Assessing the South African Brain Drain
A statistical comparison

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Introduction

The brain drain has been a highly discussed, sensitive and controversial issue in South Africa during the past decade. While everyone agrees that there is indeed a brain drain problem, there is little agreement on its dimensions, its causes and its remedies. This paper deals directly with the first of these three points, thus hoping to bring light to both the second and the third.

The accuracy of the official statistics on the extent of emigration from South Africa, particularly skilled people, has been increasingly questioned by journalists and academics. Doubts arose in the mid-90s as empirical findings indicated that the departures were far higher than the data published by Central Statistical Services indicated[1]. These studies were based on data from embassies or removal companies which showed that more people were leaving than the statistics indicated. This evidence was later confirmed by statistical comparison between South African emigration data and South African registered immigration to countries such as Australia, New Zealand and the UK. (Kaplan 1997). This Immigration data was approximately 3 times higher than South Africa's emigration data. (Fourie and Soubert 1998)

That the SA data is underestimating the extent of emigration is now widely accepted. It has been acknowledged by the Department of Home Affairs as well as by the Central Statistical Services (now Statistics South Africa). Both are aware that their records can only take into account the registered emigrants, those who declare themselves as such when crossing the border at the exit[2]. However, there has not yet been a systematic assessment with more reliable data. This absence of statistical ground has left the debate open to speculative arguments, a situation which is unfortunately not sound for good policy decision.

This working paper precisely addresses this issue: it is a systematic comparison of South African emigration official data with those of other countries. The time period, the number of countries and the disaggregation of data in detailed categories allows an in depth quantitative analysis of the brain drain phenomenon. Without pretending to be a definite closure to the debate, it provides a much more realistic basis for discussion than the one that prevailed up to now.

The paper not only aims at showing the results of this comparison. It extensively describes how these results have been obtained.

Two different ways of dealing with the data, each with a specific objective, have been used and are presented here. The first method measures the discrepancies between SA and other countries' data. The second estimates the realistic outflows of skilled South Africans. Their results are complementary: they converge in giving more realistic dimensions of the flows though their contents differ marginally. A description of the data precedes the explanations about both methods, which are followed by a presentation of the main results. The paper is thus divided into 4 different parts: confronting the data, assessing the discrepancy, estimating the brain drain, and correcting the picture.

1. Confronting Data

The objective of this study is: to check whether the emigration figures (especially for highly skilled) are incorrect, to assess how much they are incorrect by and to make more realistic estimations of the extent of the brain drain. The most effective way to do this empirical task is to compare South African data with other countries' data.

[1] Doubts began as early as in 1992 and have not stopped ever since. See for instance: 'Moving in, moving out', Sunday Times Oct 25 1992; 'HSRC report airs fears of exodus by disgruntled white SA youth' Business Day Jan 11 1993; 'Brain drain a myth: official statistics at odd with exodus claims' The Star July 9 1993; 'Where have all the doctors gone?' Cape Argus Dec 20 1995; 'New Brain Drain gives business a headache' Sunday Times Sept 15 1996; 'Exodus as Rainbow Nation iridescence fades' Financial Mail Oct 25 1996; 'Brain Drain highest in decades' Cape Times June 13 1997

[2] 'Exodus as Rainbow Nation iridescence fades' Financial Mail Oct 25 1996; 'Brain Drain highest in decades' Cape Times June 13 1997

Official emigration figures were taken from various documents of Statistics South Africa. These figures were compared to immigration figures from SA to other countries, as recorded by their own agencies[3]. Department of Immigration and Multicultural Affairs of Australia, Citizenship and Immigration Canada, Statistics New Zealand, Immigration, Research and Statistics Service of the United Kingdom, United States Department of Justice, Immigration and Naturalization Service

Data was collected from 7 countries: United Kingdom (UK), United States of America (US), Australia (AU), Canada (CA), New Zealand (NZ), Israel and France. The last two countries were dropped for technical reasons: the statistical series were less precise, sometimes shorter, sometimes discontinuous or mixing several years, with small figures, which made them difficult to compare systematically with the 5 others. However, what the figures from both countries indicate is consistent with the other countries findings, namely that the SA statistics are underscoring the extent of the emigration and the other countries figures are significantly higher than the SA ones.

Categories were quite comparable across countries though they did have small differences. They all referred to immigrants entering the country some of them qualifying the origin of the migrant (US, country of birth) whereas others referred to the last country of residence before immigration (Canada, for instance). This question of a non-universal definition of the migrant is inherent to the study of migration and has been reported extensively in the literature. We assume here that this should not affect the bulk of the data, i.e. most of the people recorded should be altogether born in SA and having been officially resident in this country before departure.

With regards to socio-professional categories SSA occupational breakdown was taken as the reference. Thus, the "active population" includes various categories of which those we define as "highly skilled" are the "professionals, semi-professionals and technical occupations" and the "managerial, executive and administrative occupations". Hereafter in the paper both categories are referred to as "professionals" and "managers", respectively. The former –which is the most important of both highly skilled categories- includes "architects, engineers and technicians; natural science; medical, dental and related health; education and related, humanities and related, accountant and related, art, sport and entertainment". The most disaggregated data that we received from our foreign sources were always easy to re-aggregate and recombine in a manner that would fit with the SA classification. Therefore, the comparisons made in this paper do bear on homogenous statistical objects, thanks to the uniformity of their statistical systems shaped by a common Anglo-Saxon tradition.

However, the data was not complete for all the years, all the categories and all the countries. The UK detailed data per category were missing. The US's data was just available for one year. Australia's were missing for some years and limited to broad categories. Canada and New Zealand had a more detailed and complete set. In any case, to get a more general picture, calculations were necessary with occasional extrapolations and interpolations.

The 5 countries studied absorb 3/4 of SA emigrants, according to SSA (79% before 1994 and 71% after, exactly). It is thus relevant to focus on these as they surely represent the largest part of the migrating population from this country. However, it is impossible to establish the exact proportion of these 5 countries among all those which receive SA citizens. The SSA figures' distribution among the 5 countries slightly differs from the one and obtained the very countries data (see table 1). If this distribution is different from the SSA one, then the proportion they represent of all the receiving countries may also be different. However, in absence of the other countries' data, there is no way to check this and the percentage inferred from the SSA is most reliable and operational.

Foreign data is more reliable than South African data. - first, because the reasons why the emigrants would not declare themselves at the exit do not prevail where they enter; second because it is almost impossible to enter illegally in a country through airports (air is obviously the transportation used here); third because, when it turns to highly skilled formal positions, illegal work is absent or exceptional. We may be sure, therefore, that the SA skilled immigrants in these countries are registered immigrants and counted in their statistics. However, if may happen that some professionals do enter one of these countries under a different status and settle afterwards. This is not an exceptional case in the US, where transitory though rather long-

[3] Department of Immigration and Multicultural Affairs of Australia, Citizenship and Immigration Canada, Statistics New Zealand, Immigration, Research and Statistics Service of the United Kingdom, United States Department of Justice, Immigration and Naturalization Service

term work permits are delivered to some visa holders. In that sense, the brain drain evaluation that is done here cannot reflect all the dimensions of the outflows. It refers only to the official permanent immigration, which is what is usually referred to when dealing with the brain drain.

Table 1: Percentage of each of the 5 major receiving countries

Countries	1990 - 96
SSA-UK	41
UK	**50**
SSA-US	11.5
US	**15.5**
SAA-AU	24
AU	**15**
SSA-CA	10.5
CA	**10.5**
SSA-NZ	12.5
NZ	**9**

Note: Percentage in the SSA statistics and in the other countries statistics (in bold) for various reasons

2. Assessing the discrepancy

The second task was to assess the discrepancy between SA and foreign data, over time and across countries. Only the years and countries for which the data was quite complete have been taken into consideration here: namely the years for which figures - both SSA and others - are given for a majority of these countries.

2.1. Data sets at the overall and detailed levels

This led to a selection of the period running from 1989 to 1997, for overall migration figures. SAA figures for 1993 per country were absent and this year was not therefore taken into account. This gives 2 distinct four years periods: before and after the change of government (see appendix 1).

With detailed figures (active population, professionals, managers), the period 1991-97 was chosen for AU, NZ, CA (excluding 1991). Data was indeed not available for the majority of the countries in 1989 and 1990. UK detailed data is not available at all and US data only for 1996. This country's year was taken into account as a witness, an additional checking element to confirm trends or results identified through the other 3 countries (see appendix 1).

Then, the figures for the highly qualified population, composed of both the professional and managerial occupations, are compared.

