

An economic approach of higher education in Brazil*

Jean-Jacques Paul**

Laurence Wolff***

Summary: 1. Introduction; 2. Description and history of the system; 3. Diversity of course offerings in public and private institutions; 4. Internal efficiency; 5. The costs of higher education; 6. Socioeconomic background of students; 7. The labor market for graduates; 8. Conclusions.

Higher education in Latin America is considered by many to be in a state of crisis. In Brazil this is certainly the case. In the press and regularly in meetings and discussions in Brazil there is a growing debate about whether public education is excessively costly, inequitable, and inefficient, about the proper role of private institutions, and overall on how the system should change to meet the challenges of the 21st century. A major problem in this debate is a lack of real data and information on the issues under discussion. The purpose of this paper is to provide better information on these points of debate.

Specifically, this paper seeks to answer the following questions: to what extent do public institutions in Brazil have a different mission than private institutions? What is the internal efficiency of the various types of Brazilian higher education institutions, in terms of percentage of entering students who graduate and number of years to produce a graduate? What are the comparable unit costs of public and private institutions and what is the explanation for this difference? What is the socioeconomic background of students attending the various types of higher education institutions? What kinds of jobs do graduates of various types of higher education institutions get?

Muitos consideram que o ensino superior na América Latina está em estado de crise. Na imprensa e em reuniões e discussões no Brasil, há um debate crescente acerca dos custos elevados, da falta de equidade e da ineficiência do ensino superior; do papel das instituições particulares e, sobretudo, como o sistema deveria mudar para enfrentar os desafios do século XXI. A grande dificuldade do debate é a falta de dados e informações sobre os assuntos em discussão. O objetivo deste artigo é fornecer mais informações sobre esses aspectos do debate.

Mais especificamente, este artigo tenta responder às seguintes perguntas: em que medida as instituições públicas têm um papel diferente das instituições particulares? Qual a eficiência interna dos vários tipos de ensino superior no Brasil, em termos de proporção dos alunos ingressantes que concluem o curso e do tempo necessário para produzir um graduado? Quais os custos unitários das instituições públicas e particulares e como se explica essa diferença? Qual é a origem sócio-econômica dos alunos matriculados nos vários tipos de ensino superior? Que tipo de emprego os formados nos vários tipos de ensino superior obtêm?

1. Introduction

Higher education in Latin America is considered by many to be in a state of crisis. In Brazil this is certainly the case. In the press and regularly in meetings and discussions in Bra-

* Paper received in Aug. 1994 and approved in Feb. 1995. This paper is part of a larger research effort on issues related to education, economic growth, and inequality in Brazil, under the direction of Nancy Birdsall and Richard Sabot. The authors are grateful for comments provided by Julian Schweitzer, Nancy Birdsall, Jamil Salmi, George Psacharopoulos and two anonymous referees.

** Senior researcher at the Institut de Recherche sur l'Economie de l'Education (Iredu), Centre National de la Recherche Scientifique, Dijon, France. A part of the data used in this paper has been gathered when he was an associate professor at the Federal University of Ceará.

*** A staff member of the World Bank.

zile there is a growing debate about whether public education is excessively costly, inequitable, and inefficient, about the proper role of private institutions, and overall on how the system should change to meet the challenges of the 21st century. A major problem in this debate is a lack of real data and information on the issues under discussion. The purpose of this paper is to provide better information on these points of debate. Specifically, this paper seeks to answer the following questions:

(a) To what extent do public institutions in Brazil have a different mission than private institutions through specialization in high cost science and technology and other programs, while private institutions offer lower-cost, market-oriented programs?

(b) What is the internal efficiency of the various types of Brazilian higher education institutions, in terms of percentage of entering students who graduate and number of years to produce a graduate?

(c) What are the comparable unit costs of public and private institutions and what is the explanation for this difference?

(d) What is the socioeconomic background of students attending the various types of higher education institutions?

(e) What kinds of jobs do graduates of various types of higher education institutions get?

It should be emphasized that this paper provides partial and incomplete answers to all of these questions, since it is based on secondary analysis of existing data on all institutions and on detailed surveys of individual rather than all institutions. With this caveat, it is hoped that the conclusions of this paper will put our understanding of higher education in Brazil on a firmer factual basis, and will also provide some guidelines for similar analysis of higher education in other countries in Latin America.

2. Description and history of the system

Higher education enrollment in Brazil has grown over the past 30 years from less than 100,000 in 1960 to nearly 1.6 million in 1989. The overall gross enrollment ratio is now 12%. Growth was particularly rapid in the period 1965-80. Figure 1 summarizes growth of public and private institutions.

Currently, federal institutions, most of which are universities, account for 22% of enrollments. State institutions enroll an additional 13%, with the vast majority in São Paulo and Paraná. Municipal institutions, also mainly in the Southeast and South, enroll 5% of students. The proportion of private education has grown from 44% in 1965 to 60% in 1989. Private institutions are generally divided between secular institutions (44%) and those with religious, mostly Catholic affiliation (16%). Higher education is further divided between universities, with 51% of enrollment, and free standing faculties or schools, or groups of schools, with 49% of enrollment. Crossing the major categories, higher education in Brazil can be divided as follows:

Figure 1
Evolution of enrollment in higher education in Brazil

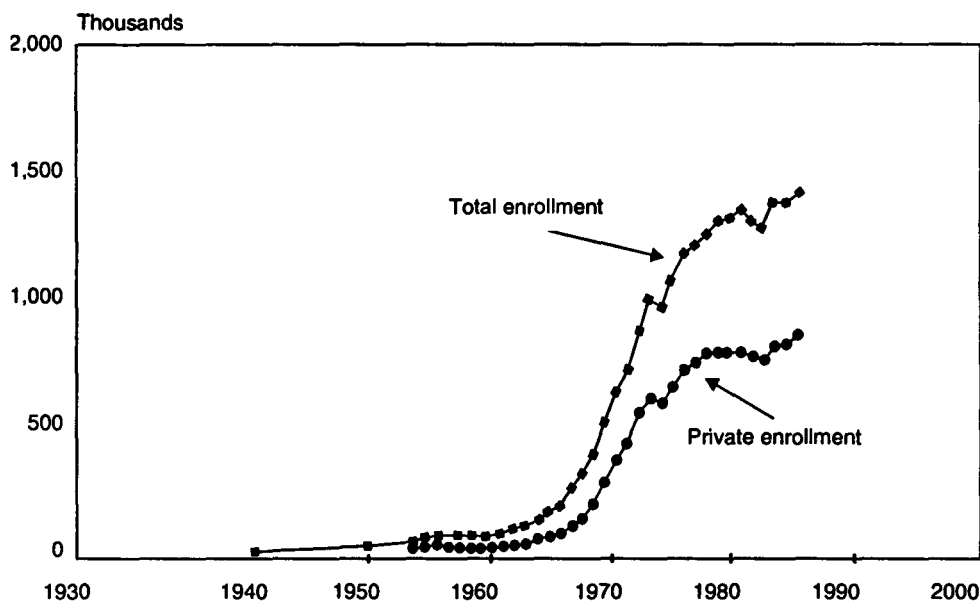


Table 1
Enrollment by governing authority and institutional type, 1960, 1975, 1985, 1989

	1960	1975	1985	1989	% of total
Federal	34,986	248,849	344,617	340,203	22
Universities		236,595	330,178	323,675	21
Non-universities		12,254	14,439	16,529	1
State	16,062	107,111	160,067	211,946	13
Universities		58,196	117,692	154,386	10
Non-universities		48,915	42,375	57,560	3
Municipal	867	54,265	83,342	75,434	5
Universities		4,143	15,414	21,663	2
Non-universities		50,122	67,928	53,771	3
Private	41,287	662,323	817,309	943,276	60
Universities		166,996	242,974	363,512	23
Non-universities		495,327	574,335	579,765	37
Aggregate total	93,202	1,072,548	1,405,335	1,570,860	100

Source: MEC.

