The changing face of public funding of higher education, with special reference to South Africa

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The changing face of public funding of higher education, with special reference to South Africa[1]

PIERRE DE VILLIERS AND GERT STEYN[2]

ABSTRACT

Higher education displays characteristics of both private and public goods and there is a trend worldwide to expect individuals to pay more of the costs of their higher education. In South Africa public funding of higher education decreased from 0.86% of GDP in 1986 to only 0.66% in 2006. Due to the decrease in state appropriations, student tuition fees had to be increased to compensate for this loss of income. In the process staff numbers were kept relatively constant, while student numbers increased at a much faster rate. Two future scenarios, based on public higher education expenditure as a percentage of GDP and on real state allocation per WFTES, are included. Although the qualifications awarded per FTE academic staff member increased over time, the graduation rates of the higher education institutions in South Africa are worsening. High-level research, measured in publication units per FTE academic staff member, shows a disturbing decreasing trend since 1997.

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JEL codes: H52, I22, I23

[1] This article is based on results contained in a report by Steyn and de Villiers (2006). See the report for a more detailed discussion of all the aspects dealt with in this article.

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The changing face of public funding of higher education, with special reference to South Africa[3]

1. INTRODUCTION

Government participation in the economy increased substantially during the previous century. By the same token, public spending on education increased as a result of the development of the human capital model during the 1960s[4]. According to the human capital model, people are made more productive by further training and the market will subsequently pay higher remuneration to well-trained workers. This led to the belief that more investment in human capital will lead to higher economic growth rates and that the rates of return on these investments for both government and private individuals would be very profitable.

In the first part of the paper the profitability of investment in education is explored and the expenditure on specifically higher education worldwide will receive special attention. The experience of the change in public funding of higher education in South Africa for the period 1987 – 2003 will then be investigated. This is the period during which the South African Post-Secondary School (SAPSE) subsidy formula was used to fund universities and technikons, and also a period when the higher education system in South Africa remained fairly stable and unchanged. During 2004-2005 the HE landscape altered completely with the merging of institutions, which reduced the 36 HE institutions to 23. The paper will in the third place focus on possible future financial scenarios for state funding of HE. Finally some recommendations will be made.

2. PROFITABILITY OF INVESTMENT IN EDUCATION

The profitability of an investment in education can be calculated by using cost benefit analysis. Most empirical studies make use of the internal rate of return - equal to the rate that will equate the discounted present values of the costs and benefits of education. Psacharoupoulos and Patrinos (2002) give a detailed summary of the results of studies that have been conducted in 98 countries to calculate the profitability of investment in education over the period 1960-1999. The results are summarised in Table 1.

From Table 1 certain clear tendencies can be deduced. Firstly, the private rate of return is higher than the social rate of return for all areas and all levels of education. On average for the world the private rate of return for primary education is 7.7 percentage points higher than the social rate of return, and the corresponding figure for secondary schooling is 3.9 percentage points. On average the private rate of return for higher education is no less than 8.2 percentage points higher than the social rate of return. This seems to indicate that there is scope for individuals to pay more of their own cost for higher education. However, one has to remember that Table 1 includes countries where higher education was almost fully subsidised, which may increase the private rates of return to artificially high levels, because individuals' contribution to their own education is very small. The private rates of return are higher than the social rates of return for all educational levels, but the rates normally decrease as the level of education increases. The rates of return in developing countries are also normally higher for all levels of education than the rates in developed countries.

Table 1. Rate of return of investment in education

	Social			Private		
Region	**Primary**	**Secondary**	Higher	**Primary**	**Secondary**	**Higher**
Asia	16.2	11.1	11.0	20.0	15.8	18.2
Europe/Middle East/North Africa	15.6	9.7	9.9	13.8	13.6	18.8
Latin America	17.4	12.9	12.3	26.6	17.0	19.5
OCED	8.5	9.4	8.5	13.4	11.3	11.6
Sub-Saharan Africa	25.4	18.4	11.3	37.6	24.6	27.8
South Africa (1980)	22.1	17.7	11.8	-	-	-
World	18.9	13.1	10.8	26.6	17.0	19.0

Source: Psacharoupoulos & Patrinos, 2002: 14 and Psacharoupoulos 1994

[3] This article is based on results contained in a report by Steyn and de Villiers (2006). See the report for a more detailed discussion of all the aspects dealt with in this article.

[4] Theodore Shultz, Edward Denison and Gary Becker did pioneering work in this field. See, for example, Rosen (1987) and Cohn and Geske (1990) for a good discussion of this period.

When one looks at the sub-Saharan Africa region (of which South Africa forms part), it is clear that the rates of return for all levels of education are the highest of all regions in the world (which may be a result of the low existing stock of human capital in the region). Especially the private rate of return on higher education is very high. Very little research on this topic (using the above-mentioned rate of return analysis) has been done for South Africa. There are no private rates of return available for South Africa, but according to Psacharoupoulos (1994) the social rate of return for all levels of education is higher than the average for the world (see Table 1). These rates are based on studies done in metropolitan areas in KwaZulu-Natal and may not be representative of the whole of South Africa. Since the social rates of return for South Africa are not so different from those of sub-Saharan Africa, this could also point to similar private rates, but there is no empirical evidence to confirm this .

The high private rate of return is a good argument for an increase in the private fees of education, but the high social rates of return also indicate that investment in education is a profitable investment for the state. This means that an argument can be made in favour of increased public expenditure on education. Here we have to make a distinction between fields of study. According to Psacharoupoulos (1994: 1330), the social rate of return on higher education is the highest in law (12.7%), economic and business sciences (12.0%) and engineering (10.9%). The highest private rate of return on higher education is in engineering (19.0%), economic and business sciences (17.7%) and medicine (17.7%). These rates indicate that there is a case to be made in favour of the introduction of differentiated class fees for different fields of study and that certain fields of study may be financed to a larger extent by the students themselves.

3. PUBLIC AND PRIVATE FEES IN HIGHER EDUCATION

In most countries there is some form of public financing of higher education. Total expenditure on higher education per student, both private and public, differs substantially among countries. In OECD countries, for example, this varied between $4 000 in Greece in 2003 to $20 000 in the USA (OECD, 2003). If higher education expenditure as a percentage of the GDP is used as a yardstick, America spends the highest percentage on education (Who pays to study? 2004). Especially the private component of educational expenditure is much higher than in any other country. Research tends to indicate that the more private-driven education sector in America operates more efficiently than elsewhere in the world (Shangai quoted in Who pays to study? 2004).