2.2 Discrepancies of the overall emigration data

To get a comprehensive understanding of the data and their comparison, a "rate of coverage" was constructed. It indicates in percentage how much of the 5 countries recorded SA immigration is covered by the SSA emigration data. For instance, if the SSA emigration figures to the UK is 1420 in 1989 and the UK figures indicate a SA immigration of 11700 for the same year, the rate of coverage of UK figures by SA figures is 12%.

Table 2: Rate of coverage per country and year (%) - overall emigration

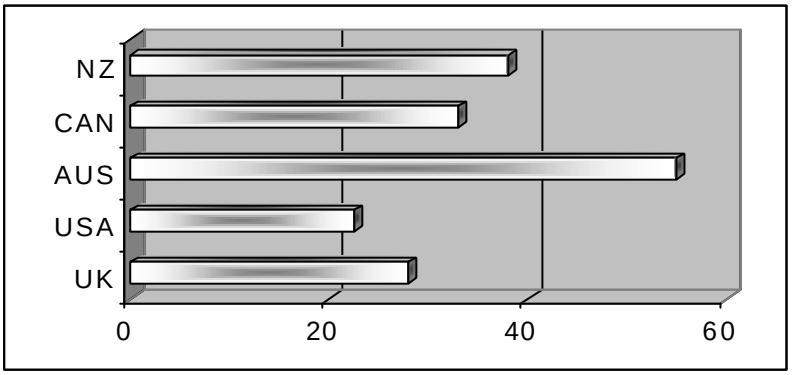
	1989	1990	1991	1992	1994	1995	1996	1997
UK	12	28	22.5	29	35.5	48.5	19.5	
US	11	14	16.5	12.5	35	34.5	32.5	
AU		62	73	68	46.5	47	55	35
CA	29	32	26	25	32.5	39	50.5	29.5
NZ	28.5	31.5	22.5	30	55.5	46	48	43

The rate of coverage may vary a lot from year to year and country to country: the range is from 11% (US 1989) to 73% (AU 1992).

However, 2 points may be emphasised:

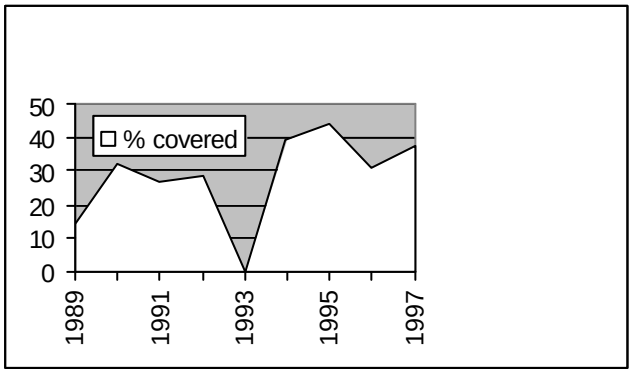
- over the whole period, the rate of coverage is much better for some countries than for others
- the rate of coverage improves over the period. It is significantly better post 1994 than pre 1994.

Figure 1: Rate of coverage per country (1989-97 overall migration)



The rate of coverage per period pre or post 1994 is calculated by including every year from 1989 to 1997 (excluding 1993) and taking into account only the countries that have figures available for these years. We therefore have two 4 year periods, before and after 1994, with the following results: average rate of coverage for the first period is of 24.5%; for the second, 37.5% and for the whole 1989-97 period 31.5%.

Figure 2: Rate of coverage before and after 1994

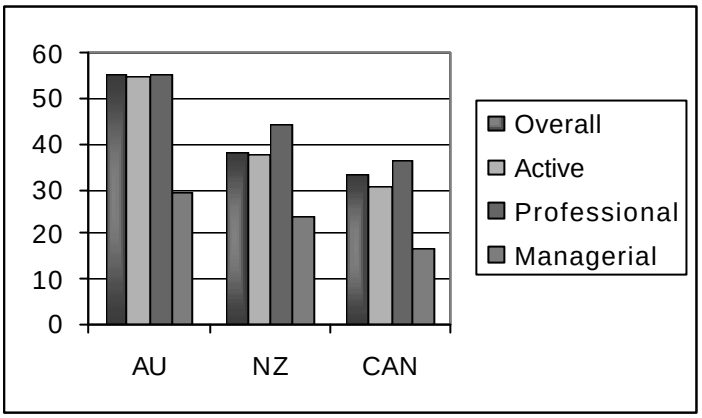


2.3 Discrepancies of the detailed emigration data

In the absence of detailed figures from the UK, it was necessary to look at the other countries' data and compare the discrepancies at the detailed levels to the ones at the overall level. This would show whether the discrepancies were similar or not and whether consequently the proportions at one level would be -or not- representative of what they were at another level.

On the overall period the rate of coverage of SA data by the other countries data is quite similar at 3 different levels: overall migration, active population and professionals.

Figure 3: Rate of coverage per category of emigrants (1989-97)



In contrast, the managerial population has a much lower rate of coverage. For some reason, many emigrants registered as managers in the country of destination do not declare themselves as such when leaving SA. There may be 2 explanations: either their number is understated at point of departure (managers hiding they leave) or overstated at point of arrival (people claiming a higher status for admission).

Interestingly, the professional population is covered to the same extent as the 2 other larger populations of which it is part. Its rate of coverage even tends to be slightly better.

The US data for the only year available (1996) is quite similar to the other countries. The UK data are not available.

When isolating two populations, overall and professionals, the rate of coverage for the latter follows quite closely that of the former, for each of the 3 countries and almost all of the 6 years. Exceptionally, as in 1992, the rate may be significantly different, which suggests that it would be preferable to utilise periods of several years rather than individual years as reference, to flatten accidental variations (see appendix 2).

Considering the similarity of the rate of coverage between populations when data is available, it is assumed that the discrepancy identified at the overall level for the 5 countries may be taken as the reference for the professional population too.

Following these insights, further on, the estimate of professional emigration to the 5 countries is based on the evidence gathered about the overall emigration. If the SSA overall emigration figures for the UK represent 25% of the UK data, we assume that the discrepancy between the two statistical sources at the professional level is also of 25%[4].

4 This could possibly and occasionally lead to slightly overestimate the highly skilled emigration, when the professional population is a little bit better covered than the overall population as shown in the graphs above. However, according to the data gathered on 4 out of the 5 countries, this overestimation should not be in excess of 22% and is very likely to be under 10%.

The same cannot be done with the managerial population as the rate of coverage is significantly lower than any other. This instability of the information explains why the focus, thereafter, is on the professionals and not on the managers.

2.4 Synthetic index of all the discrepancies weighted by country

The weight of each of the 5 countries is determined according to their respective percentage before and after 1994.

Table 3: Proportion of emigrants per country ***(5 major recipient countries' data)***

	1990-92	1994-96
UK	59	44
US	17.5	14
AU	12	17
CA	9	11.5
NZ	2.5	13.5
Total	100	100

The rate of coverage per country and per period is the following:

Table 4: Rate of coverage (RC) per country and per period

	RC pre 94	RC post 94	RC 1989-97
UK	23	34.5	28
US	13.5	34	22.5
AU	67.5	46	55
CA	28	38	33
NZ	28	48	38

This rate of coverage may be converted into a factor of discrepancy (FoD) that indicates the number of times one needs to multiply the original data (from SSA) to get the adjusted ones (from the foreign statistical sources). For example, if the rate of coverage of UK data by the SSA is of 23% in the period before 1994, one needs to multiply the SSA figures by 4.3 to get the UK ones.

The FoD per country is then combined with the relative part of each country, expressed on 1 instead of 100, to obtain an index to be applied to the original figures in order to get the adjusted ones.

Table 5: Factor of discrepancy and index per country pre 94 and post 94

	% pre 1994	FoM pre 94	Index pre 94	% post 1994	FoM post 94	Index post 94
UK	0.59	4.3	2.537	0.44	2.9	1.276
US	0.175	7.4	1.295	0.14	2.9	0.406
AU	0.12	1.5	0.18	0.17	2.2	0.374
CA	0.09	3.6	0.324	0.115	2.6	0.299
NZ	0.025	3.6	0.09	0.135	2.1	0.283
Total	**1 (100%)**		**4.42**	**1 (100%)**		**2.64**

2.5 Checking the difference

The 2 synthetic indeces have now to be applied to the official figures. The SSA figures of professional emigrants from 1989 to 1992 included are of 3721 and have to be multiplied by 4.42 to be adjusted in accordance to the combined sources of information from the other 5 countries. The same has to be done for the period of 1994 to 1997 included for an amount of 7534 with a multiplier of 2.64.