Note: Figures for 1960 and 1975 do not include graduate enrollment, which is estimated as less than 2%.

Higher education institutions in Brazil are diverse in terms of institutional mission, costs, and quality. Two state universities (in São Paulo) have high quality undergraduate programs and enroll 1/4 of all Brazil's graduate students. About 12 federal institutions and two private Catholic universities offer undergraduate programs, which are reported to be of relatively

good quality. Private higher education can be divided into three types: (a) the higher quality Catholic institutions; (b) other private universities, both religious and secular; and (c) a large number of "isolated faculties", run essentially as businesses, and offering low cost education, usually through night classes.

3. Diversity of course offerings in public and private institutions

It has been hypothesized that public institutions would have greater enrollment in higher cost and more traditional courses of study, specially in science, engineering, and the arts, since they have larger and more stable sources of financing, while private institutions would be more likely to have enrollments in lower cost areas such as law and social sciences as well as in courses more closely tied to the evolving labor market, such as data processing. As can be seen in annex table, federal and state institutions have higher percentages of enrollment (significantly above their overall 22% of enrollment) in the more costly areas of agronomy, pharmaceuticals, veterinary science, medicine, engineering, physics, chemistry, geology, and nursing. Federal institutions also predominate in the traditional areas of library science, music, and statistics. In comparison, private institutions predominate in administration, accountancy, pedagogy, general science, law, and social studies, all of which are traditionally considered lower cost courses of study, as well as data processing, architecture, psychology, and social communications. However, as can be seen in the annex table, private institutions also enroll significant numbers of students in the traditional high-cost areas. For example, 42% of all enrollments in medicine and 50% of all enrollments in engineering are in private institutions.

It can be noticed an opposition between private universities to state and municipal institutions. In this case, public institutions appear to be more involved in the preparation of teachers, including the liberal arts subjects of history, science, literature, and geography. In comparison, private universities are more heavily involved in data processing, architecture, psychology, and social communications. Law is covered equally by these two types of institutions.

State and municipal institutions appear to have some of the characteristics of both federal and private institutions. At the same time, there are significant differences among the private institutions. For example, the private faculties are more linked to the liberal arts teaching careers, while the private universities focus more on data processing, psychology, and social communication. The religious institutions predominate in philosophy.

Overall, it is clear that the various types of institutions do specialize as hypothesized. A further corroboration of this would be in examining graduate enrollment. More than 50% of total graduate enrollment is in federal institutions. An additional 35% is in the two São Paulo state institutions of USP and Unicamp. Only about 20% of all graduate enrollment is in private institutions, mainly PUC-Rio (science and engineering) and PUC-São Paulo (social science). But it is important to note that, while there is a relative specialization, there is no monopoly: the same course of study is supplied by more than one type of institution and vice versa. This result signifies that the student, once he selects his field of study, can choose among various types of institutions.

4. Internal efficiency

Internal efficiency in higher education can be measured in two ways — percentage of entering students who graduate, and the number of years to produce a graduate. For both of these measures, available data must be interpreted and estimated. The concept underlying this study is that of educational production function, as presented by Hanushek (1986). The objective is to identify two parameters of this function: the completion rate and the numbers of years to produce a graduate. Output will be considered later, at a micro level, through the earnings of the graduates.

Completion rates

To measure the percentage of entrants who graduate, a usual approach is to get a ratio of entering students five years earlier to graduates in the current year. This data was not available. It was therefore necessary to use entering and completion data for the same year (1988). As enrollment in higher education has been relatively static in the 1980s, this approach does not bias the results significantly. The raw data is based on 3,007 observations of enrollment by institutions and course of study made available by the Ministry of Education. Based on the data used, the overall completion rate for the entire higher education system is estimated at about 50%.

There are several hypotheses to be tested. The first is that students attending institutions which charge tuition (e.g., private institutions) are more likely to complete their courses rapidly. The second is that more selective institutions will have better flow rates, since students would be more academically able and therefore less likely to drop out than those in the less selective institutions. This data was available, and institutions were divided among those which accepted more or less than one-third of their applicants. A third hypothesis would be that courses of study with expected higher earnings would retain students better, and they would complete their courses more rapidly. To test this hypothesis, published estimates on average earnings for four main courses of study (in the *Guia de Estudante*, a commercially prepared guide for entering students) were used. It was assumed that literature and humanities have low earnings and low selection criteria; while engineering and health have high earnings and high selection criteria, and therefore should have higher internal productivity. Other hypotheses are that institutions with large enrollments have lower productivity, that night schools have lower productivity, and that older institutions and programs have higher productivity.

Data on all the above, along with 3,007 observations of enrollments by course of study and institutions, were entered into a regression equation, the results of which are summarized in table 2. The dependent variable in the equation is $\text{Log} [\text{PROD}/(1-\text{PROD})]$, where PROD is the estimation of the completion rate. This variable was estimated by an ordinary least squares regression.

Table 2
Productivity equations

Variable/modality	Productivity equations	
	Parameter	Marginal effect (%)
Administrative status and initial selectivity		
Federal and $R \leq 3$	Omitted	
Federal and $R > 3$	0.380***	9.5
State and $R \leq 3$	-0.162	
State and $R > 3$	0.550***	13.8
Municipal and $R \leq 3$	0.012	
Municipal and $R > 3$	0.639***	16.0
Secular priv. and $R \leq 3$	0.144	
Secular priv. and $R > 3$	0.795***	19.9
Religious priv. and $R \leq 3$	0.108	
Religious priv. and $R > 3$	0.612***	15.3
Kind of organization		
University	Omitted	
Federation of faculties	0.009	
Independent faculties	0.105***	2.6
Field		
Exact sciences	-0.237***	-5.9
Biological sciences	0.144	
Engineering	-0.150	
Health	0.851***	21.3
Agrarian sciences	0.602***	15.1
Social sciences	-0.011	
Humanities	0.182*	4.6
Literature	Omitted	
Shift		
Day	Omitted	
Night	-0.101	
Number of admissions		
Adm. ≤ 50	0.137*	3.4
$50 < \text{Adm.} \leq 80$	0.142**	3.6
$80 < \text{Adm.} \leq 130$	0.146**	3.7
Adm. > 130	Omitted	
Date of creation		
Before 1971	0.225***	5.6
1971 and after	Omitted	
Intercept	-0.649***	
R^2	0.1279***	
N	3,007	
Average productivity	0.502	

Level of significance: * 10%; ** 5%; *** 1%.

