arrived before ages 12, 18 and 22. Countries are ranked by alphabetical order.

Table A1. Alternative brain drain rates

Country	Brain drain 0+		Brain drain 12+		Brain drain 18+		Brain drain 22+	
	1990	2000	1990	2000	1990	2000	1990	2000
Afghanistan	13.3%	23.3%	12.8%	22.7%	11.9%	21.5%	11.2%	20.4%
Albania	17.4%	14.3%	17.3%	14.1%	17.1%	13.9%	16.1%	13.2%
Algeria	7.2%	9.4%	6.0%	7.8%	5.4%	6.9%	4.7%	6.1%
Andorra	2.3%	6.9%	1.7%	5.8%	1.5%	5.4%	1.2%	4.6%
Angola	4.6%	33.0%	4.4%	30.6%	4.2%	29.2%	4.0%	26.4%
Antigua and Barbuda	64.9%	66.8%	61.8%	63.4%	56.8%	57.8%	48.8%	49.6%
Argentina	3.6%	2.5%	3.2%	2.1%	2.9%	2.0%	2.7%	1.8%
Armenia	-	9.0%	-	8.5%	-	7.8%	-	7.1%
Australia	2.1%	2.7%	1.8%	2.3%	1.6%	2.2%	1.5%	2.0%
Austria	16.2%	13.5%	13.8%	11.8%	12.6%	10.9%	10.9%	9.6%
Azerbaijan	-	2.0%	-	1.9%	-	1.9%	-	1.8%
Bahamas, The	57.3%	61.3%	49.8%	53.7%	44.1%	47.7%	39.3%	42.3%
Bahrain	4.3%	4.9%	3.8%	4.3%	3.4%	3.9%	3.0%	3.5%
Bangladesh	2.1%	4.3%	2.0%	4.2%	1.9%	4.0%	1.7%	3.6%
Barbados	67.3%	63.5%	63.9%	59.7%	58.8%	53.8%	52.6%	47.5%
Belarus	-	3.2%	-	3.1%	-	3.0%	-	2.9%
Belgium	4.6%	4.9%	3.7%	4.0%	3.4%	3.6%	3.0%	3.2%
Belize	67.3%	65.5%	63.4%	61.5%	57.1%	54.8%	49.8%	47.0%
Benin	7.3%	11.3%	6.4%	10.2%	5.7%	9.2%	4.4%	7.7%
Bhutan	0.7%	0.6%	0.7%	0.6%	0.7%	0.6%	0.7%	0.6%
Bolivia	6.4%	5.8%	5.8%	5.3%	5.2%	4.8%	4.4%	4.0%
Bosnia and Herzegovina	-	23.9%	-	23.2%	-	22.9%	-	21.9%
Botswana	2.2%	3.6%	2.0%	3.0%	1.8%	2.7%	1.6%	2.3%
Brazil	1.5%	2.3%	1.4%	2.1%	1.4%	2.0%	1.3%	1.9%
Brunei	22.9%	15.6%	20.9%	13.3%	19.1%	11.5%	17.2%	9.7%
Bulgaria	4.0%	6.8%	3.9%	6.6%	3.8%	6.5%	3.7%	6.2%
Burkina Faso	1.5%	2.6%	1.2%	2.2%	1.1%	2.0%	1.0%	1.8%
Burma (Myanmar)	4.3%	4.0%	3.9%	3.8%	3.8%	3.7%	3.7%	3.6%
Burundi	9.5%	8.5%	8.5%	8.1%	8.1%	7.9%	7.0%	7.4%
Cambodia	15.6%	18.3%	12.8%	14.8%	10.2%	11.5%	8.6%	9.6%
Cameroon	13.2%	17.2%	11.7%	15.5%	10.8%	14.6%	8.9%	12.3%
Canada	4.8%	4.6%	3.6%	3.5%	3.1%	3.0%	2.7%	2.6%
Cape Verde	56.7%	67.4%	53.0%	62.9%	50.1%	59.4%	47.7%	55.5%
Central African Republic	4.1%	7.1%	3.3%	5.6%	2.8%	4.7%	2.5%	4.1%
Chad	2.2%	2.4%	1.8%	2.1%	1.5%	1.9%	1.4%	1.7%
Chile	6.7%	6.1%	5.9%	5.3%	5.3%	4.8%	4.8%	4.3%