1989-92: 3721 x 4.42 = **16447**

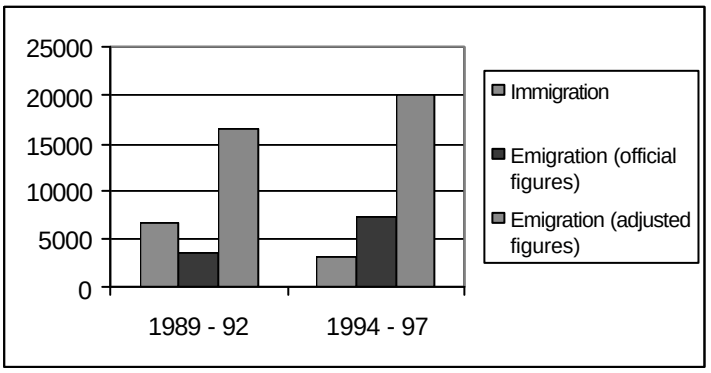
1994-97: 7534 x 2.64 = **19890**

The results need only to be compared to the official figures

Table 6: Comparison of migration, official and adjusted data

Migration of professionals	1989 - 92	1994 - 97
Immigration	6714	3295
Emigration (official figures)	3721	7534
Emigration (adjusted figures)	16447	19890

Figure 4: Comparison of migration figures



3. Estimating the brain drain

The following exercise shifted the emphasis from the evaluation of the discrepancy according to available figures to an estimation of the brain drain through a rational reconstruction of the missing information.

3.1 Overall emigration

The first step was to compile statistics of emigration to the five countries according to the Statistics South Africa (SSA) data for the years 1987-1997. These figures were then compared to the number of South African immigrants to these five countries for the same time-period as received from the countries. The data for overall migration received from the five countries was mostly complete, except for a few years. The figures for 1997 for the UK, 1987 for Canada and 1997 for the US as well as the SSA figures for 1993 were missing.

It was decided to make estimates for the missing years based on the proportions of previous years. For example for the UK it was assumed that the 1997 figure was the same proportion of the SSA data as the1996 figure (see table 7).

$$\frac{11400}{2243} \times \frac{2162}{1} = 10988$$

To get to the missing data for 1993, it was assumed that the proportions of overall migration for 1993 that went to these five countries were the same as in 1992). For example for Australia:

$$\frac{694}{4289} \times \frac{100}{1} = 16.2\%$$

16.2% of 8078 = *1309*

Table 7: Emigration to Five Countries According to SSA and Countries' Data

New Zealand	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997
(data)	632	246	209	202	223	422	2054	2638	2046	2648	2689
SSA	411	176	83	64	50	126	242	1465	939	1266	1157
Australia	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
(data)	3792	3024	2424	2084	1274	1021	1654	2792	3190	3211	4281
SSA	3484	2588	1275	1292	928	694	1309	1298	1507	1767	1508
UK	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
(data)	6700	7000	11700	6400	8000	6900	9400	8100	4200	11400	*10988*
SSA	3817	2295	1420	1804	1800	1987	3716	2880	2045	2243	2162
Canada	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
(data)	*1748*	1672	1558	1083	1014	1141	1822	2910	1753	1526	1898
SSA	755	722	454	349	266	285	566	947	679	774	557
US	**1987**	**1988**	**1989**	**1990**	**1991**	**1992**	**1993**	**1994**	**1995**	**1996**	**1997**
(data)	1741	1832	1899	1990	1854	2516	2197	2144	2560	2966	*2563*
SSA	543	325	174	278	307	314	566	752	882	963	832

After filling in the gaps, the data was split up into two time-periods – 1987-1993 and 1994-1997. The countries' data for 1987-1993 of South African immigrants, the SSA data of emigrants to the five countries as well as the overall emigration according to the SSA were added up. The same was done for the other period (see Table 8).

Table 8: Overall emigration figures 1987-97

	1987-1993	*1994-1997*
Countries Data	99428	76503
SSA Data(for 5 countries)	35465	26623
SSA Overall Migration	45197	37614

The next step was to calculate the ***percentage*** of emigrants to these five countries according to the SSA data. This was done by dividing the SSA figures of emigrants to these five countries for the different time periods by the overall migration (SSA) for the different time periods. For example for the period 1987-1993: (see table 2)

$$\frac{35465}{45197} \times \frac{100}{1} = 79\%$$

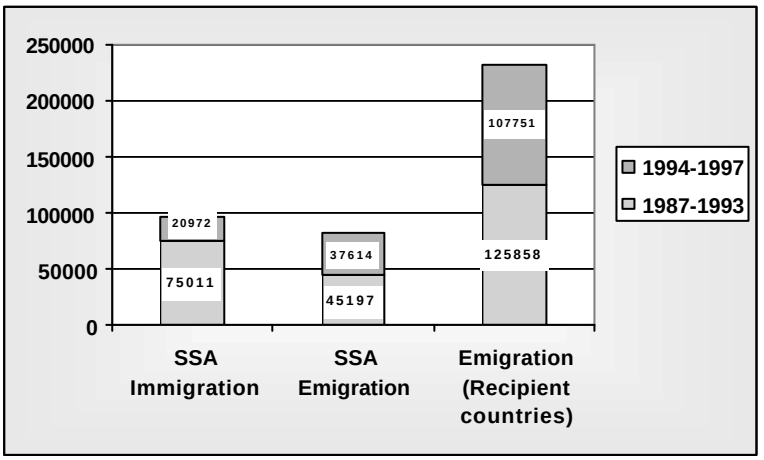
These countries account for 79% of South African emigration for the period 1987-1993 and 71% for the second period. These percentages were then applied to the figures of South African immigrants to these five countries, as supplied by the countries, to get to the reconstructed figures of emigration (See table 9 and figure 6).

$$\frac{100}{79} \times \frac{99428}{1} = 125858$$

Table 9: Emigration-immigration comparison 1987-97

	87-93		94-97
Immigration	75011	**Immigration**	20972
Emigration	45197	**Emigration**	37614
Reconstructed	125858	**Reconstructed**	107751

Figure 6: Comparison of overall migration figures 1987-97



3. 2 Professional Migration

The first step was to compile data for professional emigration and immigration to the above-mentioned five countries according to the SSA data for the period 1989-1997. Here professional migration refers to the category professional, semi-professional and technical and does not include managerial and administrative occupations. The data received from the five countries was aggregated. However the data received was very limited. Complete data was only obtained from New Zealand. For Australia two years, 1989 and 1990 data were missing and for Canada three years, 1989, 1990 and 1991 data were missing. For the United States data was only available for 1996 and for the United Kingdom there was no data. (see table 10). The missing data was estimated in the following way:

For Australia: the figures for professional migration from 1991-1997 were aggregated and used as a percentage of overall migration for the period 1991-1997. This percentage was then applied to the overall migration for the two missing years. The same procedure was used to calculate the missing data for Canada.

$$\frac{4054}{17423} \times \frac{100}{1} = 23\%$$

$$(1989)\quad \frac{23}{100} \times \frac{2424}{1} = 558$$

$$(1990)\quad \frac{23}{100} \times \frac{2084}{1} = 479$$

For the United States, the data for the one year, 1996, was used as a percentage of overall migration for 1996. This percentage was then applied to all the other years, assuming that the same percentage of professionals emigrate to the United States for all the other years as in 1996.

For the United Kingdom, the figures of professional migration to the other four countries for the period 1989-1997 was added and used as a percentage of overall migration to the four countries for the same period, assuming that the proportions of professional emigrants to the UK are the same as for the other four countries. This percentage was then applied to the overall migration to the UK for every year, 1989-1997.

Table 10 Professional Emigration Figures According to the Countries' and SSA Data

	1989	1990	1991	1992	1993	1994	1995	1996	1997
AUS (SSA)	312	291	198	189	356	274	308	420	310
AUS	*558*	*479*	295	213	353	610	765	696	1122
NZ(SSA)	25	24	12	49	93	349	209	297	286
NZ	60	59	63	104	551	656	462	628	631
CAN (SSA)	94	85	63	69	136	224	173	170	118
CAN	*327*	*227*	*213*	243	407	677	421	315	421
US (SSA)	56	68	89	81	153	216	235	254	258
US	*399*	*418*	*389*	*528*	*461*	*450*	*538*	618	*538*
UK (SSA)	275	331	296	349	661	450	368	422	444
UK	*2574*	*1408*	*1760*	*1518*	*2068*	*1782*	*924*	*2508*	*2417*

Again the data was divided into two time-periods, 1989-1993 and 1994-1997. The figures were added for professional emigration to the different countries for the two time-periods.