With regard to administrative status and selectivity, it appears that institutional selectivity has a strong effect on completion rates within each type of institution. This effect ranges from 9.5% in federal institutions to nearly 20% in secular private institutions. However, the kind of organization appears to have no, or little effect, on completion rates, with the exception that free-standing faculties have slightly better completion rates (2.6%).

With regard to field, health has the best completion rates, proving the hypothesis that courses of study with high selectivity and high pay retain students. However, agrarian sciences also retain students, while engineering, which would be expected to have a high completion rate, does not do any better than literature and social sciences. This may be a result of the possibly excessively high economic demand set by the teaching staff with the result that students drop out of engineering into less demanding courses. Such a result should be examined more deeply, bearing in mind the long-term needs of the country for engineering manpower.

The equation reveals no difference between day and night courses. It shows some minor increases in completion rates of courses enrolling less than 130 students, as well as some minor increases in completion ratios for courses established before 1971.

Years to produce a graduate

Using available data from MOE it is possible to estimate the number of years to produce a graduate. This estimate requires an assumption that dropouts on average complete half the course. This assumption has been proved correct in studies of three universities in Ceará; but it would have to be empirically tested elsewhere. Assuming that this is the case, we can draw the following equations for total enrollment (ENR), new enrollees (ADM), dropouts (DROP), graduates (GRAD), and the time to produce a graduate:

$$\text{ENR} = \text{GRAD} \times \text{TIME} + \text{DROP} \times \text{TIME}/2$$

$$\text{WITH DROP} = \text{ADM} - \text{GRAD}$$

It follows that:

$$\text{TIME} = \text{ENR}/(\text{GRAD} + \text{DROP}/2)$$

Table 3 summarizes the results by type of institution.

Table 3
Time to produce a graduate
(years)

Type of institution	Time
Federal universities	6.1
Federal faculties	5.1
State universities	5.0
State faculties	4.1
Municipal universities	4.1
Municipal faculties	3.7
Secular universities	4.4
Federations of secular faculties	4.0
Secular faculties	4.0
Religious universities	4.8
Federations of religious faculties	4.3
Religious faculties	3.8
Mean	4.5

As can be seen, the average number of years to produce a graduate is 4.5 years. Federal universities take the longest period of time (6.1 years), while free standing state, municipal and private faculties take the shortest period of time — about 4 years. However, each course of study has a different formal length, ranging from medicine (6 years) to engineering (5 years), to a number of three year courses, especially in teaching. To try to break down these differences, a regression equation similar to that for completion rates was built up (table 4), which considered TIME as the dependent variable. This shows that type of institutions appears to be more important than length of course.

Table 4
The production time equations

Variable/modality	Parameter
Administrative status and initial selectivity	
Federal and $R \leq 3$	Omitted
Federal and $R > 3$	-0.365**
State and $R \leq 3$	-1.973***
State and $R > 3$	-1.141***
Municipal and $R \leq 3$	-2.547***
Municipal and $R > 3$	-1.225***
Secular priv. and $R \leq 3$	-2.214***
Secular priv. and $R > 3$	-1.199***
Religious priv. and $R \leq 3$	-2.128***
Religious priv. and $R > 3$	-1.331***
Kind of organization	
University	Omitted
Federation of faculties	-0.654***
Independent faculties	-0.184***
Field	
Exact Sciences	-0.146
Biological Sciences	-0.583*
Engineering	0.131
Health	-0.347**
Agrarian Sciences	-0.041
Social Sciences	0.171
Humanities	-0.374***
Literature	Omitted
Number of admissions	-0.001***
Date of creation	-0.012***
Intercept	-0.649***
R^2	0.2391***
N	3,015
Average time	4.51

Level of significance: * 10%; ** 5%; *** 1%.

The equation shows that even when entering the course of study, type of institutions is the most important. The exception is health and humanities (teaching) which present a shorter length of study than literature. Productivity is the lowest in federal institutions and the highest in municipal and private institutions.

In short, federal institutions have the lowest internal productivity, while private institutions have the highest. This is in accordance with human capital theory, which assumes that students paying for their studies will be motivated to complete them more rapidly. On the other hand, it may be that private institutions, not wishing to discourage their fee paying students, have lower standards. From this point of view, it will be important to examine performance in the labor market of the graduates of the different types of institutions, to get some measure of quality.

5. The costs of higher education

There is currently a great deal of debate over the costs of higher education in Brazil. It is alleged that public higher education is excessively costly. Reliable data on costs are difficult to estimate, and it is all but impossible to break down costs by the traditional categories of teaching, research, student services, and administration. Furthermore, the high rate of inflation and fluctuating exchange rates in Brazil mean that international comparisons can be very misleading, especially when the exchange rate from one month to another can vary by as much as 30%. It is particularly difficult to get reliable estimates of costs for private institutions.

Costs of private higher education

A previously unused source of information for the costs of private higher education is that of the data gathered by the Caixa Econômica Federal (CEF) on tuition charges in private institutions. This data is relatively reliable because CEF manages the student loan scheme and pays tuition directly to private institutions; therefore the figure should be a fairly good estimate of costs in those private institutions which receive relatively little from other sources, such as investments, government subsidies, and private contributions. With the exception of a few of the larger Catholic institutions, these additional sources of income are minimal. The year of the data is the second semester of 1989. The fees are translated into US dollars on the basis of the exchange rate of July 1989, when the fees were supposed to be paid.

Table 5 summarizes the results of the data for eight types of private institutions¹ in accordance with the breakdowns described previously, and also broken down by four categories of courses of study — social science and administration, science and engineering, health, and humanities and teaching.

¹ It should be noted that municipal institutions are permitted to charge fees and most of them are private in all but name.

Table 5
Annual fees per institution and per course of study
(US\$ 1989)

	Administration	Science	Health	Humanities
Municipal universities	1,930	1,952	2,652	1,452
Municipal faculties	1,225	1,331	1,613	592
Secular universities	1,781	2,324	3,233	1,717
Fed. secular faculties	1,744	2,174	2,166	1,781
Ind. secular faculties	1,413	2,148	3,106	1,253
Religious universities	1,745	2,387	3,528	1,842
Fed. religious faculties	1,253	1,633	2,566	1,530
Ind. religious faculties	750	1,496	2,143	1,055

As can be expected, tuition is the highest in the health sciences, where it ranges from US\$1,500 to US\$3,500, followed by science and engineering, where it ranges from US\$1,500 to US\$2,400. Tuition is the lowest in the social sciences and humanities, where it ranges from less than US\$600 to a maximum of US\$1,800. In general, the municipal institutions and the religious faculties have the lowest fees, while the private universities have the highest fees.