China	3.1%	3.8%	2.9%	3.6%	2.7%	3.3%	2.5%	3.1%
China, Hong Kong SAR	32.5%	28.8%	28.3%	24.8%	24.6%	21.2%	21.5%	18.0%
China, Macao SAR	20.6%	14.4%	19.2%	13.3%	18.1%	12.5%	16.7%	11.4%
Colombia	9.1%	10.4%	8.1%	9.4%	7.3%	8.5%	6.3%	7.4%
Comoros	9.8%	21.9%	8.9%	19.5%	8.1%	17.3%	6.1%	13.1%
Congo, Dem. Rep. of the	21.0%	13.7%	17.5%	11.9%	16.0%	11.2%	14.2%	10.3%
Congo, Rep. of the	9.4%	22.2%	8.1%	19.9%	7.7%	19.2%	6.9%	17.8%
Costa Rica	8.3%	7.2%	6.9%	6.0%	5.8%	5.0%	4.7%	4.0%
Cote d'Ivoire	2.9%	5.7%	2.5%	5.0%	2.3%	4.6%	2.1%	4.3%
Croatia	-	24.1%	-	22.1%	-	20.7%	-	18.9%
Cuba	31.0%	28.7%	24.7%	22.9%	20.8%	19.4%	18.2%	17.0%
Cyprus	31.4%	33.2%	27.1%	28.6%	25.0%	26.3%	20.5%	21.3%
Czech Republic	-	10.4%	-	9.6%	-	9.2%	-	8.4%
Denmark	7.1%	7.7%	6.1%	6.7%	5.8%	6.3%	5.0%	5.5%
Djibouti	7.7%	11.0%	6.8%	9.2%	6.3%	8.3%	5.9%	7.5%
Dominica	68.6%	64.2%	66.2%	61.2%	62.9%	57.4%	57.4%	51.2%
Dominican Republic	18.2%	21.6%	16.2%	19.2%	13.1%	15.7%	10.6%	12.8%
East Timor	-	15.5%	-	11.7%	-	9.5%	-	7.9%
Ecuador	5.5%	9.5%	4.7%	8.4%	4.0%	7.3%	3.2%	6.2%
Egypt	5.9%	4.6%	5.3%	4.2%	5.0%	3.9%	4.5%	3.5%
El Salvador	32.8%	31.0%	30.0%	28.1%	25.5%	23.3%	20.9%	18.3%
Equatorial Guinea	1.1%	12.9%	1.1%	12.0%	1.1%	11.5%	1.0%	10.2%
Eritrea	-	34.0%	-	33.2%	-	31.7%	-	27.9%
Estonia	-	11.5%	-	10.8%	-	10.3%	-	9.4%
Ethiopia	8.0%	10.0%	7.6%	9.4%	7.0%	8.7%	6.0%	7.3%
Fiji	66.4%	62.2%	61.0%	56.4%	55.5%	50.9%	50.4%	44.5%
Finland	7.3%	7.5%	6.6%	6.7%	6.2%	6.2%	5.4%	5.3%
France	2.7%	3.4%	2.3%	2.9%	2.1%	2.6%	1.9%	2.4%
Gabon	5.5%	14.7%	4.4%	11.6%	3.9%	10.0%	3.3%	8.4%

Table A1. Alternative brain drain rates

Gambia, The	80.5%	63.2%	80.2%	62.5%	80.0%	62.1%	79.3%	60.4%
Georgia	-	2.3%	-	2.3%	-	2.2%	-	2.1%
Germany	5.7%	5.2%	4.5%	4.3%	3.9%	3.8%	3.3%	3.2%
Ghana	37.7%	46.8%	36.9%	46.0%	36.0%	44.9%	33.9%	42.3%
Greece	14.2%	12.0%	12.2%	10.4%	10.8%	9.3%	9.4%	8.3%
Grenada	77.7%	85.1%	76.1%	83.7%	72.8%	81.2%	67.4%	76.9%
Guatemala	20.4%	24.2%	18.4%	21.7%	15.7%	18.4%	12.3%	14.1%
Guinea	13.5%	11.2%	11.7%	10.6%	11.1%	10.3%	10.1%	9.8%
Guinea-Bissau	9.3%	24.4%	8.9%	21.7%	8.7%	20.5%	8.5%	18.7%