The SSA emigration data of professionals to the five countries (see table 12) was used as a percentage of overall professional emigration according to the SSA data.

Again the data was split into two time-periods: 1989-1993 and 1994-1997.

Professional emigration to the five countries according to the SSA for the period 1989-1993: 4355 and 1994-1997: 5785

Overall Emigration (SSA):

1989-1993: **5415**

1993-1997: **7534**

1989-1993: $\frac{4355}{5415} \times \frac{100}{1}$ = **80%**

1994-1997: $\frac{5785}{7534} \times \frac{100}{1}$ = **77%**

Thus for the first period (1989-1993) these five countries represent 80% of professional emigration and for the second period, they represent 77%. These percentages were then applied to the immigration figures of South African professionals to the five countries to get to the reconstructed figures for emigration (See table 11 and figure 7).

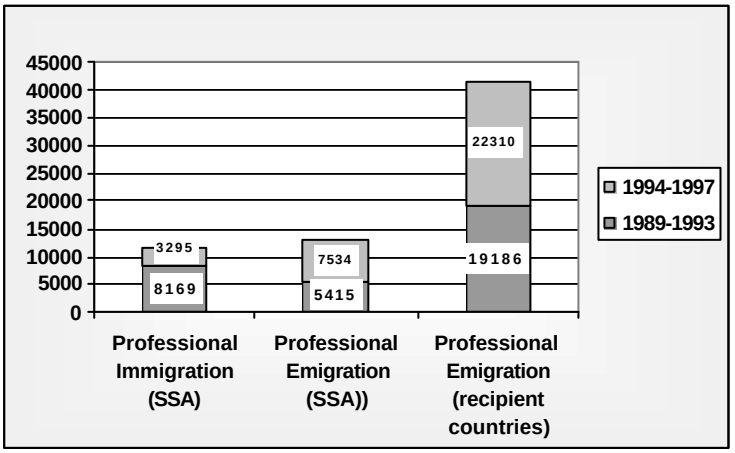
1989-1993: $\frac{100}{80} \times 15349 =$ ***19186***

1994-1997: $\frac{100}{77} \times 17179 =$ ***22310***

Table 11: Professional emigration – immigration figures (1989-93; 1994-97)

	'89-93		'94-97
Professional Immigration (SSA)	8169	Professional Immigration (SSA)	3295
Professional Emigration (SSA))	5415	Professional Emigration (SSA)	7534
Professional Emigration (recipient countries)	19186	Professional Emigration (recipient countries)	22310

Figure 7: Comparison of professional migration figures (1989-97)



4. Correcting the picture

Focusing on different objectives, the two methods used in part 2 and 3 give slightly different results. However, they converge in correcting the picture left by the official data, in many ways. The first method assesses the discrepancy between SA and foreign figures at every level. It thus relies on existing data provided by the statistical services. Only one extrapolation is made at the end from the overall to the professional data after having checked the analogy of their curbs on the majority of the countries.

The second method estimates the emigration figures on as long a period of time as possible. It then proceeds to several extrapolations, in order to rationally fill in the gaps of information for the countries and years unavailable. It thus provides a continuity to look at the evolution in a broad perspective.

4.1 The Brain drain is much higher than official figures used to show…

For 11 years, from 1987 to 1997 included, the country has lost 233 609 emigrants as opposed to the 82 811 declared and registered by the South African statistics. This is 28 times higher than what the official figures show.

With regards to professionals, during the 9 years, from 1989 to 1997, the country lost 41 496 emigrants, which is 3.2 times more than the 12 949 declared.

These figures confirm the former estimates, which suggested that the realistic size of the brain drain was about 3 times higher than shown by the official statistics (see introduction).

The figures given by the 5 countries of SA immigration also illustrate emigration trends with regards to geographic destination. Comparison of the data has been done between the two periods pre and post 1994 and between SAA and the countries statistics, on the years with complete data.

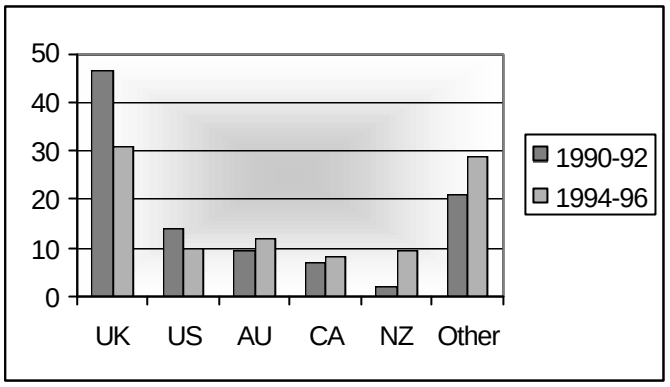
Table 12: Percentage of emigrants per country of destination

Countries	1990-92	1994-96	1990-96
SSA-UK	53	35	41
UK	59	44	**50**
SSA-US	8.5	12.5	11.5
US	17.5	14	**15.5**
SAA-AU	27.5	22.5	24
AU	12	17	**15**
SSA-CA	8.5	12	10.5
CA	9	11.5	**10.5**
SSA-NZ	2.5	18	12.5
NZ	2.5	13.5	**9**

There is a relative diversification of emigration flows. The UK remains dominant but its share decreases though less than indicated by SAA. The United States' also drops significantly contrary to the official data. Meanwhile, Australia, Canada and New Zealand jump to almost a third of the total (including other countries) altogether. Oceania, and particularly New Zealand become the attractive region at the expense of the traditional receiving countries. Australia, whose share was overestimated in official statistics compared to the other countries due to its higher rate of coverage (see part 2), has increased its percentage over the period, contrary to what these indicate. The comparison between SSA and the other countries statistics tends to indicate that there are indeed changing patterns but it is an evolution with continuities rather than sharp modifications between pre and post 1994 periods.

In this diversification process, other countries expand their share of SA migrant population. Though figures are not given here, these countries are especially those of the Southern African region (Zimbabwe and Namibia) which have received higher inflows in the post 1994 period than before.

Figure 8: Evolution of the countries share in total emigration (%)



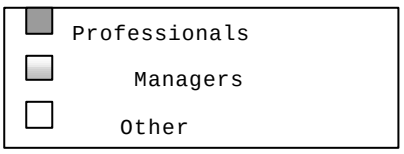
During the period covered, the composition of the emigrant population does not change much. Half of the emigrant population is professionally active, meaning that in average every individual professional leaves with one dependent with her/him. This corresponds to a statistically standard profile of a young professional married but without children moving to a new country in the early years of a career.

The active population is divided into non-highly skilled (about 1/3), managerial occupations (about 20%) and professionals (about 50%). The proportion of non-highly skilled is especially high in Canada and the managers are more prone to go to Australia and the U.S.A. However, the bulk of the population is highly qualified and are mostly located in professional, semi-professional and technical occupations.

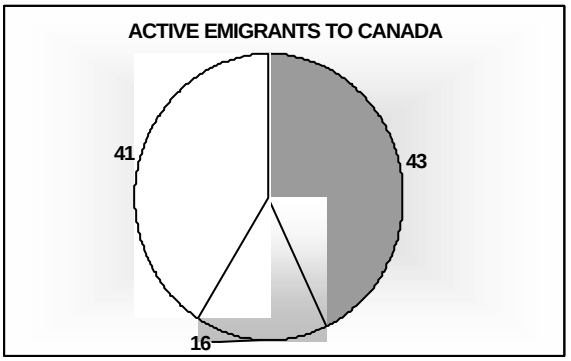
The immigration into these countries is clearly selective but the qualifications of the overall emigrant population do not increase significantly over the period. These countries have point systems for selection, with age, family and qualifications/skills combined. The non-highly skilled are likely to be young in order to fit with the requirements. They probably constitute the bulk of the single individuals, tending to indicate that the professional population may be emigrating with a relatively higher number of dependents than the average mentioned above (1).