A model was built to examine these differences in greater detail. The dependent variable is the logarithm of the annual fees. The explanatory variables are the course of study and the type of institution. One hypothesis to be tested was that institutions in poorer parts of the country might charge lower tuition. Therefore the state's per capita income was built into the model. The results of the model are shown in table 6.

Table 6
Equation of logarithm of annual fees

	Coefficient	Elasticity ⁴ (%)
Per capita income ¹	0.0078***	0.78
Administration ²	0.0610**	6.09
Science ²	0.3173***	30.60
Health ²	0.6088***	52.73
Municipal universities ³	-0.1599**	-15.85
Municipal faculties ³	-0.6564***	-55.42
Fed. secular faculties ³	-0.0676*	-6.75
Ind. secular faculties ³	-0.2032***	-20.03
Religious universities ³	0.1311***	13.03
Fed. religious universities ³	-0.1135***	-11.30
Ind. religious universities ³	0.3834***	-36.33
Intercept	6.5881***	
R ²	0.3964***	
N	1802	

Level of significance: *10%; ** 5%; *** 1%.

¹ In US\$.

² Compared with Humanities.

³ Compared with secular universities.

⁴ Computed according to the Kennedy's formula. Cf. Kennedy, P. Estimation with correctly interpreted dummy variables in semi-logarithmic equations. *A.E.R.*, 71(4), 1981.

The results of the model show, first, that per capita income by state appears to have a significant effect on fees. A 1% increase in the per capita income is accompanied by a 0.78% increase in the fees. As can be expected, health sciences are 52% more expensive than humanities, followed by science, 31% more expensive, and social science, 6% more expensive. Municipal faculties are the least expensive, followed by religious faculties. Secular and religious universities are the most expensive. This is more than likely a result of the higher quality offered by these institutions.

Costs of public education. International comparisons

Unit costs in federal institutions in 1988 are estimated at US\$7,930 per student (Paul and Wolyneck, 1990). This estimate is based on official statistics of enrollment and the MOE budget, using official exchange rates prorated on a monthly basis during 1988. Francisco Gaetani and Jacques Schwartzman (1991) argue that these unit costs would be about 40% lower if the parallel rather than the official exchange rates were used, which would put the federal institutions in a more favorable light in international comparisons. Gaetani and Schwartzman also argue that unit costs would be reduced by an additional 25% if the costs of university hospitals (about 10% in many institutions) as well as the costs of payments to retired teachers (estimated at 15% for some institutions) were discounted from the overall budget. However, retirement costs may be considered a part of wages. In addition, most developing countries have a fluctuating gap between the official and parallel exchange rates, and the cost of retirees as well as hospitals are often included in international estimates.

Because the main determinant of costs in higher education worldwide is teaching, which normally accounts for 70% of higher education costs, the use of student-teacher ratios, which are not subject to problems of exchange rates corrections and are relatively stable over time, provide a somewhat better way of doing cross-country comparisons. Full-time equivalent (FTE) student-teacher ratios in Brazil's federal institutions average 8.8:1. As can be seen in table 7, with the exception of Colombia, Brazil's student-teacher ratio, in federal institutions are the lowest among the countries compared.

Table 8 provides unit cost estimates for selected developed and developing countries, and compares them with estimates for Brazil of unit costs based on the official and the parallel exchange rates. Even making the exchange rate adjustment suggested by Gaetani and Schwartzman, Brazil's unit costs in federal institutions are equal to about half of those in the USA, Japan, and Australia, and are significantly higher than those of its Latin American neighbors. This is quite striking considering that faculty salaries average less than \$20,000 per year.

Another element of importance is the ratio of students to non-teaching personnel. While no international comparisons are available, the current students to non-teaching staff ratio in Brazilian federal institutions is 3.9:1 (it was 5.1:1 in 1980). In short, despite the usual caution attached to international comparison, Brazil's federal system is undoubtedly one of the high cost systems in the world, once one takes into consideration Brazil's salary levels. The main determinant of these high costs is the large numbers of teaching and non-teaching staff compared to students.

Table 7
Higher education: student — teacher ratios in selected countries^a

Country	Total faculty	Student enrollment	S/T ratio	Year
Argentina	41,804	707,016	16.9	1986
Chile	11,603	132,254	11.4	1984
Colombia	37,557	331,150	8.8	1987
Japan	195,276	1,965,023	10.1	1986
Korea	33,340	1,040,166	31.2	1990
Malaysia	4,717	47,946	10.2	1987
Spain	48,360	900,417	18.6	1986
UK	31,432	360,800	11.5	1986
Brazil ^b				
Federal	25,497	224,665	8.8	1988
State	14,658	130,481	8.9	1988
Private	10,989	323,766	29.5	1988
USA				
Public 4-yr. inst.	319,000	5,544,000	17.4	1989
Private 4-yr. inst.	218,000	2,631,000	12.1	1989

Sources: Unesco. *Statistical Yearbook* (several years) and MEC. *Sinopse do ensino superior*, 1988.

^a Figures for some countries are aggregate (private plus public).

^b Faculty figures are in FTE.

Table 8
Unit cost in public institutions
(in US\$)

Country	Unit cost	Year
Japan	5,968	1985
UK		
Universities	12,950	1986
Polytechnics	6,160	1986
USA	8,724	1984
Philippines	3,492	1985
Spain	906	1985
Australia	6,126	1987
Brazil — using official exchange rate	7,930	1988
Brazil — using parallel exchange rate	4,760	1988
Venezuela	1,625	1989
Chile	1,030	1990

Sources: OECD (1979); James (1989); Paul and Wolyneck (1990).

Comparisons within Brazil

Table 9 provides estimates of FTE student-teacher ratios for all federal institutions and for state and private universities. The overall student-teacher ratio in federal institutions is 8.8:1, compared to 10:1 in state universities and 29:1 in private universities. A review of the data shows the following:

- Federal institutions vary greatly in student-teacher ratios, from about 4:1 to about 12:1. A few small specialized institutions in agriculture and medicine have around 4:1 ratios.
- In terms of student-teacher ratio, there are no economies of scale among the 23 universities. In fact several of the largest institutions, such as the Federal Universities of Pernambuco and Paraíba, have student-teacher ratios of less than 7:1, and the largest institution, the Federal University of Rio, has a student-teacher ratio of 8:1.
- The highest student-teacher ratios in federal institutions appear among the youngest institutions. While this may in part be a result of a lack of graduate education, it may also be a result of an inadequate ability to lobby MEC to authorize new positions.
- The state University of São Paulo (USP), the largest and best institution of higher education in Brazil, has a student-teacher ratio of 10:1. Unicamp, with the highest percentage of enrollment at graduate level (31%) has a student-teacher ratio of 7:1, and Unesp also 7:1. Most of the other state institutions have student-teacher ratios of 10:1 or above.
- Graduate education, which requires lower student-teacher ratios than undergraduate education, affects the student-teacher ratio in Unicamp, with 31% of enrollment at the graduate level, and USP, with 25% of enrollment at the graduate level. Among federal institutions, only the federal universities of Rio and Minas have more than 9% of their enrollment in graduate education (18 and 9%).