Guyana	91.1%	89.0%	90.2%	87.7%	88.5%	85.4%	85.7%	81.9%
Haiti	78.6%	83.6%	76.9%	82.0%	72.9%	78.3%	67.9%	73.7%
Honduras	22.2%	24.4%	20.1%	22.2%	17.2%	18.9%	14.0%	15.2%
Hungary	14.4%	13.2%	12.8%	11.7%	11.8%	10.8%	10.3%	9.3%
Iceland	24.9%	19.6%	23.4%	18.3%	22.3%	17.4%	20.8%	15.8%
India	2.8%	4.3%	2.7%	4.0%	2.5%	3.9%	2.2%	3.4%
Indonesia	3.9%	2.1%	3.5%	1.8%	3.2%	1.7%	2.8%	1.4%
Iran	25.3%	14.5%	24.1%	13.7%	21.8%	12.2%	19.1%	10.4%
Iraq	8.2%	11.2%	7.5%	10.4%	7.0%	9.7%	6.3%	8.9%
Ireland	35.7%	29.5%	33.3%	27.2%	32.0%	26.0%	29.0%	23.3%
Israel	8.6%	7.9%	6.8%	6.3%	6.1%	5.5%	5.2%	4.7%
Italy	11.2%	10.0%	9.1%	8.2%	7.8%	7.1%	6.7%	6.1%
Jamaica	85.1%	85.1%	83.2%	82.9%	79.5%	78.9%	75.6%	74.6%
Japan	1.3%	1.2%	1.0%	0.9%	0.9%	0.8%	0.8%	0.7%
Jordan	8.6%	7.2%	7.8%	6.5%	6.8%	5.7%	5.3%	4.4%
Kazakhstan	-	1.2%	-	1.2%	-	1.1%	-	1.1%
Kenya	42.7%	38.4%	41.3%	37.0%	40.1%	35.7%	38.0%	33.4%
Kiribati	68.5%	23.1%	65.7%	22.0%	63.6%	21.2%	62.4%	20.7%
Korea	9.4%	5.6%	7.7%	4.4%	7.0%	3.9%	6.4%	3.5%
Kuwait	2.8%	7.1%	2.6%	6.5%	2.1%	5.3%	1.5%	3.9%
Kyrgyzstan	-	0.7%	-	0.7%	0.0%	0.7%	-	0.7%
Laos	29.9%	37.4%	24.2%	30.2%	20.4%	25.7%	17.3%	21.9%
Latvia	-	8.8%	-	7.6%	-	6.6%	-	6.0%
Lebanon	43.9%	38.6%	40.7%	35.6%	37.5%	32.5%	32.4%	27.4%
Lesotho	10.4%	4.3%	10.1%	4.1%	10.1%	4.1%	9.9%	3.9%
Liberia	32.4%	45.0%	31.3%	43.8%	28.9%	41.0%	26.0%	37.7%
Libya	2.3%	2.4%	2.2%	2.3%	2.2%	2.2%	2.0%	2.1%
Lithuania	-	8.6%	-	7.8%	-	7.3%	-	6.7%
Luxembourg	8.9%	8.0%	7.9%	7.1%	7.4%	6.7%	6.6%	5.8%
Macedonia	-	29.1%	-	26.9%	-	25.9%	-	24.1%
Madagascar	5.7%	7.6%	4.6%	6.0%	3.9%	5.1%	3.4%	4.4%
Malawi	16.8%	18.7%	16.5%	18.4%	16.3%	18.2%	16.1%	18.0%
Malaysia	24.7%	11.1%	21.3%	9.5%	18.9%	8.4%	16.1%	6.9%
Maldives	1.2%	1.2%	1.0%	1.0%	0.9%	0.9%	0.7%	0.8%
Mali	8.2%	15.0%	6.9%	12.4%	6.4%	11.5%	5.5%	9.8%
Malta	68.8%	57.6%	65.7%	53.3%	63.1%	49.7%	58.1%	44.1%
Marshall Islands	70.9%	39.4%	70.8%	39.4%	70.8%	39.3%	70.8%	39.2%
Mauritania	2.8%	11.7%	2.6%	10.8%	2.5%	10.5%	2.3%	9.6%
Mauritius	64.7%	56.1%	60.3%	52.2%	57.6%	49.4%	54.3%	45.1%
Mexico	10.7%	15.3%	8.5%	12.3%	6.7%	9.8%	5.4%	7.8%
Micronesia, Federated States of	34.6%	37.8%	34.2%	37.4%	33.9%	36.9%	32.4%	34.8%