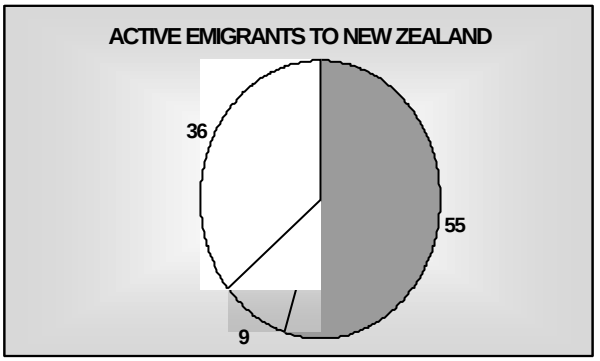
Figures 9a-b-c-d: Categories of SA active emigrants per country of destination

a) Canada

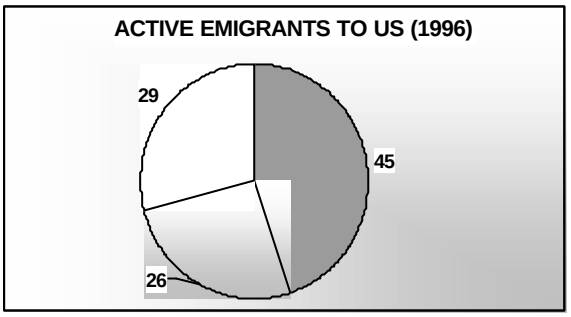


b) New Zealand

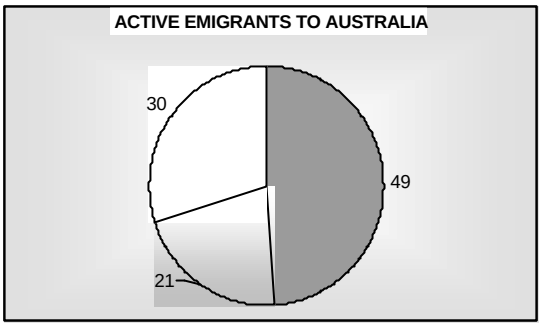




c) USA



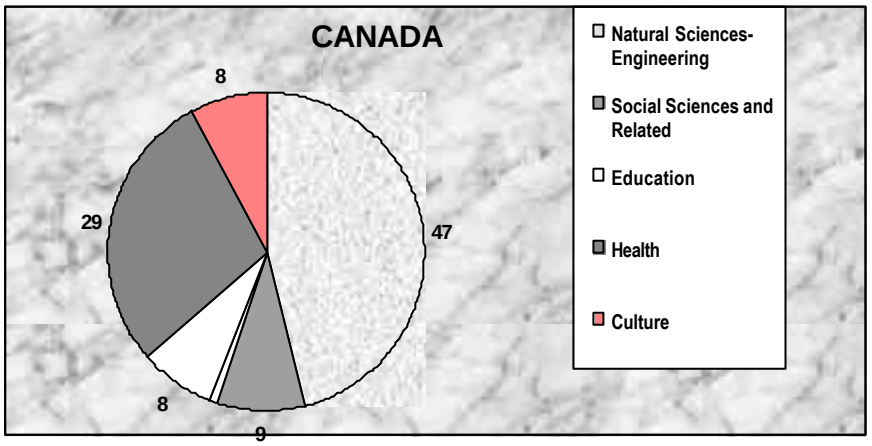
d) Australia

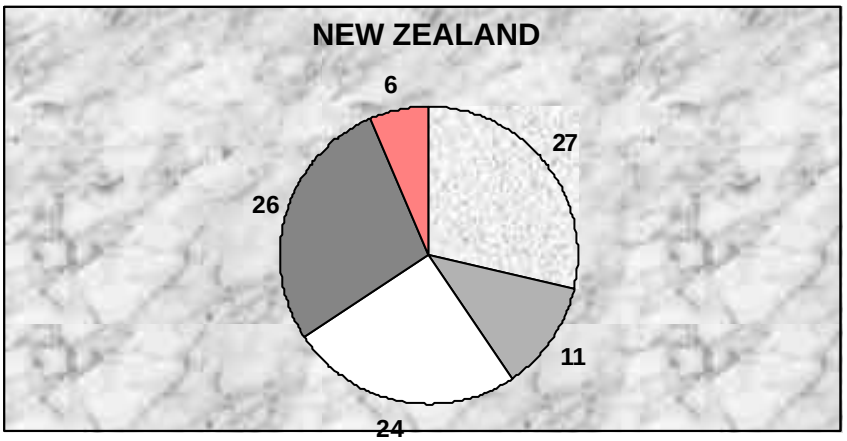


The detailed categories within the professional occupations are available only for 2 countries: Canada and New Zealand. The numbers involved at these levels are too small to provide a reliable statistical basis for extrapolations from the official data, through an application of an index like the one used in part 2. However, they are quite suggestive and serve as a reference point on detailed categories.

Figures 10a-b: Canada and New Zealand professional emigrants by sub-categories

(Nat-Eng: Natural sciences and Engineering)





Within the professionals, the natural scientists/engineers and the health workers are the major groups. However, the proportion may vary significantly from one country to the other. Indeed, each individual host country seems to have a specific profile of skilled immigration. New Zealand data even gives a more detailed picture within the main sub-categories:

Figure 11: New Zealand immigration evolution of SA natural scientists and engineers

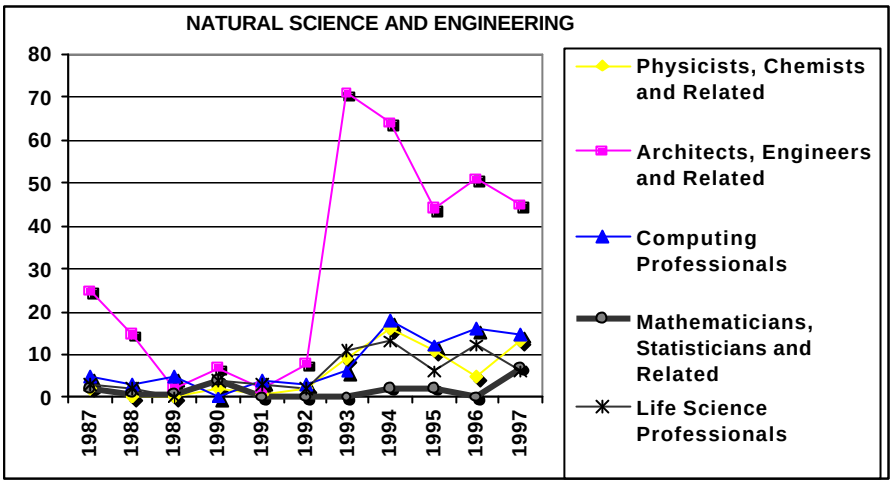
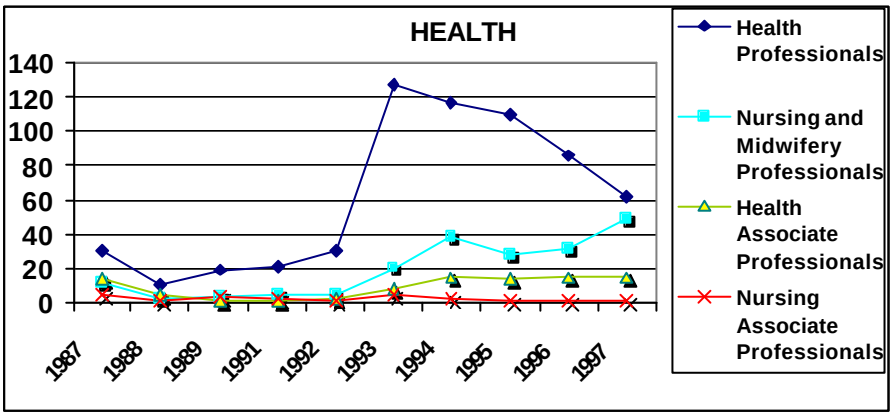


Figure 12: New Zealand immigration evolution of SA health professionals



A large part of the dramatic increase of the emigration to New Zealand during the 90s is due to only 2 categories: health professionals and engineers. The frequently and recently mentioned exodus of information/computer scientists does not appear massive here, though there is indeed an increase in the last years. However, the profile may be different for other countries.

4. 2. …the brain drain recent increase is much smaller than suggested by the official figures

The official statistics point to a sharp increase of the brain drain in the period following the change of government (1994), compared to the one that preceded it. However, this is not checked by the other countries' data.