Table 10 summarizes unit costs in 1988 for 36 federal universities. By and large, it confirms the same variations noted in the student-teacher ratios. The highest unit costs are in the Federal University of Viçosa, which is a specialized agricultural institution. The three universities in Rio also have the highest unit costs. The lowest unit costs are in institutions in the North and Northeast with little graduate education. Paul and Wolyneck (1990) estimated that unit costs in federal institutions are 60% higher than the unit costs of the University of São Paulo (USP), in spite of the fact that 25% of USP's enrollment is in graduate education, and USP is considered the highest quality institution in Brazil. But Gaetani and Schwartzman have argued that more than 9,000 students in USP reported as full time graduate students are in fact not engaged in full time study or research. After eliminating these students and taking out funds for retirees, they argue that the difference is only about 13%. The conclusion, even after accepting Gaetani and Schwartzman's revisions, is that, while the highest quality public institution in Brazil, USP, does not appear to be particularly costs efficient, nevertheless it has lower unit costs than the major federal institutions with which it is compared.

During the period 1983-89, the number of teachers in federal universities increased from 43,000 to 44,500, while the number of students declined from 340,000 to 318,000. Thus, the nominal student-teacher ratio decreased from 7.9:1 to 7.1:1. During the period 1980-89 the number of non-teaching staff increased strikingly from 65,000 to 92,000.

Table 9
Student-teacher ratios in federal universities, 1988

Name of institution	Faculty				Students		Student-teacher ratio	
	Part time	Full time	Total faculty	FTE ^a	Undergrad.	Grad.	Head-count	FTE
1 Universidade de Brasília	200	769	969	869	8,417	511	9	10
2 Universidade do Amazonas	125	588	713	651	7,306		10	11
3 Universidade do Rio de Janeiro	311	246	557	402	2,191	19	4	6
4 Universidade do Rio Grande	49	404	453	429	4,071	24	9	10
5 Universidade Federal da Bahia	608	1,401	2,009	1,705	16,091	511	8	10
6 Universidade Federal da Paraíba	350	2,388	2,738	2,563	17,758	858	7	7
7 Universidade Federal de Alagoas	242	653	895	774	6,536		7	8
8 Universidade Federal de Goiás	357	965	1,322	1,144	7,262	137	6	6
9 Universidade Federal de Juiz de Fora	164	578	742	660	6,126	20	8	9
10 Universidade Federal de Minas Gerais	629	1,898	2,527	2,213	15,925	1,659	7	8
11 Universidade Federal de Ouro Preto	49	238	287	263	2,162	29	8	8
12 Universidade Federal de Pelotas	122	626	748	687	5,047	161	7	8
13 Universidade Federal de Pernambuco	542	1,352	1,894	1,623	12,938	899	7	9
14 Universidade Federal de Rondônia	55	53	108	81	1,332		12	17
15 Universidade Federal de Santa Catarina	649	1,267	1,916	1,592	12,023	694	7	8
16 Universidade Federal de Santa Maria	77	1,083	1,160	1,122	8,764	249	8	8
17 Universidade Federal de São Carlos	11	409	420	415	2,438	316	7	7
18 Universidade Federal de Sergipe	142	340	482	411	5,523	10	11	13
19 Universidade Federal de Uberlândia	51	833	884	859	5,908	34	7	7
20 Universidade Federal de Viçosa	12	600	612	606	4,214	619	8	8
21 Universidade Federal do Acre	22	231	253	242	1,988		8	8
22 Universidade Federal do Ceará	232	1,115	1,347	1,231	13,261	536	10	11
23 Universidade Federal do Espírito Santo	174	884	1,058	971	9,043	58	9	9
24 Universidade Federal do Maranhão	173	587	760	674	6,443		8	10
25 Universidade Federal do Mato Grosso	104	989	1,093	1,041	6,277		6	6
26 Universidade Federal do Mato Grosso do Sul	169	466	635	551	4,912		8	9
27 Universidade Federal do Pará	285	1,017	1,302	1,160	14,092	166	11	12
28 Universidade Federal do Paraná	86	38	124	81	1,014	784	15	22
29 Universidade Federal do Piauí	525	512	1,037	775	8,766		8	11
30 Universidade Federal do Rio de Janeiro	770	2,806	3,576	3,191	22,769	5,035	8	9
31 Universidade Federal do Rio Grande do Norte	191	1,605	1,796	1,701	15,372	202	9	9
32 Universidade Federal do Rio Grande do Sul	869	1,325	2,194	1,760	16,368	1,379	8	10
33 Universidade Federal Fluminense	725	1,955	2,680	2,318	11,709	786	5	5
34 Universidade Federal Rural de Pernambuco	101	333	434	384	4,186	130	10	11
35 Universidade Federal Rural do Rio de Janeiro	61	416	477	447	3,412	253	8	8
Total	9,232	30,970	40,202	35,586	291,644	16,079	8	9

Source: MEC. *Sinopse estatística do ensino superior*, 1988.

^a Assuming one full time appointment equals two part time ones.

Table 9, part B
Student-teacher ratios in state and municipal universities, 1988

Name of institution	Faculty				Students		Student-teacher ratio	
	Part time	Full time	Total faculty	FTE ^a	Undergrad.	Grad.	Head-count	FTE
State								
1 Universidade Estadual da Bahia	130	192	322	257	3,534		11	14
2 Universidade do Estado do Rio de Janeiro	1,338	891	2,229	1,560	15,651	303	7	10
3 Universidade Estadual Paulista Julio Mesquita Filho	282	2,395	2,677	2,536	16,051		6	6
4 Universidade Estadual da Paraíba	78	419	497	458	8,232		17	18
5 Universidade Estadual de Campinas	366	1,609	1,975	1,792	6,635	2,981	3	4
6 Universidade Estadual de Feira de Santana	54	257	311	284	3,332		11	12
7 Universidade Estadual de Londrina	354	797	1,151	974	10,053		9	10
8 Universidade Estadual de Maringá	193	670	863	767	8,119		9	11
9 Universidade Estadual de Ponta Grossa	286	199	485	342	6,096		13	18
10 Universidade Estadual do Ceará	418	517	935	726	10,245		11	14
11 Universidade Regional do Cariri	83	0	83	42	2,588		31	62
12 Universidade Estadual do Maranhão	191	220	411	316	2,230		5	7
13 Universidade Estadual do Sudoeste da Bahia	269	0	269	135	1,523		6	11
14 Universidade para Desenv. do Est. de Santa Catarina	206	228	434	331	3,414		8	10
15 Universidade de São Paulo	1,641	3,359	5,000	4,180	32,082		6	8
Subtotal	5,806	11,753	17,559	14,656	127,197	3,284	7	9
Municipal								
1 Universidade de Taubaté	525	6	531	269	11,539		22	43
2 Universidade Regional de Blumenau	240	48	288	168	5,639		20	34
Subtotal	765	54	819	437	17,178		21	39

Source: MEC. *Sinopse estatística do ensino superior*, 1988.