The share of private financing at higher education institutions in OECD countries, with the exception of Australia, did not increase much during the period 1995-2000 (OECD, 2003). Apart from the 15% increase in Australia, there were only marginal increases in Germany, Hungary, Netherlands, Denmark, Sweden and Portugal, while in Spain it remained the same. In Japan, Canada, UK, Mexico, Czech Republic, Ireland, Iceland, France, Austria, Slovak Republic and Norway it decreased. The private contribution to higher education differed substantially between countries. In 2000, for example, only 3% of total higher education expenditure in Denmark was privately funded, while the corresponding figure in Japan was 55%.

It is becoming a more common practice that bursaries or loans are made available to help students from poor communities afford higher education. For example, in Australia the Higher Education Contribution Scheme is used, where individuals start to pay back their loans when their income exceeds $21 000 Australian per annum (Maslen, 2004). In Britain, which introduced the income-contingent scheme in 2006, students start paying back their loans once their annual income exceeds £15 000 (Jammed, 2004). Barr (2004: 273) justifies this type of scheme by stating that "It shifts resources from today's best-off (who lose some of their fee subsidy) to today's worst-off (who receive a grant) and tomorrow's worst-off (who, with income-contingent repayments, do not repay their loan in full)." It is acknowledged that as individuals must pay more for their higher education, governments must provide some form of financial assistance to especially students from poor communities.

4. AN INTERNATIONAL PERSPECTIVE ON PUBLIC FUNDING OF HIGHER EDUCATION IN SOUTH AFRICA

The South African state's annual allocation to HE is the outcome of a long negotiation process influenced by economic and political processes, and therefore varies to some extent from year to year. More stability was introduced into the system with the introduction of the Medium-Term Expenditure Framework (MTEF) by the government a few years ago, whereby not only the HE allocation for a specific financial year is given, but also probable allocations for the next two financial years.

In Table 2 the actual state allocations made by the Minister of Education to the higher education sector for the years 1987 to 2006 are shown as well as MTEF estimates for 2007 and 2008. These allocations are also expressed

as:

- percentages of the total expenditure of the state on education (EE);
- percentages of the total state expenditure (TE);
- percentages of the Gross Domestic Product (GDP) of the RSA.

Table 2. Relative state allocations to universities and technikons: 1987-2008

Year	Sector	State allocation (R million)	% of total state expenditure on education	% of total state expenditure	% of GDP	% of GDP excluding NSFAS
1987[1)]	Universities	1 159.730	12.58	2.47	0.700	
	Technikons	263.071	2.85	0.56	0.160	
	Total	1 422.801	15.43	3.03	0.860	
1988[1)]	Universities	1 210.187	11.79	2.25	0.590	
	Technikons	272.276	2.65	0.51	0.133	
	Total	1 482.463	14.44	2.76	0.722	
1989[1)]	Universities	1 425.777	11.85	2.24	0.593	
	Technikons	334.985	2.79	0.53	0.139	
	Total	1 760.762	14.64	2.77	0.732	
1990[1)]	Universities	1 648.529	10.67	2.29	0.608	
	Technikons	394.178	2.55	0.55	0.145	
	Total	2 042.707	13.22	2.84	0.753	
1991[1)]	Universities	1 775.260	10.37	2.18	0.640	
	Technikons	478.158	2.79	0.59	0.170	
	Total	2 253.418	13.16	2.77	0.810	
1992[1)]	Universities	1 948.650	9.55	1.85	0.582	
	Technikons	564.842	2.77	0.54	0.169	
	Total	2 513.492	12.31	2.39	0.751	
1993[1)]	Universities	2 336.518	9.87	1.87	0.550	
	Technikons	692.676	2.93	0.55	0.160	
	Total	3 029.194	12.80	2.42	0.710	
1994	Universities	2 768.887	9.03	1.97	0.574	
	Technikons	795.484	2.60	0.57	0.165	
	Total	3 564.371	11.63	2.54	0.739	
1995	Universities	3 066.472	9.15	2.03	0.559	0.553
	Technikons	1 006.336	3.00	0.66	0.184	0.183
	Total	4 072.808	12.15	2.69	0.743	0.736
1996	Universities	3 850.804	9.22	2.19	0.623	0.589
	Technikons	1 356.458	3.25	0.77	0.220	0.205
	Total	5 207.262	12.46	2.97	0.843	0.794

Table 2 (continued)

Year	Sector	State allocation (R million)	% of total state expenditure on education	% of total state expenditure	% of GDP	% of GDP excluding NSFAS
1997	Universities	3 975.855	9.06	2.09	0.580	0.559
	Technikons	1 455.513	3.32	0.77	0.212	0.204
	Total	5 431.368	12.38	2.86	0.792	0.763
1998	Universities	4 336.687	9.71	2.15	0.584	0.558
	Technikons	1 663.101	3.73	0.83	0.224	0.210
	Total	5 999.788	13.44	2.98	0.808	0.768
1999	Universities	4 648.252	9.97	2.16	0.571	0.543
	Technikons	1 896.873	4.07	0.88	0.233	0.214
	Total	6 545.125	14.04	3.05	0.804	0.757

2000	Universities	5 001.196	9.95	2.13	0.542	0.515
	Technikons	1 976.701	3.93	0.84	0.214	0.194
	Total	6 977.897	13.89	2.97	0.757	0.709
2001[2)]	Universities	5 398.837	9.82	2.05	0.529	0.505
	Technikons	2 122.769	3.86	0.81	0.208	0.190
	Total	7 521.606	13.68	2.86	0.737	0.694
2002[2)]	Universities	5 707.815	9.22	1.96	0.488	0.465
	Technikons	2 215.857	3.58	0.76	0.190	0.171
	Total	7 923.672	12.80	2.72	0.678	0.636
2003[2)]	Universities	6 070.619	8.67	1.85	0.483	0.460
	Technikons	2 563.990	3.66	0.78	0.204	0.185
	Total	8 634.609	12.34	2.63	0.687	0.645
2004[2)]	Total	9 364	12.44	2.53	0.675	0.634
2005[2)]	Total	10 215	12.65	2.44	0.671	0.614
2006[2)]	Total	11 187	12.58	2.37	0.657	0.603
2007[2)]	Total	12 169	12.72	2.34	0.649	0.590
2008[2)]	Total	13 185	-	2.31	0.636	0.580

1) Excluding the TBVC states.
2) Amounts include incorporation of teachers training colleges, but exclude NSFAS administration cost, provision for student fee differences at teachers training colleges, as well as funding for institutional restructuring in 2003-2008.