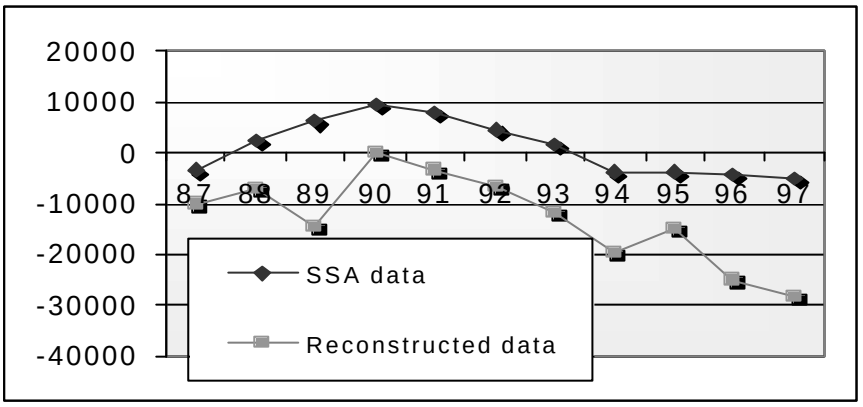
	1989-92	1994-97
Emigration (official figures)	3721	7534
Emigration (adjusted figures)	16447	19890

The year 1993 cannot be included in this comparison for 2 reasons:

- the SSA data for the professionals are missing
- the year was already a pre-transition one, historically

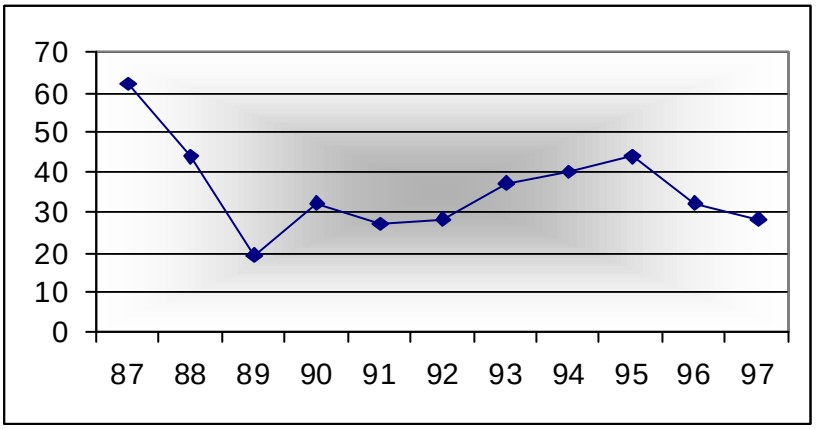
What appears as a major increase of 102% in the official data is a moderate one of 21% in the other countries ones[5]. In other words, the common belief that the political changes in SA have dramatically changed the conditions of the highly skilled migration just does not stand the evidence. Moreover, the real brain drain - which is a net loss of skilled people - existed much before 1994, as the emigration was superior to the immigration since the beginning of the period covered here (see figure 4 as well as figure 13).

Figure 13: Net gain/loss in migration to and from South Africa 1987-97



From 1987 to date, no single year has had a positive net migration. The reason why it appeared as if this was the case between 1988 to 1993 in the SSA records is the very poor rate of coverage by the official statistics. In other words, the precise coincidence of the occurrence of the brain drain with the transition is nothing but a statistical artefact. In fact the rate of coverage has not always been as bad as during the early 90s and it might have been significantly better before (see figure 8)[6].

Figure 14: Rate of coverage of other countries' data by SSA 1987-97



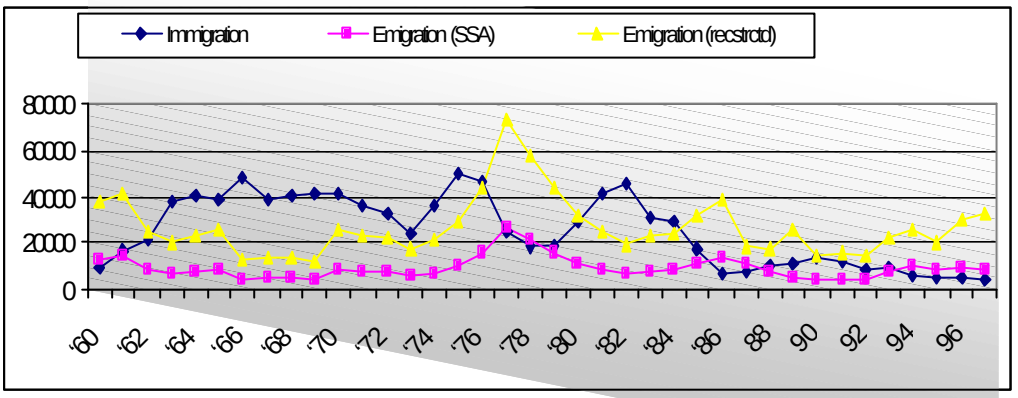
[5] This result comes through the first method; the second method (based on more estimations) gives an increase of 51% for the same period which is also much smaller than the official one and much closer to the results of the first method.

4.3 Putting the picture in perspective

When, then, did the brain drain start? When did the migration turn from a net gain to a net loss? The foreign data collected do not go further back than 1987. However, it is possible advance an hypothesis: namely, that the average rate of coverage for the period 1987-97 is representative of the long term. This rate was of 36%, meaning that the SA data had to be multiplied by 2.8 to reach the foreign figures. Figure 15 show the results when this 2.8 factor is applied to the SA data every year from 1960 to 1986 included.

Is this a realistic hypothesis? A way to check it is to refer to the CSS figure pointing to a difference of 511 855 between the number of SA citizens declaring leaving for visits abroad and the number of those registered as coming back, from 1975 to 1994 (FRD 1996). The reconstructed figures below point to a difference between SA and foreign data of 382.685 on the same period. Therefore, it covers almost 4/5 of the hidden emigration evaluated by the CSS. This suggests that the hypothesis is realistic, being of the same order of magnitude.

Figure 15: Migration to and from SA during the last 4 decades



This picture modifies the traditional representation about migration in South Africa. SA no longer appears as a country of immigration, corresponding to a pattern of much larger inflows than outflows. Years with net gains and years with net losses are balanced in favour of the latter (18/20). The actual emigration increases and immigration lows do correspond to political events (Sharpeville, Soweto, State of Emergency) as it has been pointed out before (Kaplan 1997). However, the returns to positive balances were much slower and more limited than official statistics would let think. This is a more realistic picture of the migration phenomenon.

This graph shows that the recent emigration is not low. However, it is far from being exceptionally high. What is of most concern is that it is linked with an exceptionally low - and durably low - immigration rate. For this very reason, the net loss, therefore the actual brain drain, is large.

For the last decade, SA has lost about 4600 professionals every year, which represents 0.3% of its national stock (1 428 737, according to 1996 census data). In terms of labour market flows, the brain drain levy on the professionals turn over nationally is around 13%. About 36 000 new professionals are employed every year. This percentage is close to those given by the corporate sector in business surveys (Kaplan, Meyer, Brown 1999).

This is a significant percentage, and a considerable concern for the development of the country. But it is not of a magnitude that puts the country's immediate future in jeopardy. There is time is for corrective action to be taken.

[6] Both methods 1 and 2 give comparable though different rates of coverage per period (respectively 23 and 25% from 1989 to 1992 and 38 and

Conclusion

The points raised by this paper may now be summarised and their consequences for policy design may be drawn.

1. The brain drain is 3 times higher than that described in official statistics. However, its recent increase is much smaller than what the official data indicates. This is due to a better statistical coverage of the phenomenon.

2. When put in perspective, the brain drain is not a deluge. Moreover, it is not narrowly tied to the political changes of the last decade. It is a slow though significant erosion of the country's human resources and endowments.

3. Emigration has been going on for decades. What makes it more critical today is that it is no longer compensated by immigration. There has never been such a degree of loss for such a long time. Moreover, the trend is not improving.

Following from this:

- the issue should not be over dramatised. The country is not under threat of a sudden and massive desertion of its talents
- the issue should not be narrowly politicised. The phenomenon does not originate in the recent political changes, though they do have an impact on its evolution
- The issue should be addressed. Over the longer term, the country cannot afford to continue to loose these skills which are ever more necessary to its development

34% from 1994 to 1997) pointing at a much better coverage after 1994 than during the period that just preceded

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United States Department of Justice, Immigration and Naturalization Service Table 21, Immigrants Admitted By Major Occupation Group and Region and Selected Country of Birth, Fiscal Year 1996

Appendix 1

Number of emigrants - Overall emigration

(SSA figures in plain and countries figures in bold characters)

	1989	1990	1991	1992	1994	1995	1996	1997
SSA-UK	1420	1804	1800	1987	2880	2045	2243	2162
UK	**11700**	**6400**	**8000**	**6900**	**8100**	**4200**	**11400**	
SSA-US	212	278	307	314	752	882	963	832
US	**1899**	**1990**	**1854**	**2516**	**2144**	**2560**	**2966**	
SSA-AU	1275	1292	928	694	1298	1507	1767	1508
AU		**2084**	**1274**	**1021**	**2792**	**3190**	**3211**	**4281**
SSA-CA	454	349	266	285	947	679	774	557
CA	**1558**	**1083**	**1014**	**1141**	**2910**	**1753**	**1526**	**1898**
SSA-NZ	83	64	50	126	1465	939	1266	1157
NZ	**289**	**202**	**223**	**422**	**2638**	**2046**	**2648**	**2689**