Moldova	-	3.6%	-	3.5%	-	3.5%	-	3.3%
Mongolia	0.2%	1.1%	0.2%	1.0%	0.2%	1.0%	0.2%	1.0%
Morocco	21.6%	17.0%	19.5%	14.6%	18.3%	13.4%	17.1%	12.1%
Mozambique	26.6%	45.1%	26.0%	44.6%	25.2%	44.4%	24.5%	43.7%
Namibia	3.2%	3.4%	3.0%	3.1%	2.9%	2.9%	2.7%	2.7%
Nauru	82.5%	34.5%	78.0%	28.0%	74.1%	23.4%	70.5%	19.8%
Nepal	1.8%	5.3%	1.7%	5.2%	1.7%	5.0%	1.4%	4.7%
Netherlands	11.8%	9.6%	9.9%	8.1%	8.9%	7.3%	7.8%	6.5%
New Zealand	16.2%	20.7%	13.0%	16.9%	12.3%	15.8%	11.3%	13.7%
Nicaragua	29.7%	29.6%	27.4%	27.3%	23.2%	22.8%	20.0%	19.4%
Niger	6.6%	6.0%	5.7%	5.4%	5.3%	5.0%	4.9%	4.7%
Nigeria	8.0%	10.7%	7.8%	10.5%	7.5%	10.2%	6.7%	9.2%
Norway	6.9%	6.5%	5.8%	5.6%	5.4%	5.2%	4.6%	4.4%
Occupied Palest. Territory	7.5%	7.2%	7.1%	6.8%	6.8%	6.5%	6.4%	6.0%
Oman	0.4%	0.6%	0.4%	0.6%	0.4%	0.5%	0.4%	0.5%
Pakistan	6.9%	12.6%	6.3%	11.6%	5.8%	10.8%	5.0%	9.4%
Palau	88.9%	26.1%	88.0%	24.1%	87.1%	22.3%	84.9%	18.5%

Table A1. Alternative brain drain rates

Panama	22.5%	16.0%	17.5%	12.3%	14.6%	10.2%	12.5%	8.5%
Papua New Guinea	38.7%	28.5%	31.9%	23.1%	27.5%	19.8%	24.1%	17.1%
Paraguay	3.6%	3.9%	3.1%	3.4%	2.8%	3.1%	2.4%	2.7%
Peru	5.6%	5.8%	5.1%	5.4%	4.7%	4.9%	4.1%	4.3%
Philippines	13.0%	13.7%	11.8%	12.6%	10.9%	11.6%	9.7%	10.3%
Poland	14.4%	14.1%	13.1%	13.0%	12.3%	12.2%	11.3%	11.2%
Portugal	16.0%	19.5%	13.1%	16.4%	11.4%	14.7%	10.1%	13.1%
Qatar	1.8%	2.5%	1.7%	2.3%	1.6%	2.1%	1.4%	1.9%
Romania	9.1%	11.9%	8.7%	11.4%	8.2%	10.8%	7.7%	10.2%
Russia	-	1.5%	-	1.4%	-	1.3%	-	1.3%
Rwanda	17.4%	25.8%	16.0%	25.2%	14.9%	24.7%	13.8%	23.9%
Saint Kitts and Nevis	77.8%	78.5%	75.5%	76.3%	71.2%	72.0%	64.8%	65.3%
Saint Lucia	67.7%	71.1%	64.9%	68.2%	61.5%	64.8%	55.7%	59.2%
Saint Vincent & Grenadines	80.7%	84.5%	79.0%	83.0%	75.6%	79.8%	69.8%	75.1%
Samoa	96.7%	76.4%	95.9%	71.7%	94.7%	66.4%	93.5%	60.9%
San Marino	33.0%	17.1%	32.1%	16.4%	31.6%	15.9%	30.2%	14.9%
Sao Tome and Principe	3.6%	22.0%	3.5%	21.5%	3.4%	21.2%	3.3%	20.0%
Saudi Arabia	0.9%	0.9%	0.8%	0.8%	0.7%	0.7%	0.6%	0.6%
Senegal	12.2%	17.7%	11.0%	15.5%	10.3%	14.1%	9.5%	12.5%
Serbia and Montenegro	-	13.7%	-	13.3%	-	12.9%	-	12.3%