Sources: Steyn (2002) for 1987 -1993
Department of Education budgets: 2001-2006
GDP for 1994 - 2005: SARB (2003 and 2006)
Projections of GDP for 2006-2008: BER (2006)

Figure 1 is a graphical representation of Table 2. The official state budgets for higher education include the National Student Financial Aid Scheme (NSFAS) allocations since 1995. However, it could be argued that part of the NSFAS allocations should be excluded from the calculation of the above defined indicators of relative HE state expenditure. In the last column of Table 1 the HE expenditure of the state as a percentage of the GDP (probably the most informative of the three indicators) is also calculated when the NSFAS allocations are excluded.

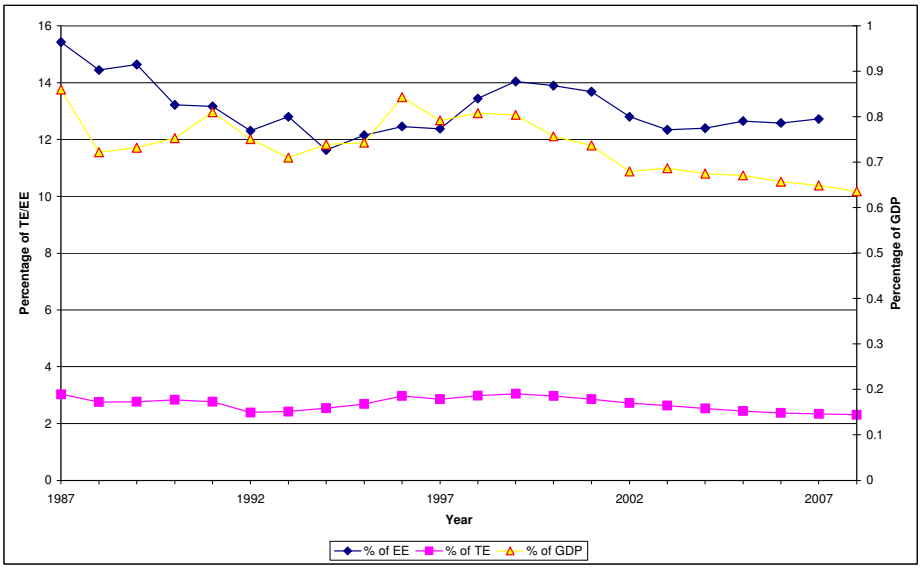

Figure 1. Relative expenditure on universities and technikons: 1987-2008

The following trends can be deduced from Table 2 and Figure 1:

- The joint total state allocations to universities and technikons as a percentage of EE decreased rather rapidly during the late 1980s from 15.43% in 1987 to an all-time low of 11.63% in 1994. After that this percentage steadily increased to 14.04% in 1999, but has slumped back since then to 12.58% in 2006 and is projected to increase slightly to 12.72% in 2007.
- The universities' share of EE declined from 12.58% in 1987 to about 8.67% in 2003. In contrast to this, the technikons' share steadily increased from 2.55% in 1990 to 4.07% in 1999, with the 2003 percentage on 3.66%. This is the result of a higher growth rate in student numbers, especially during the 1990s, at technikons than at universities. The fact that since 1993 the projection formula for effective subsidy students (ESS) in the revised SAPSE formula for technikons allowed for a higher subsidizable growth than the revised SAPSE formula for universities also contributed to these inverse relationships.
- The total allocations to HE as a percentage of TE show some fluctuations in the earlier years, then a sharp increase to 3.05% in 1999 and since then an alarming decline to 2.37% in 2006, i.e. a decline of 22% in 7 years. It is projected to decrease even further to 2.31% in 2008.
- The total allocations to universities and technikons as a percentage of the GDP have fluctuated during the study period, mainly between 0.7 and 0.8. A consistent annual decline from 0.80% in 1999 to 0.66% in 2006 is, however, evident. This figure is projected to decrease even further to 0.64% by 2008. When the NSFAS allocations are subtracted from the total allocations to the HE sector, this indicator declined to 0.60% in 2006, i.e. a decline of more than 18% in 7 years. This declining trend is projected to continue for 2007 and 2008.
- The increases in the mid-1990s of the total state allocations to universities and technikons in all three relative measures of spending are partly the result of the transfer of the HE institutions in the so-called TBVC states to the SA system during that time. No relative increases are, however, noted in 2001 and 2002, when the teachers training colleges were incorporated into the HE system, thus concealing a further decline in funding for HE.

Table 3 shows a summary of figures by Unesco of the total expenditure on higher education institutions and higher education administration as a percentage of the GDP made by local, regional and national governments in 2001 for 84 countries. The average public spending on HE of 29 OECD countries in 2000 was 0.90% of GDP (OECD 2004). The RSA expenditure on HE as a percentage of the GDP, namely 0.74 (or 0.69 if the NSFAS allocations are excluded) for 2001 is lower than both the average value for all 84 countries and the average value for 15 countries in Africa, or when the RSA figure for 2000 (0.76% or 0.71% without NSFAS) is compared with the above-mentioned OECD average.

Table 3. Total expenditure on HE by government as a percentage of the GDP for 2001 according to continent/region

Continent/region	Number of countries	% of GDP (Average)
Africa	15	0.85
North America	13	0.88
South America	6	0.85
Asia	24	0.64
Europe	21	0.95
Oceania	5	0.74
TOTAL	**84**	**0.81**

Source: UNESCO Institute of Statistics (2004): Table 11

There has been a steady increase in the annual allocations to the NSFAS since its introduction in 1995. Many institutions benefit from these increased allocations, since they tend to increase the proportion of tuition fees collected annually. The significant increases in NSFAS allocations are, however, eroding the HE block funding, since these allocations must usually be afforded inside the very stringent and conservative MTEF of the state.