Number of emigrants - Active population

	1991	1992	1994	1995	1996	1997
SSA-AU	443	404	569	648	765	616
AU	**581**	**470**	**1364**	**1532**	**1508**	**1985**
SSA-NZ	22	65	547	378	499	453
NZ	**113**	**181**	**1162**	**902**	**1202**	**1183**
SSA-CAN	124	143	454	315	313	258
CAN		**635**	**1526**	**935**	**784**	**965**
SSA-US					473	
US					**1376**	

Professional emigrants

	1991	1992	1994	1995	1996	1997
SSA-AU	198	189	276	308	420	310
AU	**295**	**213**	**610**	**765**	**696**	**1122**
SSA-NZ	12	49	349	209	297	286
NZ	**60**	**106**	**618**	**463**	**614**	**595**
SSA-CA	63	69	224	169	169	114
CA		**246**	**676**	**421**	**315**	**421**
SSA-US					254	
US					**618**	

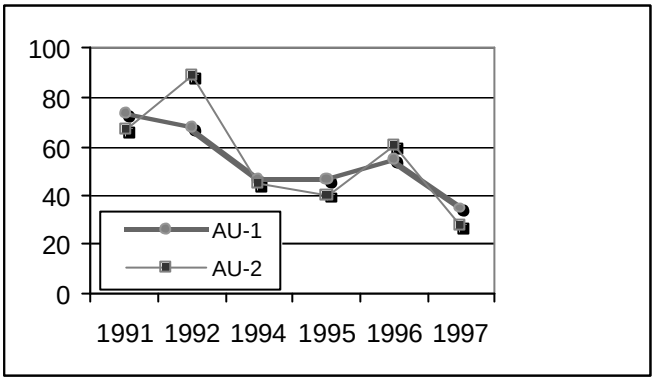
Managerial emigrants

	1991	1992	1994	1995	1996	1997
SSA-AU	34	40	62	95	105	77
AU	**84**	**128**	**291**	**302**	**352**	**362**
SSA-NZ	3	4	64	45	59	51
NZ	**19**	**29**	**208**	**149**	**198**	**210**
SSA-CAN	10	22	40	33	27	22
CA		**96**	**316**	**185**	**148**	**170**
SSA-US					65	
US					**362**	

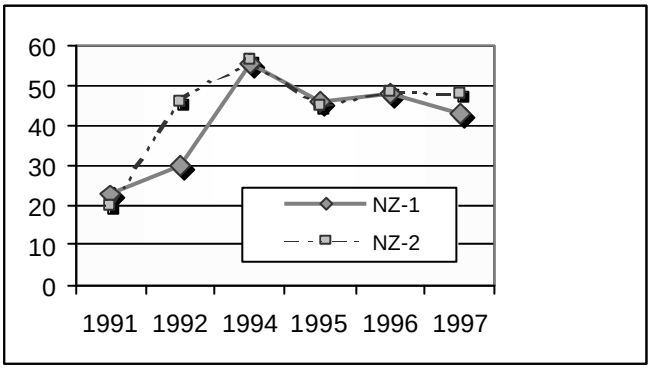
Appendix 2

Rates of coverage for the overall (-1 on the graph) and professionals (-2 on the graph) populations, per country, per year

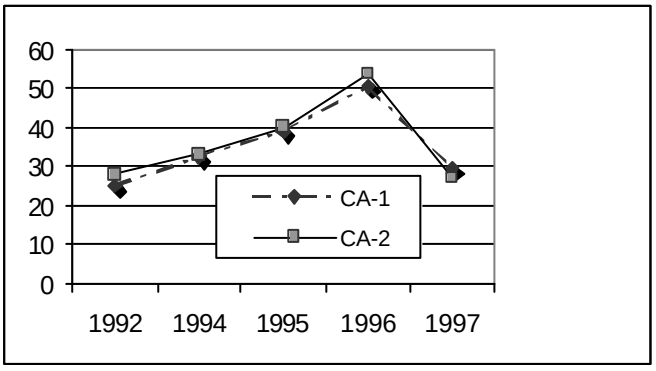
a) Australia



b) New Zealand



c) Canada



Appendix 3

Example1: Overall Emigration to the United Kingdom
Source: Table 2.3 Series MN no.23

International Migration, estimates from International Passenger Survey: Commonwealth country of last or next residence, 1987-1996

Year	South Africa
1987	6700
1988	7000
1989	11700
1990	6400
1991	8000
1992	6900
1993	9400
1994	8100
1995	4200
1996	11400

Example 2: Detailed Occupational Categories For New Zealand
Source: External Migration, Ref: C2963TM

Permanent and Long-term Arrivals from South Africa by Period and Occupation

Year	Occupation	South Africa
1991-1992	Armed Forces	-
1991-1992	Senior Government Administrators	-
1991-1992	Senior Business Administrators	-
1991-1992	Special-Interest Organisation Administrators	-
1991-1992	General Managers	3
1991-1992	Specialised Managers	12
1991-1992	*Physicists, Chemists & Related Professionals*	*1*
1991-1992	*Mathematicians, Statisticians & Related Professionals*	*-*
1991-1992	*Computing Professionals*	*4*
1991-1992	*Architects, Engineers & Related Professionals*	*2*
1991-1992	*Life Science Professionals*	*3*
1991-1992	*Health Professionals (Except Nurses)*	*22*
1991-1992	*Nursing & Midwifery Professionals*	*4*
1991-1992	*Tertiary Teaching Professionals*	*1*
1991-1992	*Secondary Teaching Professionals*	*1*
1991-1992	*Primary & Early Childhood Teaching Professionals*	*6*
1991-1992	*Special Education Teaching Professionals*	*-*
1991-1992	*Other Teaching Professionals*	*-*
1991-1992	*Business Professionals*	*2*
1991-1992	*Legal Professionals*	*1*
1991-1992	*Archivists, Librarians & Related Information Professionals*	*-*

1991-1992	***Social & Related Science Professionals***	***1***
1991-1992	***Religion Professionals***	***1***
1991-1992	***Physical Science & Engineering Technicians***	***1***
1991-1992	***Computer Equipment Controllers***	***1***
1991-1992	***Optical & Electronic Equipment Controllers***	***1***
1991-1992	***Ship & Aircraft Controllers & Technicians***	***-***
1991-1992	***Safety & Health Inspectors***	***-***
1991-1992	***Life Science Technicians & Related Workers***	***1***
1991-1992	***Health Associate Professionals***	***1***
1991-1992	***Nursing Associate Professionals***	***2***
1991-1992	Finance & Sales Associate Professionals	1
1991-1992	Administrative Associate Professionals	2
1991-1992	Government Associate Professionals	-
1991-1992	***Social Workers Associate Professionals***	***-***
1991-1992	***Careers & Employment Advisors***	***-***
1991-1992	***Writers, Artists, Entertainment & Sports Associates***	***5***
1991-1992	***Non-Ordained Religion Associate Professionals***	***2***
1991-1992	Secretaries & Keyboard Operating Clerks	6
1991-1992	Numerical Clerks	-
1991-1992	Material Recording & Transport Clerks	-
1991-1992	Library, Mail & Related Clerks	3
1991-1992	Cashiers, Tellers & Related Clerks	1
1991-1992	Client Information Clerks	-
1991-1992	Travel Attendants & Guides	-
1991-1992	Housekeeping & Restaurant Service Workers	1
1991-1992	Personal Care Workers	-
1991-1992	Other Personal Services Workers	1
1991-1992	Protective Service Workers	-
1991-1992	Salespersons & Demonstrators	3
1991-1992	Street Vendors	-
1991-1992	Fashion & Other Models	-
1991-1992	Market Farmers & Crop Growers	-
1991-1992	Market-Oriented Animal Producers	2
1991-1992	Forestry & Related Workers	-
1991-1992	Fishery Workers, Hunters & Trappers	-
1991-1992	Building Frame & Related Trades Workers	2
1991-1992	Building Finishers & Related Trade Workers	-
1991-1992	Electricians	2
1991-1992	Metal Moulders, Sheet-Metal & Related Workers	-
1991-1992	Blacksmiths, Toolmakers & Related Workers	1
1991-1992	Machinery Mechanics & Fitters	3
1991-1992	Electrical & Electronic Instrument Mechanics & Fitters	-
1991-1992	Precision Instrument Makers & Related Workers	-
1991-1992	Glass Cutters & Related Workers	-
1991-1992	Printing Trades Workers	-
1991-1992	Food & Related Products Processing Trades Workers	-
1991-1992	Cabinetmakers & Related Workers	2
1991-1992	Tailors, Dressmakers & Related Workers	-
1991-1992	Leather Goods Makers	-
1991-1992	Mining & Mineral Processing Plants Operators	-
1991-1992	Metal-Processing Plant Operators	-
1991-1992	Glass & Ceramics Kiln & Related Plants Operators	-
1991-1992	Wood-Processing & Papermaking Plant Operators	-
1991-1992	Chemical Processing Plant Operators	-
1991-1992	Power Generating & Related Plant Operators	-
1991-1992	Metal & Mineral Products Processing Machine Operators	-
1991-1992	Chemical Products Machine Operators	-
1991-1992	Rubber & Plastics Products Machine Operators	-
1991-1992	Wood Products Machine Operators	-