^a Assuming one full time appointment equals two part time ones.

Table 9, part C
Student-teacher ratios in private universities, 1988

Name of institution	Faculty				Students		Student-teacher ratio	
	Part time	Full time	Total faculty	FTE ^a	Undergrad.	Grad.	Head-count	FTE
Catholic								
1 Pontificia Universidade Católica de Campinas	1,186	131	1,317	724	19,307	180	15	27
2 Pontificia Universidade Católica de Minas Gerais	720	93	813	453	13,380		16	30
3 Pontificia Universidade Católica do Paraná	574	42	616	329	8,549		14	26
4 Pontificia Universidade Católica de São Paulo	1,058	433	1,491	962	15,103	2,594	10	16
5 Pontificia Universidade Católica do Rio de Janeiro	367	470	837	654	6,305	1,298	8	10
6 Pontificia Universidade Católica do Rio Grande do Sul	1,649	129	1,778	954	22,461	467	13	24
7 Universidade Católica de Petrópolis	232	41	273	157	3,401		12	22
8 Universidade Católica de Salvador	615	0	615	308	11,709		19	38
9 Universidade Católica de Goiás	397	237	634	436	12,347		19	28
10 Universidade Católica de Pelotas	312	28	340	184	4,743		14	26
11 Universidade Católica de Pernambuco	522	31	553	292	14,542		26	50
12 Universidade Católica de Santos	395	11	406	209	5,232		13	25
Subtotal	2,480	266	2,746	1,506	41,236	180	15	27
Other religious								
1 Universidade do Sagrado Coração	113	36	149	93	2,906		20	31
2 Universidade Luterana do Brasil	188	43	231	137	3,019		13	22
3 Universidade Metodista de Piracicaba	309	88	397	243	8,212	144	21	34
4 Universidade de São Francisco	607	25	632	329	9,316		15	28
Subtotal	1,217	192	1,409	801	23,453	144	17	29
Other								
1 Universidade Braz Cubas	365	66	431	249	10,970		25	44
2 Universidade de Caxias do Sul	499	43	542	293	8,390		15	29
3 Universidade de Fortaleza	551	107	658	383	12,197		19	32
4 Universidade de Guarulhos	284	18	302	160	6,790		22	42
5 Universidade de Ijuí	98	102	200	151	4,378		22	29
6 Universidade de Marília	191	20	211	116	6,987		33	60
7 Universidade de Mogi das Cruzes	833	0	833	417	16,288		20	39
8 Universidade de Passo Fundo	444	59	503	281	7,024		14	25
9 Universidade de Ribeirão Preto	153	128	281	205	6,349		23	31
10 Universidade do Oeste Paulista	303	50	353	202	7,645		22	38
11 Universidade do Vale do Rio dos Sinos	690	67	757	412	21,218		28	52
12 Universidade Gama Filho	1,324	40	1,364	702	20,396	271	15	29
13 Universidade Mackenzie	669	0	669	335	12,068		18	36
14 Universidade Santa Cecília dos Bandeirantes	277	185	462	324	8,223		18	25
15 Universidade Santa Ursula	580	13	593	303	9,357		16	31
Subtotal	7,261	898	8,159	4,529	158,280	271	19	35
Total for private universities	13,732	2,046	15,778	8,912	270,891	2,775	17	30

Source: MEC. *Sinopse estatística do ensino superior*, 1988.

^a Assuming that one full time appointment equals two part time ones.

Table 10
Federal universities, expenditures per student, 1988

Name of institution	Total expenditure	Undergraduate enrollment	Graduate enrollment	Total enrollment	Expenditures per student (in US\$)
Universidade de Brasília	70,444,463	8,417	511	8,928	7,890
Universidade do Amazonas	41,784,341	7,306		7,306	5,719
Universidade do Rio de Janeiro	28,094,234	2,191	19	2,210	12,712
Universidade do Rio Grande	25,099,608	4,071	24	4,095	6,129
Universidade Federal da Bahia	130,827,169	16,091	511	16,602	7,880
Universidade Federal da Paraíba	152,609,612	17,758	858	18,616	8,198
Universidade Federal de Alagoas	42,079,779	6,536		6,536	6,438
Universidade Federal de Goiás	65,235,123	7,262	137	7,399	8,817
Universidade Federal de Juiz de Fora	36,776,467	6,126	20	6,146	5,984
Universidade Federal de Minas Gerais	161,406,240	15,925	1,659	17,584	9,179
Universidade Federal de Ouro Preto	19,105,135	2,162	29	2,191	8,720
Universidade Federal de Pelotas	43,172,353	5,047	161	5,208	8,290
Universidade Federal de Pernambuco	122,544,094	12,938	899	13,837	8,856
Universidade Federal de Rondônia	5,276,987	1,332		1,332	3,962
Universidade Federal de Santa Catarina	99,859,127	12,023	694	12,717	7,852
Universidade Federal de Santa Maria	76,192,453	8,764	249	9,013	8,454
Universidade Federal de São Carlos	24,811,908	2,438	316	2,754	9,009
Universidade Federal de Sergipe	24,522,551	5,523	10	5,533	4,432
Universidade Federal de Urubelândia	62,317,236	5,908	34	5,942	10,488
Universidade Federal de Viçosa	65,704,517	4,214	619	4,833	13,595
Universidade Federal do Acre	16,574,646	1,988		1,988	8,337
Universidade Federal do Ceará	101,239,931	13,261	536	13,797	7,338
Universidade Federal do Espírito Santo	60,761,579	9,043	58	9,101	6,676
Universidade Federal do Maranhão	39,527,736	6,443		6,443	6,135
Universidade Federal do Mato Grosso	55,007,196	6,277		6,277	8,763
Universidade Federal do Mato Grosso do Sul	39,499,183	4,912		4,912	8,041
Universidade Federal do Pará	77,240,564	14,092	166	14,258	5,417
Universidade Federal do Paraná	93,446,433	1,014	784	1,798	51,972
Universidade Federal do Piauí	57,071,544	8,766		8,766	6,511
Universidade Federal do Rio de Janeiro	249,090,119	22,769	5,035	27,804	8,959
Universidade Federal do Rio Grande do Norte	106,091,926	15,372	202	15,574	6,812
Universidade Federal do Rio Grande do Sul	152,086,308	16,368	1,379	17,747	8,570
Universidade Federal Fluminense	139,633,147	11,709	786	12,495	11,175
Universidade Federal Rural de Pernambuco	33,057,555	4,186	130	4,316	7,659
Universidade Federal Rural do Rio de Janeiro	38,136,249	3,412	253	3,665	10,406

Source: MEC.

Note: There are minor differences with Paul and Wolynech (1990) because of the different exchange rates and enrollment figures used.