5. IMPACT OF LOWER RELATIVE PUBLIC SPENDING ON HIGHER EDUCATION IN SOUTH AFRICA

The financial statements of higher education institutions in South Africa and the data concerning student enrolments, staff numbers and research publications were supplied by the Department of Education (1998-2005

annual reports and 2005a). The institutions were split into four groups, namely historically advantaged universities (HAUs), historically disadvantaged universities (HDUs), historically advantaged technikons (HATs) and historically disadvantaged technikons (HDTs). Because of inaccuracies and incomplete data not all institutions could be incorporated into the financial analyses. All 11 HAUs (Cape Town, Natal, Free State, Port Elizabeth, Potchefstroom, Pretoria, Rhodes, South Africa, Stellenbosch, Witwatersrand and Rand Afrikaans), but only 5 out 10 HDUs (Durban-Westville, Fort Hare, Western Cape, Vista and the North) were included in the analysis. Five out of the 8 HATs (Cape, Free State, Port Elizabeth, Pretoria and Peninsula) and only 2 of the 7 HDTs (Northern Gauteng and Peninsula) could be included in the study. Especially the HDTs are thus totally under-represented. The results contained in the next four sections are derived from an analysis of some of the results in the broader CHE study which covered the performance of the higher education sector in South Africa for the period 1986-2003.[5]

5.1 Impact on resources of HE institutions

The income composition of HE institutions changed substantially over the study period 1986-2003. Real state appropriations (in constant 2000 prices) per weighted full-time equivalent student (WFTES[6]) at all HE institutions decreased from an average of R30 556 in 1987 to R19 494 in 2003 – a decrease of 36%. As a result of the decrease in real state appropriations, HE institutions had to secure income from other sources to enable them to balance their books. This loss of income from the side of the state was largely compensated for by levying higher tuition fees. Real tuition fees per WFTES (in constant 2000 prices) increased from an average of R5 896 in 1987 to R8 535 in 2003 – an increase of 45%. The result of this was that state appropriations as source of income for HAUs decreased from 51% to 40% of their total income; at HDUs it decreased from 66% to 51%; at HATs it dropped from 60% to 50%; and at HDTs it decreased from 69% to 54%. On the other hand, student tuition fees increased in relative importance. From 1987-2003 tuition fees of HAUs increased from 13% to 23% of their total income; at HDUs it increased from 11% to 25%; at HATs from 15% to 31%; and at the two HDTs from 4% to 24%. In the case of many HE institutions state appropriations are less than 50% of their total income. Although public funding is still the main source of income of HE institutions, its relative importance diminished quite substantially, while student tuition fees clearly became a more important source of income.

Because of the decrease in the real value of public funds being allocated to HE, staff in this sector did not keep up with the increase in student numbers. From Table 4 it can be deduced that the number of WFTES in the whole HE system increased by 141% during the period 1986-2003, while academic staff increased by only 53% and other staff by just 22%. Academic staff increased more than the other staff, since many services, e.g. cleaning and gardening services, have been contracted out since the early 1990s. Consequently the overall *Student/Lecturer* (*S/L)* ratio – WFTES per FTE instruction/research (academic) staff - of the university sector increased from 12.7 in 1986 to 18.0 in 2003, while the technikon sector's *S/L* ratio increased from 14.9 in 1986 to a very high 29.0 in 2003. Compared to 'international standards' (the average *S/L* ratio of 11 countries for 1992 was 19.9), the university ratios are acceptable, but from 1990 the technikon ratios have been too high.

Table 4. Weighted FTE enrolled students, FTE instruction/research (academic) staff numbers and FTE other staff numbers according to institutional group and year

Group	Weighted FTE students		FTE instruction/ research staff		FTE other staff	
	1986	2003	1986	2003	1986	2003
All institutions.	183 604	442 962	14 036	21 510	28 354	34 538
HAUs	121 267	216 213	9 604	12 557	19 238	18 825
HDUs	28 722	77 220	2 177	3 790	5 530	6 792
HATs	27 954	101 238	1 763	3 734	2 828	6 657
HDTs	5 661	48 291	492	1 429	758	2 309

Real expenditure per qualification awarded by the 4 groups of institutions for 3 specific years during the study period is given in Table 5. For HAUs it remained fairly constant – implying maintained cost efficiency in delivering qualifications. For the HDUs the real expenditure per qualification awarded remained fairly constant until about 1997, and since then started to increase quite substantially. The HATs followed almost the identical

[5] See a more detailed summary of certain aspects in de Villiers and Steyn (2006) and a thorough discussion of this section with all the data attached in the report by Steyn and de Villiers (2006).

[6] The FTE value of a full-time student who takes all the modules of an academic programme in a specific year will normally be about 1, but could differ depending on specific module choices. Weighted FTE students (WFTES) for an institution are equal to FTE contact tuition students plus 0.67×FTE distance tuition students (because the educational costs of distance education students are assumed to be 67% of the costs of full-time students).

pattern, although the rate of increase was much less than for the HDUs. The series of real expenditure per qualification awarded for HDTs is very volatile, partly since it is based on only two institutions, but in general expenditure came down from very high levels and have been fairly constant since 1993. Obviously the different student growth patterns at the 4 institutional groups over the study period play an important role in these unit costs.

Table 5. Real expenditure per qualification awarded according to HE group and year (in constant 2000 prices)

Group	Real expenditure per qualification awarded		
	1987	**1995**	**2003**
HAUs	120 581	105 225	123 924
HDUs	78 263	70 075	169 464
HATs	78 622	74 201	111 096
HDTs	213 259	95 589	96 966

The impact of the change in the composition of the income of HE institutions is twofold. Firstly, HE became more unaffordable for many prospective students because of the increase in tuition fees, and secondly, it seems as though high-level research and efficient teaching are hampered by the increasing teaching load for academic staff. In the next three sections these issues are discussed.

5.2 Impact on student debt

As a result of the high costs of HE and the availability of only a few financial support structures for students from poor communities, student debt increased substantially over the years. Data on student debt are available only for the 26 HE institutions classified into the four groupings for the years 2001-2003 and for student debt written off for the years 2000-2003. Although a complete analysis of the problem could not be conducted, the trend in Table 6 is clear. Student debt doubled over the period 2001-2003 and student debt written off increased by 102%. The actual situation may be even worse, because the institutions for which no data are available fall into the institutional groups where large debts could be expected.