1991-1992	Paper Products Machine Operators	-
1991-1992	Textile Product Machine Operators	-
1991-1992	Food & Related Products Processing Machine Operators	1
1991-1992	Leather & Related Products Processors	-
1991-1992	Assemblers	-
1991-1992	Railway Engine Drivers & Related Workers	-
1991-1992	Motor Vehicle Drivers	1
1991-1992	Agricultural, Earthmoving & Other Materials -Handling Equipment Operators	-
1991-1992	Ships' Deck Crews & Related Workers	-
1991-1992	Building & Related Workers	-
1991-1992	Building Caretakers & Cleaners	-
1991-1992	Messengers & Doorkeepers	-
1991-1992	Refuse Collectors & Related Labourers	-
1991-1992	Packers & Freight Handlers	-
1991-1992	Labourers	-
1991-1992	Occupation Unidentifiable/Illegal	3
1991-1992	Not Actively Engaged	108
1991-1992	Unspecified	2
1991-1992	Total	223

Example 3: Detailed Occupational Groups For Australia
Source: Bureau of Immigration Research, Table B12

Settler Arrivals By Region/Country of Birth By state of Intended Residence By Major ASCO Groups

Year	Occupation	South Africa
1992-1993	Managers/Admin	128
1992-1993	Professionals	189
1992-1993	Para-Professionals	24
1992-1993	Tradespersons	39
1992-1993	Clerks	44
1992-1993	Salespersons/Personal/ Serviceworkers	42
1992-1993	Plant/Machine Operators/Drivers	1
1992-1993	Labourers/Related Workers	3
1992-1993	Subtotal Workers	470
1992-1993	Not in Workforce	531
1992-1993	Not in Employment	10
1992-1993	Not Stated	10
1992-1993	Total	1021

Example 4: Detailed Occupational Groups For Canada
Source: Citizenship and Immigration Canada

Country of Last Permanent Residence By Intended Occupations

Year	Occupations	South Africa
1995	Entrepeneurs	23
1995	Investors	1
1995	Managerial,Administrative	161
1995	Natural Sciences, Engineering, Mathematics	203
1995	Social Services and Related	41
1995	Religion	3
1995	Teaching	40
1995	Medicine and Health	98
1995	Art. Literature and Performing Arts	32
1995	Sport and Recreation	4
1995	Clerical and Related	108
1995	Sales	39
1995	Services	29
1995	Farming, Hort. And Animal-Husbandry	2
1995	Fishing, Hunting and Trapping	
1995	Forestry and Logging	
1995	Mining, Quarrying, Well Drilling	1
1995	Processing	1
1995	Machining and Related	13
1995	Fabricating, Assembling and Repairing	42
1995	Construction Trades	13
1995	Transport Equipment Operating	3
1995	Material Handling and Related n.e.c.	1
1995	Other Crafts and Equipment Operating	3
1995	Occupations n.e.c.	74
1995	Total Destined to the Labour Force	935

Example 5: Detailed Occupational Categories for the United States
Source: United States Department of Justice, Table 21

Immigrants Admitted By Major Occupation Groups and Region and Selected Country of Birth

Year	Occupation	South Africa
1996	Professional, Specialty and Technical	618
1996	Executive, Administrative and Managerial	362
1996	Sales	65
1996	Administrative Support	125
1996	Precision Production, craft and repair	64
1996	Operator, fabricator and laborer	37
1996	Farming, Forestry and fishing	11
1996	Service	94
1996	No Occupation or not reported	1590
1996	Total	1376
1996	Grand Total	2966

Example 6: Occupational Groups According to the SSA
Source: SSA Statistical Reports No. 03-51-01

Emigrants: Country of Destination By Occupation

Year	Occupation	Canada
1994	Total Economically Active	454
1994	Professional, Semi-Professional and Technical	224
1994	Managerial, Executive and Administrative	40
1994	Clerical and Sales	104
1994	Transport and Communication	
1994	Service	9
1994	Farming	
1994	Artisan and Apprentice	35
1994	Mining, Quarrying and Production	3
1994	Not Classifiable	39
1994	Not Economically Active	493

Detailed Occupational Groups According to the SSA

Year	Occupation	Australia
1994	**Total Economically Active**	**592**
1994	**Professional, Semi-Professional & Technical Occupations**	**276**
1994	***Engineer and Related Technologist/Technician***	**48**
1994	***Industrial/Production***	0
1994	***Chemical***	1
1994	***Electric and related***	3
1994	***Agricultural***	0
1994	***Mechanical***	1
1994	***Metallurgical***	0
1994	***Mining***	0
1994	***Civil and related***	8
1994	***Engineer and related***	27
1994	***Technologist/Technician Nec***	1
1994	***Technician: Draftsman***	3
1994	***Technical inspector and related occupations***	0
1994	***Architect and related occupations***	3
1994	***Land surveyor and related occupations***	1
1994	***Natural Science Occupations***	**30**
1994	***Physical scientist and related occupations***	1
1994	***Geological sciences occupation***	1
1994	***Mathematical and related occupations***	2
1994	***Computer sciences occupations***	13
1994	***Chemical sciences occupation***	3
1994	***Biological sciences occupations***	1
1994	***Agricultural, forestry and food sciences occupations***	5
1994	***Natural sciences technologist***	1
1994	***Natural sciences technician***	3
1994	***Medical, dental and related health services occupations***	**53**

1994	***Medical practitioner, physician***	***13***
1994	***Medical specialist***	***2***
1994	***Medical professions Nec***	***4***
1994	***Dental professions***	***1***
1994	***Veterinary sciences professions***	***0***
1994	***Pharmaceutical professions***	***5***
1994	***Supplementary medical professions***	***13***
1994	***Nursing professions***	***13***
1994	***Technician: Medical and related sciences***	***2***
1994	***Health services professions Nec***	***0***
1994	***Education and related occupations***	***46***
1994	***Humanities and related occupations***	***37***
1994	***Legal occupations***	***18***
1994	***Religious professions***	***5***
1994	***Social sciences occupations***	***6***
1994	***Personnel and management services occupations***	***4***
1994	***Economic occupations***	***2***
1994	***Humanities and related occupations Nec***	***2***
1994	***Accountant and related accounting occupations***	***40***
1994	***Art, Sport and Entertainment occupations***	***22***
1994	***Artist, Plastic arts***	***3***
1994	***Designer***	***11***
1994	***Artist, performing arts and related occupations***	***3***
1994	***Author and related occupations***	***4***
1994	***Sports occupations***	***1***
1994	**Managerial, Executive and administrative occupations**	**62**
1994	Legislative, Executive and Managerial occupations (Government sector)	4
1994	Managerial occupations (Excluding government sector)	58
1994	Administrative occupations	0
1994	**Clerical and sales occupations**	**154**
1994	Clerical occupations	80
1994	Sales occupations	54
1994	**Transport, Delivery and Communications Occupations**	**0**
1994	Transport occupations	0
1994	Communications occupations	0
1994	**Service occupations**	**14**
1994	Protective service occupations	3
1994	Catering and accommodation services occupations	4
1994	Personal and related services occupations	6
1994	Service occupations Nec	1
1994	**Farming and related occupations**	**0**
1994	Farmer, Farm Manager	0
1994	Farm, Forest, Nursery and related worker	0
1994	Farming and related occupations Nec	0
1994	**Artisan, Apprentice and related occupations**	**73**
1994	Artisan	71
1994	Apprentice/Trainee	0
1994	Trade related occupations	2
1994	**Production supervisor, miner, quarry and related**	**12**
1994	Production foreman/-supervisor	4
1994	Mining, quarry and related worker	0
1994	Operator, production and related semi-skilled worker	7
1994	Labourer and other unskilled worker Nec	1