Institutional case studies undertaken by Rogerio Vahl break down expenditures in 1989 by budgeting categories, by faculties, and by departments for two federal universities, Minas Gerais (UFMG) and Santa Catarina (UFSC). Table 11 summarizes the information on these institutions as well as four other private institutions, the Catholic universities of Minas Gerais and of Paraná, and the two "community-based" universities of Ijuí and Blumenau. The average unit cost of the two federal universities studied is US\$9,400 per student. The nominal student-teacher ratio is 7:1. Full time teachers are required to teach 8-14 hours per week and are expected to prepare classes and undertake research during the rest of the time (compared to 24 hours in the private institutions). The top salary for a full professor is around US\$2,300 per month in the federal institutions (compared to US\$1,600 per month in the private universities surveyed). The number of non-teaching staff in the two federal institutions is equivalent to about 25% of student enrollment (compared to 5% of enrollment in the private institutions). The average salary of the non-teaching staff is roughly US\$1,000 per month in the two federal institutions (compared to \$300 in the private institutions).

Vahl sought to break down costs by program of study. Since universities do not keep systematic records of this sort, only rough estimates, converging teaching costs only (but not maintenance and materials), are possible. The average costs breakdowns in UFMG and UFSC are as follows: science and technology, US\$9,447; biomedical sciences, US\$11,985 (e.g., medicine, US\$11,844; dentistry, US\$13,059; nursing, US\$11,755); and humanities and social sciences, US\$6,854 (e.g., law, US\$6,681; mathematics, US\$7,290; pedagogy, US\$9,863). The cost differential between science and law is about 1.5:1 compared with a USA differential ranging from 2 to as much as 5:1. Federal universities rarely use the combination of very large lectures accompanied by smaller classes common to the USA.

Table 11
Comparison of federal and private universities
quality efficiency measures and costs, 1989

Efficiency measure	Federal ^a	Private ^b
Square meters per student	28	6
Number of chairs per student	1.6	0.8
Occupancy rate of chairs (%)	32	66
Yearly subsidy per student per meal	31	0
Number of library books per student	23	15
Ratio of students to administrative staff	3.8	18.7
Students in graduate programs (%)	9	2
Students in day-time courses (%)	81	51
Students in high costs courses (%)	48	36
Classes with less than 10 students (%)	7	0.4
Classes with more than 40 students (%)	3	4
Students per teachers	7	16.3
Students per teacher FTE	6.9	30.1
Total faculty full time (%)	82	16
Total faculty part time (%)	18	19
Total faculty hired on hourly basis (%)	0	65
Faculty with graduate degrees (%)	55	16
Books and chapters written per year as a ratio per faculty	18	0.03
Cost per student in US\$	8,515	986

^a Based on case studies, undertaken by Vahl (1990), of two federal universities: UFMG and UFSC.

^b Based on case studies, undertaken by Vahl, of PUC-MG, PUC-PR, Unijui, and Furb.

Another element of interest is that of space utilization. The two federal universities surveyed, UFMG and UFSC, provide 28 square meters per student, compared to 6 square meters in the four private universities surveyed (table 11). The former has an average of 1.6 seats for every student enrolled in the system compared to 0.8 in the private institutions. Assuming that classes can take place eight hours in a day (a reasonable expectation, with classes running 8-12 a.m. and 2-6 p.m.), and students attend about four classes of one hour per day, on average seats in the two federal institutions are utilized about 30% of the time, compared to 66% utilization in the comparable private institutions. Based on this analysis, the physical facilities in the two federal universities surveyed are adequate to serve about twice the number of students currently being served without initiating any night classes. Put differently, if the cost per square meter of construction and furnishing is about US\$400 then the government has invested about US\$190,000,000 in excess physical facilities in the two universities studied. While it is difficult to generalize to all federal universities, if all federal institutions were in fact similarly over-built, then the total excess capital investment would be on the order of more than US\$1.6 billion. Since private institutions normally put aside capital funds or pay mortgages for construction and refurbishing, the costs of the physical facilities in the public sector should be annualized and added to the recurrent cost to get an economic cost per student which would be comparable to the private institutions. Assuming a 30 year life of physical facilities, a 10% discount rate, and a cost of physical facilities per student of US\$11,400, then the unit costs per student in the two federal institutions surveyed should be increased by US\$1,200 or an additional 15%.

In part the higher unit costs of the federal institutions are a result of higher quality staff, many of whom undertake research, of programs in science and engineering, and of graduate programs. The two federal institutions surveyed do undertake research and extension and do have many programs in higher cost areas such as medicine and engineering. In particular, teachers in the two federal institutions surveyed reportedly produced 1,034 books, chapters of books, and articles in 1989, which is an average of .24 per faculty member. Almost 10% of the students at the two federal universities surveyed are at the graduate level; 55% of the enrollment in the federal universities is in high cost courses, defined as science, engineering, agriculture, and medicine, compared to 36% in the four private universities surveyed. Furthermore, in 1989, the federal universities provided for 421 specialized training and extension courses compared to about 176 in the private universities. Finally around half of the federal university faculty in the federal institutions have advanced degrees (doctorate or masters). These figures all represent higher quality input and more research output than the vast majority of private universities in Brazil.

PUC-Rio and PUC-SP are the two private institutions acknowledged to be among the highest quality institutions in Brazil, with high percentages of graduate students, and with input and output quality measures similar to UFMG and UFSC. Table 12 shows that unit costs in the two federal universities are twice as high as PUC-Rio and about four times as high as PUC-SP, which have equally high quality staff and major graduate programs. It should be noted that PUC-SP focuses on the social sciences and has very little enrollment in medical or hard sciences. Therefore, its unit costs should be compared with estimated unit costs of over US\$6,000 for the two federal universities in humanities and the social sciences (Vahl). PUC-Rio's enrollment profile is similar to the two federal institutions surveyed, since it has a very strong science and engineering program (but no medical school), much of it supported by grants from Finep. In spite of these qualifications, the two best private institutions in Brazil offer programs similar to those of the two federal institutions at less than half their

costs. This lower costs appear to be mainly a result of higher student-staff ratios as well as a much leaner administration.

It should be noted that UFMG and UFSC are among the oldest and best federal institutions. In contrast, the federal universities of Ouro Preto, Mato Grosso, Juiz de Fora and Espírito Santo have negligible graduate enrollment and are reported to undertake little or no research but have FTE student-teacher ratios of 9:1 or less and unit costs ranging from US\$6,500 to US\$9,000.

Table 12
Costs and quality in two federal and two private universities

	UFMG	UFSC	PUC-Rio	PUC-SP
Graduate students (%)	11	10	17	15
Staff with doctorate (%)	20	18	30	15
FTE student-teacher ratios	8:1	8:1	10:1	16:1
Student/non-teaching staff ratios	3:1	4:1	11:1	14:1
Unit costs in US\$	9,179	7,852	4,535	2,089

Source: Student-teacher ratios from table 9. Unit costs from table 10 and Tramontin and Braga (1990). Other data from Vahl (1991), and from Tramontin and Braga (1990).