Table 6. The size of accumulated student debt at 26 HE institutions in South Africa (R'000)

Year	Student debt	*Student debt written off*
2000	-	94 218
2001	669 031	120 383
2002	1 161 116	116 676
2003	1 337 410	190 208

Table 7. NSFAS allocations to HE[1)] sector in South Africa

Year	State budget for NSFAS (R'000)	Actual expenditure on NSFAS (R'000)[2)]	Number of awards	Average size of award (Rand)
1995	40 000	-	-	-
1996	300 000	333 343	73 140	4 558
1997	200 000	350 996	68 918	5 093
1998	296 388	394 495	75 720	5 210
1999	384 897	441 053	75 900	5 811
2000	437 400	510 801	83 769	6 098
2001	440 002	635 092	97 517	6 513
2002	489 000	733 473	101 312	7 240
2003	533 000	893 672	112 264	7 960
2004		985 000	113 693	8 664
2005		1 200 000	120 000	10 000

1) All HE institutions included.
2) Also including donor funds and repayment of NSFAS loans.

Because of the large student debt starting to accumulate in the early 1990s and to make HE more affordable to needy students, the National Student Financial Aid Scheme (NSFAS) was introduced in 1995.[7] As can clearly be seen in Table 7, the state allocation for NSFAS increased substantially over time and with donor receipts and the repayment of loans the actual expenditure increased by 260% from 1996 to 2005. (Note that in Table 7 all 36 HE institutions are included.) During the same time the annual number of awards increased by 64%. For the period 2000-2005 the expenditure increased by no less than 135%. It is clear that the NSFAS is becoming a priority for government. This scheme plays an important role to ensure that certain HE institutions do not run into cash flow problems as a result of outstanding student debt. The state has increasingly channelled more of its HE allocations

[7] Originally under the name Tertiary Education Fund of South Africa (TEFSA).

to the NSFAS scheme and HE institutions actually received a smaller percentage of the education budget as block grants to conduct their day-to-day business. The scheme has helped, however, to decrease student debt. As was shown in the previous section, one result of the changing income structure of HE institutions was that the increase in academic staff lagged far behind the increase in WFTES. The next two sections explore the implications of this on teaching and research activities.

5.3 Impact on qualifications awarded to students

Since the primary purpose of HE institutions is to provide graduates to society, the number of qualifications (degrees, diplomas and certificates) awarded annually by HE institutions is of great significance to any country. Since HE is very expensive for both the state and the students, it is important to measure the resources needed to produce a successful graduate. The annual ratio of qualifications awarded per lecturer gives a useful indicator that sheds some light on possible changes in the cost effectiveness or performance of the teaching process at HE institutions. The following performance indicators are useful in this regard:

Q/L ratio = *Total number of qualifications awarded per FTE instruction/research (academic) staff member.*

M/L ratio = *Total number of masters degrees awarded by a university per FTE instruction/research (academic) staff member.*

D/L ratio = *Total number of doctoral degrees awarded by a university per FTE instruction/research (academic) staff member*

3YD/L ratio = *Total number of 1st (3-year) national diplomas awarded by a technikon per FTE instruction/research (academic) staff member.*

Obviously other ratios could also be used, but the above were regarded as expedient. Tables 8 and 9 indicate the number of qualifications awarded to students per FTE instruction/research staff member at universities and technikons respectively for selected years during the period 1986 to 2003. The *Q/L* ratios, *M/L* ratios and the *D/L* ratios for the universities for the study period appear in the Table 8, while the *Q/L* ratios and the *3YD/L* ratios for technikons appear in Table 9.

Table 8. Qualifications awarded per FTE instructional/research (academic) staff member at universities[1]: 1986-2003

	All HAUs			All HDUs		
Year	**Total**	**Masters**	**Doctoral**	**Total**	**Masters**	**Doctoral**
1986	3.168	0.261	0.054	2.812	0.041	0.007
1990	3.353	0.267	0.055	3.999	0.058	0.012
1995	4.360	0.340	0.062	5.453	0.089	0.010
2000	4.537	0.444	0.064	4.218	0.135	0.019
2003	5.281	0.517	0.073	3.950	0.182	0.029

1) All universities included.

The *Q/L* ratio of universities (HAUs plus HDUs) increased by 60% - from 3.10 in 1986 to 4.97 in 2003. During the same years the technikons' (HATs plus HDTs) *Q/L* ratio increased by 55% from 3.54 to 5.50. These trends show that significant more 'products' were produced in the HE sector per lecturer in 2003 than in 1986. Table 8 shows some differences in the *Q/L* ratios for the two groups of universities. Although the ratio for the HDUs initially increased, the momentum could not be maintained and the value in 2003 is lower than the value of 1995. This can be attributed to the decrease in student numbers at these institutions since 1996. With only a few exceptions, the ratio for HAUs increased throughout the whole period under discussion. The trends in the ratios for the two groups of technikons, as shown in Table 9 are in line with the HAUs.

Although the increasing *Q/L* ratios are partly the result of a higher increase in student enrolments than in lecturer numbers during 1986-2003, it shows that the HE sector increased its academic efficiency significantly during the study period (1986-2003). This is specifically evident in the case of the HAUs and the HDTs. It is, however, difficult to say whether the HE system still has the capacity for further efficiency improvements and to what extent some institutions are already suffering from academic overload. An important question could also be asked whether such high *Q/L* ratios still conform to acceptable academic standards.

Table 9. Qualification awarded per FTE instructional/research (academic) staff member at technikons[1]: 1986-2003

	All HATs		All HDTs	
Year	Total	1st Nat Diploma	Total	1st Nat Diploma
1986	3.821	2.448	2.392	1.539
1990	5.189	3.808	2.991	2.188
1995	6.076	4.871	3.991	3.002
2000	4.883	2.930	4.585	3.830
2003	5.159	3.096	6.379	5.102

1) All technikons included.

The relative output in master degrees at universities, as measured by the M/L ratio, has doubled from 0.22 in 1986 to 0.44 in 2003. A continuous increase in this ratio during the whole study period is evident from Table 8 for both groups of universities, although the ratios for the HDUs are substantially lower than for the HAUs. Table 9 shows that the $3YD/L$ ratio for technikons is very similar to the Q/L ratio for technikons. This is not surprising, since the number of 1st (3-year) national diplomas awarded at technikons had comprised about 65% of all qualifications awarded at technikons during the study period.