Seychelles	66.2%	55.8%	62.9%	53.3%	61.2%	51.0%	58.0%	47.5%
Sierra Leone	34.3%	52.5%	33.8%	52.1%	32.7%	51.1%	30.0%	48.4%
Singapore	24.8%	15.2%	21.0%	12.7%	19.1%	11.4%	16.5%	9.7%
Slovakia	-	16.7%	-	15.9%	-	15.4%	-	14.4%
Slovenia	-	11.5%	-	10.9%	-	10.5%	-	9.5%
Solomon Islands	39.3%	6.4%	32.9%	5.0%	28.1%	4.1%	24.6%	3.5%
Somalia	17.4%	32.6%	17.2%	32.2%	17.0%	31.4%	16.7%	29.9%
South Africa	11.8%	7.5%	10.3%	6.5%	9.4%	5.9%	8.8%	5.5%
Spain	3.8%	4.3%	3.2%	3.7%	2.9%	3.4%	2.6%	3.1%
Sri Lanka	28.7%	29.6%	26.1%	27.6%	24.5%	26.1%	23.1%	24.1%
Sudan	5.2%	7.0%	4.9%	6.6%	4.6%	6.3%	4.2%	5.9%
Suriname	52.5%	47.9%	50.3%	44.6%	48.9%	42.6%	43.7%	36.7%
Swaziland	0.2%	0.5%	0.2%	0.4%	0.2%	0.4%	0.1%	0.4%
Sweden	4.0%	4.3%	3.4%	3.8%	3.2%	3.6%	2.7%	3.2%
Switzerland	7.6%	8.9%	6.7%	7.8%	6.4%	7.4%	5.8%	6.6%
Syria	7.0%	6.1%	6.6%	5.7%	6.1%	5.3%	5.3%	4.6%
Taiwan	15.2%	12.7%	13.8%	11.6%	12.6%	10.5%	11.7%	9.7%
Tajikistan	-	0.4%	-	0.4%	-	0.4%	-	0.4%
Tanzania	11.6%	12.3%	11.1%	11.4%	10.3%	10.6%	9.3%	9.7%
Thailand	2.4%	2.4%	2.1%	2.1%	1.9%	1.9%	1.6%	1.7%
Togo	11.1%	18.7%	10.1%	17.8%	9.3%	16.9%	7.5%	15.0%
Tonga	96.2%	75.2%	95.2%	70.4%	93.9%	65.1%	92.7%	58.8%
Trinidad and Tobago	77.8%	79.3%	75.2%	76.6%	71.6%	73.0%	66.1%	67.5%
Tunisia	17.8%	12.6%	15.5%	10.6%	14.2%	9.6%	12.9%	8.5%
Turkey	8.3%	5.8%	7.7%	5.4%	7.4%	5.2%	6.9%	4.9%
Turkmenistan	-	0.2%	-	0.2%	-	0.2%	-	0.2%
Tuvalu	74.8%	27.3%	73.7%	26.1%	73.3%	25.5%	71.9%	23.8%
Uganda	44.2%	35.6%	42.8%	33.7%	41.5%	32.7%	39.3%	30.7%
Ukraine	-	3.6%	-	3.4%	-	3.3%	-	3.1%
United Arab Emirates	0.4%	1.0%	0.3%	0.9%	0.3%	0.8%	0.3%	0.7%
United Kingdom	17.9%	16.7%	15.2%	14.3%	14.0%	13.0%	12.6%	11.7%
United States	0.5%	0.5%	0.4%	0.4%	0.4%	0.4%	0.4%	0.3%
Uruguay	6.9%	8.1%	6.0%	7.0%	5.3%	6.2%	4.6%	5.3%
Uzbekistan	-	0.7%	-	0.7%	-	0.7%	-	0.6%
Vanuatu	48.3%	8.2%	42.9%	6.7%	38.4%	5.8%	35.8%	4.7%
Venezuela	3.7%	3.4%	3.3%	3.0%	2.9%	2.7%	2.6%	2.3%
Vietnam	24.5%	27.1%	21.1%	23.2%	17.5%	19.0%	14.7%	15.8%
Yemen	5.4%	6.0%	5.0%	5.7%	4.8%	5.4%	4.2%	4.9%
Zambia	16.7%	16.8%	15.5%	15.7%	14.7%	15.1%	14.1%	14.5%
Zimbabwe	7.5%	12.7%	6.5%	11.3%	5.9%	10.3%	5.1%	8.9%