Steyn and de Villiers (2006) have shown that the overall graduation rate[8] of universities showed a fairly constant rate during the period 1983-2003, while the graduation rate of technikons was declining over the same period. This is an indication that the already high drop-out rates of higher education students (see Table 9A of Department of Education (2005b)) are not declining, but that the situation is actually worsening. Increasing the number of graduates per FTE academic staff member seems a cost effective way to conduct HE business, but clearly this conceals major deficiencies in the academic progress of HE students.

5.4 Impact on research activities at HE institutions

Given the increases in student numbers without an accompanying increase in academic staff numbers, what has happened to research output at higher education institutions? The number of approved research output units (See Department of Education 1995: Report 014(95/10)) - also known as publication units (PU) - per FTE instruction/ research (academic) staff member, and the number of doctoral degrees awarded per FTE instruction/research (academic) staff member can be used as yardsticks to measure this. Reliable data on publication units for HE institutions are available only from 1993. These units for universities fluctuated around 5 300 a year during the period 1993-2003 with an all-time high of 5 606 in 2002. The total number of publication units of technikons increased rather dramatically from a very small base of 55 units in 1993 to 230 in 2003.

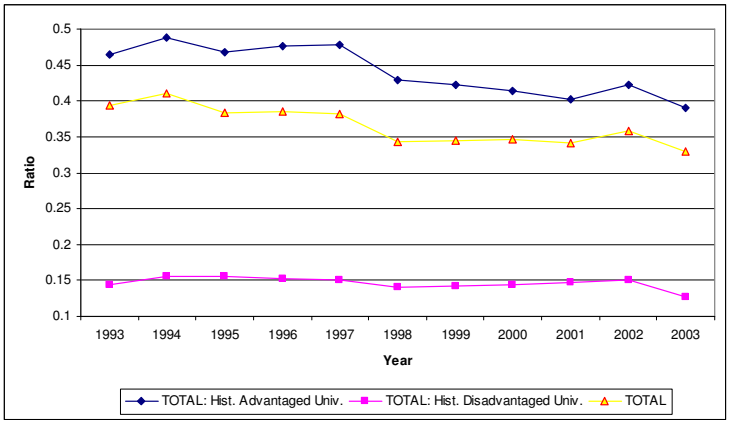

Figure 2. Publication units per FTE instruction/research personnel member for universities: 1993-2003

Figures 2 and 3 show the PU per FTE instruction/research staff member (PU rates) for the two institutional groupings for universities and the two groupings for technikons respectively. Clearly, the historically advantaged institutions' PU rates are about three times as high as the historically disadvantaged institutions' rates in both the university and technikon sectors. Although there was significant progress in research (as measured by the publication units) at technikons, especially in the last couple of years, their contribution is still relatively small compared to the research output of most universities.

[8] The overall graduation rate in a specific year equals the total number of qualifications awarded in a year divided by total headcount of students in the same year.

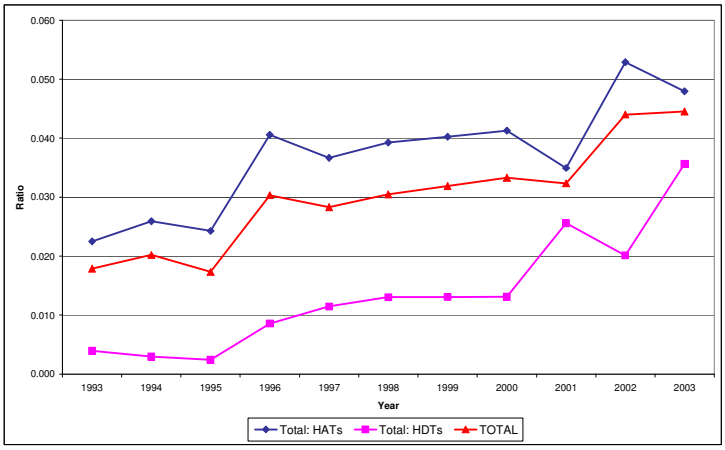

Figure 3. Publication units per FTE instruction/research staff member for technikons: 1993-2003

A disturbing observation is the decreasing trend in the PU rates at universities since 1997 (with the exception of 2002). The five universities with the highest publication numbers (in absolute terms but usually also in terms of PU rates) are annually responsible for about 60% of the total number of approved publications in the HE sector. According to Pouris (2003), the HE sector is responsible for 80% of the country's visible research output. These top five research universities are thus generating almost half of the worthwhile research in South Africa. It seems important to ensure that at least these universities will not become so pressurised by annually increasing *S/L* ratios that they lose the edge on their research capacity. There are indications that this is already happening as the PU rates of HAUs dropped by 20% from 1997-2003.

There was a steady increase in the number of doctoral degrees awarded per FTE instructional/research staff member at both HAUs and HDUs during the years 1986 to 2003. Although the HDU ratio is still much smaller than the HAU ratio, these increases are very positive signs. They clearly show that the capacity to train researchers at universities has been enhanced. The challenge seems to be to convert this enhanced capacity into significant increases in high-quality research output. More resources are needed to enable the institutions to do that.

6. FUTURE SCENARIOS OF GOVERNMENT FUNDING OF HIGHER EDUCATION IN SOUTH AFRICA

Will the financial situation in the HE system in South Africa continue to deteriorate? One could propose that total public higher education expenditure should at least stay constant as a percentage of GDP. This means that the growth in public higher education expenditure should keep pace with the growth in the economy. From Table 2 it can be deduced that on average higher education expenditure in South Africa was 0.746% of GDP for the period 1987-2006 (although there has been a clear declining trend for the last 7 years). From 1987-1994 (in other words without NSFAS awards) the public sector's contribution to higher education was almost the same, namely 0.760% of GDP. The sizes of the NSFAS awards for the period 2000-2006 varied between 0.042% and 0.057% of GDP. In Table 3 it was indicated that an international benchmark in 2001 for public higher education expenditure based on 84 countries was 0.81% of GDP, with the average for 15 African countries even higher at 0.85%.

To keep the financing of higher education in South Africa on the levels experienced elsewhere in the world, non-NSFAS higher education expenditure should be 0.756% of GDP, if we assume that a further 0.054% (the latest value, namely for 2006) will in future be awarded through the NSFAS awards (*Scenario 1*). In Table 2 it was shown that state allocation to higher education in 2006 is R11 187 million and according to Scenario 1 should thus increase to R15 188 million in 2007. This amount, as well as the calculated allocations for the years 2008-2011 based on the BER estimates for GDP until 2011, is shown in Table 11. Note that the allocations for HE institutional restructuring for the years 2003-2008 are excluded from the above calculations, since these ad hoc allocations will be phased out within a few years. According to this scenario, expenditure on higher education should increase by 105% over the 5-year period 2006-2011 in nominal terms. This is probably much higher than what the Treasury is currently budgeting for. According to the MTEF estimate, R12 169 million will be allocated to higher education in 2007 and R13 185 in 2008 (Ministry of Education 2006). This is already more than

R3 billion less than the 2007 and almost R3.6 billion less than the 2008 allocation under Scenario 1.

Scenario 2 assumes a total higher education expenditure (including NSFAS) of 0.746% of GDP for the forecasted period. This is to keep total higher education expenditure on the average level that it has been during the last 20 years, namely 1987-2006. The NSFAS allocations are assumed to be the same as in Scenario 1. These calculations are also given in Table 11 and this scenario will require an 89% increase in HE expenditure over the period 2006-2011. The 2007 estimated allocation under this scenario is more than R1.8 billion higher than the present MTEF budget estimate of government for 2007 and almost R2.3 billion more than the MTEF budget for 2008.

Scenario 3 assumes that the most recent confirmed (but very unsatisfactory) situation of a state higher education allocation of 0.657% of the GDP for the year 2006 is to be maintained for 2007-2011. This will require a nominal increase of 66% over the period 2006-2011. If the present MTEF figures are used as a yardstick, it is rather disturbing to note that even Scenario 3 shows that the estimated higher education allocation for 2008 is R428 million higher than the present MTEF budget estimate of government for 2008.

Table 11. Public expenditure on higher education: Different scenarios using higher education expenditure as percentage of GDP as yardstick (R million)

Year	Estimated nominal GDP[1)]	Formula & ad hoc allocations[2)]	NSFAS awards	Total HE Expenditure
Actual allocations				
2003	1 257 026	8 102	533	8 635
2004	1 386 658	8 786	578	9 364
2005	1 523 255	9 351	864	10 215
2006	1 701 506	10 261	926	11 187
MTEF Estimates				
2007		11 056	1 113	12 169
2008		12 010	1 175	13 185
Scenario 1: Keep HE expenditure at 0.81% of nominal GDP				
2007	1 875 094	14 176	1 013	15 188
2008	2 072 027	15 665	1 119	16 783
2009	2 302 511	17 407	1 243	18 650
2010	2 569 048	19 422	1 387	20 809
2011	2 832 673	21 415	1 530	22 945
Scenario 2: Keep HE expenditure at 0.746% of nominal GDP				
2007	1 875 094	12 976	1 013	13 988
2008	2 072 027	14 338	1 119	15 457
2009	2 302 511	15 933	1 243	17 177
2010	2 569 048	17 778	1 387	19 165
2011	2 832 673	19 602	1 530	21 132
Scenario 3: Keep HE expenditure at present 0.657% of nominal GDP				
2007	1 875 094	11 307	1 013	12 319
2008	2 072 027	12 494	1 119	13 613
2009	2 302 511	13 884	1 243	15 127
2010	2 569 048	15 491	1 387	16 879
2011	2 832 673	17 081	1 530	18 611

1) GDP values for 2003-2005 as published by SARB (2006). For 2006-2011 BER (2006) estimates are used.
2) Amounts exclude institutional restructuring (merger) funding.

The MTEF budget estimate for 2007 is estimated to be only 0.649% of GDP. For 2008 it is even lower at 0.636% of GDP (see Table 2). Using this GDP measure, the 2008 higher education allocation, if not adjusted, will represent a 5.2% decrease in the funding level of 2005. This is a worrying trend in a sector that is plagued by a shortage of resources in its effort to empower enough students with the skills that the economy needs urgently. This is the case despite the AsgiSA initiatives whereby the government wants to accelerate the economic growth rate to halve unemployment and poverty by 2014. In the AsgiSA policy document it is clearly stated that the "single greatest impediment is shortage of skills" (RSA 2006). This will put even more strain on the higher education sector to deliver sufficient numbers of well-trained workers to the labour market and also deliver high-quality research output. However, the introduction of the Joint Initiative for Priority Skills Acquisition (JIPSA) in March 2006, with an initial timetable of 18 months to identify the most urgent skills needs and find solutions for the problem, is a step in the right direction. According to the MTEF figures, however, it seems as though there will not be much financial relief for the higher education sector in South Africa in the near future.

Another way to look at higher education funding is to assume that the state's contribution per weighted FTE student should at least remain constant in real terms. This implies that the expenditure per student following a specific academic programme should increase annually with the anticipated inflation rate. Total expenditure on higher education by the state will then be dependent on assumptions concerning enrolment trends in higher education. There was a steep decline in the per capita state allocation per weighted FTE student from about R30 000 in 1987 to about R20 000 in 1992. Since then the real per capita allocation fluctuated around R20 000 per annum with the latest rand amounts per WFTES available for 2003 and 2004 being R 19 493 and R20 282

respectively.

Table 12. CPI inflation and public higher education allocations per WFTES for 2004 and estimated per WFTES allocations for 2005-2011 for the allocations to remainconstant in real terms

	2004	2005	2006	2007	2008	2009	2010	2011
Headline CPI inflation	1.4%	3.4%	4.7%	6.6%	4.8%	4.2%	5.1%	4.6%
Allocations per WFTES	20 282	20 972	21 957	23 406	24 530	25 560	26 864	28 100

In Table 12 the inflation rates predicted by the BER (2006) are given for the years 2006 to 2011, as well as the nominal higher education state allocation per WFTES. These nominal allocations were calculated in order for the relative allocations to remain constant in real terms at the 2004 level of state expenditure per WFTES; in other words, expenditure per WFTES must increase with the anticipated inflation rate. This implies that R28 046 must be spent by the state per WFTES in 2011 to have the same buying power as was the case in 2004. This method thus assumes that educational expenditure per WFTES increase by the same percentage as is the case with the general price level. This assumption is conservative and open to criticism, since there is a general opinion that HE inflation could be higher than CPI inflation.

In Table 13 different WFTES growth-rate scenarios are considered and for each scenario the higher education allocations are calculated on the assumption that higher education allocations per WFTES will remain constant in real terms for 2004-2011. Note that while the HE allocations are already available for 2005 and 2006, the most up to date official WFTES numbers are for 2004. Therefore, we treat the state higher education allocations for 2005 and 2006 as unknown.

Table 13. State HE allocations in nominal and real terms for different growth rates in WFTES on the assumption that the real state HE allocations per WFTES will remain constant for 2004-2011

(R millions)

Year	State HE allocation keeps track only with increases in student numbers	State HE allocation keeps track with increases in price and student numbers
MTEF budget estimates		
2006		11 187
2007		12 169
2008		13 185
Scenario 4: WFTES stay at 2004 level		
2004	9 364	9 364
2005	9 364	9 682
2006	9 364	10 137
2007	9 364	10 807
2008	9 364	11 325
2009	9 364	11 801
2010	9 364	12 403
2011	9 364	12 973
Scenario 5: WFTES increase by 1.33% per annum		
2004	9 364	9 364
2005	9 489	9 811
2006	9 615	10 409
2007	9 743	11 243
2008	9 872	11 940
2009	10 003	12 607
2010	10 137	13 426
2011	10 271	14 230
Scenario 6: WFTES increase by 2.67% per annum		
2004	9 364	9 364
2005	9 614	9 941
2006	9 871	10 686
2007	10 134	11 695
2008	10 405	12 584
2009	10 683	13 463
2010	10 968	14 527
2011	11 261	15 601
Scenario 7: WFTES increase by 4% per annum		
2004	9 364	9 364
2005	9 739	10 070
2006	10 128	10 965
2007	10 533	12 156
2008	10 955	13 249
2009	11 393	14 358
2010	11 848	15 693
2011	12 322	17 072

The first scenario in this approach (S*cenario 4*) to higher education budget estimates is a baseline scenario where the WFTES numbers remain constant at the 2004 level until 2011. The second column of Table 13 gives the higher education allocations which do not provide for inflation (in other words, constant nominal allocation per

WFTES) and are only included for comparative purposes. The more important figures are the higher education allocations in the last column that indicate allocations which have the characteristic that the real per WFTES allocations remain constant from 2004 to 2011. The NSFAS allocations are assumed to be the same for the years 2004 to 2011 as given in Table 11 and only the total allocations (excluding restructuring/merger funding) are therefore given in Table 13. If the higher education allocations per WFTES were to stay the same in real terms, they should increase by 39% from 2004 to 2011 under scenario 4, and by 28% from 2006 to 2011. As expected, the allocations for 2005 and 2006 are much lower than the actual allocations (see Table 11) and also lower in 2007 and 2008 than the MTEF budget estimates of R12 169 million and R13 185 million respectively. It must be noted that a scenario with no student growth in the higher education sector in South Africa can hardly be seen as realistic.

With *Scenario 5* we assume that the number of weighted FTE students increases by 1.33% per annum. For per capita higher education allocations to stay constant in real terms they must increase by 52% from 2004 to 2011 and by 37% from 2006 to 2011. In this scenario the allocations for 2005 and 2006 are still lower than the actual allocations (See Table 11) in these years and also lower in 2007 and 2008 than the MTEF budget estimates.

With *Scenario* 6 we assume annual student growth of 2.67%. In order for per capita higher education allocation to remain constant in real terms, Table 13 shows that higher education allocations must increase by 67% from 2004 to 2011 and by 46% during 2006-2011. In this scenario the allocations for 2005 and 2006 are lower than the actual allocations (see Table 11) in these years, and the higher education allocation for 2007 is R447 million less than the MTEF budget estimate of R12 169 million for 2007 and in 2008 it is R601 million less than the MTEF estimate of R13 185 million for 2008.

The last scenario (*Scenario* 7) assumes a relatively high annual increase of weighted FTE students of 4% per annum (seen from the perspective of the Minister of Education, who introduced restrictions on FTE student growth to about 3% per annum in determining block grants for higher education institutions for 2005-2007. In order for per capita higher education allocations to remain constant in real terms, Table 13 shows that HE allocations must increase by 82% from 2004 to 2011 and by 56% from 2006 to 2011. Also in this scenario the allocations for 2005 and 2006 are higher than the actual allocations (see Table 11). The higher education allocation for 2007 is almost identical to the MTEF budget estimate of R12 169 million for 2007, but in 2008 it is R64 million more than the MTEF budget estimate of R13 185 million.

Using this method, the MTEF estimates mean that at least real per capita expenditure per WFTES will be maintained or increased slightly from their present unsatisfactory low values. This is also the consequence of the latest upward revision of the MTEF estimates (see Ministry of Education 2006). The value for 2006 was increased from R10 854 million to R11 187 million and the 2007 value was increased from R11 536 million to R12 169 million. One could argue that with the higher than expected realised economic growth rates in 2004 and 2005, which led to higher tax collection than was budgeted for, these values could have been increased more substantially, especially since HE in South Africa is clearly under-funded.

7. CONCLUSIONS

Since higher education displays characteristics of both private and public goods, it is difficult to determine scientifically the magnitude of the total private gain (direct and indirect) derived from higher education. The private and public advantages of higher education have yet to be quantified. Available rates of return do, however, indicate that private investment in higher education is profitable, although research in specific developing countries in this regard is very limited.

Although government spending increased in the previous century, the government's share of the funding of higher education relative to the private contribution is currently decreasing worldwide. Europe especially seems to be looking for ways in which to increase private contributions to higher education. Government funding still remains the most important source of income for higher education institutions worldwide. All countries make provision for students from poor communities in various ways. The income-contingent loan scheme of the UK has application potential for South Africa, especially if something similar could be implemented on the postgraduate level initially.

At first glance it may look as though the higher education sector in South Africa has become more efficient because graduates are 'produced' at lower real costs than before. This is, however, a direct result of the relative decrease in the share of the budget that is devoted to higher education. There are definite indications that it is

becoming increasingly difficult for lecturers to maintain their teaching and research activities at HE institutions. Academic standards in respect of teaching could also be jeopardized. According to the MTEF of the government, the situation in higher education will not improve in the near future. This is the case despite the AsgiSA initiatives, which acknowledge the shortage of skills as the main factor that may result in lower economic growth rates being realised. However, if funded properly, HE could play a major role in this initiative.

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