6. Socioeconomic background of students

A recent study of parental income of students attending federal institutions (Gomes, 1990) found that parents of 44% of students in federal institutions earned 11 or more minimum salaries. This compares with an estimated 10% in the general population. As can be seen in table 13, students in the South and Southeast had much higher parental income than those in the North and Northeast — a result of the higher incomes in these regions.

Table 13
Parental income of federal university students by region, 1989 sample data (%)

Parental income (minimum salaries per month)	North	Northeast	Southeast	South	Centerwest	Brazil	Total students
Up to 3	13	35	14	30	9	18	620
4-10 months	10	32	19	27	12	37	1,282
11-20 months	7	25	23	29	15	20	700
21-30 months	5	23	28	27	17	11	389
31-50 months	7	17	30	28	18	8	284
Over 50 months	4	18	23	39	16	5	182
Percentage of total students	9	28	21	29	13	100	
Total students in sample	304	968	728	991	466	3,457	3,457

Source: Gomes (1990).

One minimum salary = US\$55 at time of data collection.

It has been hypothesized that the students from the highest socioeconomic background attend federal institutions, while the poorer students are attending the private institutions. A study based on the three universities in Fortaleza, Ceará (Paul and Ribeiro, 1991a), suggests a more complicated pattern which was confirmed by additional observations we made in a private institution in São Paulo.

SES in Ceará

The study in Ceará examined the three federal, state, and private universities in Fortaleza. It should be noted that, throughout Brazil, private institutions are very diverse. Overall enrollment ratios in Ceará are 5.1% compared to 11.1% in São Paulo. The vast majority (90%) of students in São Paulo attend private institutions, compared to only 33% in Ceará. In the Northeast, enrollment in private education is relatively low, since most children drop out of primary education. Therefore, the comparison of private education in Ceará should not be considered comparable to that of, say, Rio and São Paulo.

The three institutions in Fortaleza are roughly comparable in size (13,000 federal, 12,000 private, 10,000 state). Unit teaching costs are estimated at US\$4,100 federal, US\$2,500 state, and US\$1,600 private. The differences in unit costs are due in part to the different types of courses offered, with the federal institutions offering more of the higher costs science and engineering specialties. Courses of study in social science, teacher training, and nursing are offered by all three institutions. Law and engineering is offered by the federal and private institutions. Medicine and dentistry are reported to be of high quality in the federal institutions. The state university focuses on teacher training, and the private university has high enrollments in ancillary health services such as occupational and physical therapy. According to a survey of students, the main reason students selected the federal institutions was its reputation; for state institutions, the main reason was availability of night courses; for private, the main reason was that students were not accepted into the state or federal university.

Table 14 summarizes the socioeconomic status (s.e.s) and other characteristics of students in the three institutions:

Table 14
Personal characteristics by institution
(percentage of total)

	Federal	State	Private
Father's occupation: high or high-middle	46.6	35.3	51.7
Father's educational level: higher	33.6	19.5	30.7
Age at admission: 18 years and less	38.1	20.1	26.3
Public secondary education	20.4	32.3	15.9
Did not attend "cursinho"	59.7	43.2	45.6

As can be seen, federal and private institutions have a similar social economic profile, while students in the state institutions have a distinctly lower socioeconomic status. Students in the federal university are more likely to be aged 18 or less at entrance. Fully 85% of the private university students attended private schools, 80% of federal university students attended private schools, and 68% of state students attended private schools. This is a striking

ratio, considering that only 35% of all secondary school enrollment is in private institutions. It suggests that the public secondary institutions are mainly serving students of lower socioeconomic origin and weaker academic ability. It is furthermore interesting to note that about half of all students are working. This figure is slightly lower (43%) for federal university. In short, the students of higher social economic level attend both the federal and private universities, but the higher quality students attend the federal university. The state university serves students of lower s.e.s.

When the data is broken down by course of study, a more complex pattern emerges. Crossing students' characteristics by course of study and institutions shows socioeconomic background, sex and courses of study are closely related. Table 15 summarizes the results.

Table 15
Students' characteristics by major and type of institutions

	Abscis. ¹	Age≤18 (%)	Father higher education (%)	Public secondary (%)	Not "cursinho" (%)	Male (%)
Civil engineering (fed.)	435	53.7	61.0	17.1	70.7	78.0
Data processing (priv.)	399	61.5	42.3	7.7	73.1	76.9
Data processing (fed.)	356	60.8	49.0	11.8	80.4	76.5
Administration (day, state)	355	33.3	41.7	8.3	83.3	50.0
Medicine (fed.)	348	50.0	47.8	7.7	70.7	65.2
Dentistry (fed.)	323	57.1	28.6	4.8	66.7	42.9
Data processing (state)	286	50.0	50.0	14.3	78.6	92.9
Administration (fed.)	251	41.4	27.6	6.9	75.9	41.4
Administration (day, priv.)	237	44.1	38.9	5.6	66.7	34.3
Veterinary (state)	203	31.6	47.4	10.5	47.4	63.2
Geology (priv.)	-288	0.0	0.0	10.0	60.0	60.0
Geography (fed.)	-301	18.2	18.2	27.3	45.5	54.5
Literature (day, state)	-315	33.3	9.5	47.6	42.9	19.0
Pedagogy (night, state)	-332	10.7	17.9	46.4	39.3	32.1
Nursing (fed.)	-338	6.9	6.9	44.8	24.1	0.0
Geography (day, state)	-402	0.0	0.0	41.7	25.0	58.3
Literature (night, priv.)	-436	10.8	8.1	40.5	21.6	32.4
Literature (fed.)	-455	6.0	8.0	46.0	28.0	14.3
Science (night, state)	-537	0.0	0.0	54.5	9.1	36.4
Geography (night, state)	-613	8.3	12.5	58.3	29.2	58.3
Average	0	29.9	29.0	21.7	50.3	42.1

¹ Factor analysis score, cf. Paul and Ribeiro (1991a).

In the factor analysis built by Paul and Ribeiro (1991a) with characteristics of students of the different courses of study, the first axis is mainly explained by socioeconomic background, as defined by fathers' education and occupation. Of the 10 courses of study highest in a positive correlation with socioeconomic background, five are in federal institutions — civil engineering, data processing, medicine, dentistry, and administration. Three courses are in state institutions: administration, data processing, and veterinary medicine. Two courses in the private university — data processing and administration — are among the 10. Among

the 10 courses with score lowest on the axis of socioeconomic status, there are three federal university courses — geography, nursing, and literature; five state courses — literature, pedagogy (night), geography (night and day), and science (night); and two courses in the private university — geology and literature (night). Clearly then certain courses attract students of higher or lower socioeconomic status, irrespective of whether they attend public or private institutions. In the more prestigious courses of study, students are generally younger, more likely to attend private secondary schools, did not attend “cursinhos”, and were more likely to be male. The least prestigious courses in any institutions are those associated with teacher training, where most of the students are female. It is probable that the “cursinhos”, privately run courses to prepare students for the university entrance examination, are designed especially to help students attending the lower quality public secondary schools.

Additional information gathered in this study is also of interest. Students attend classes 19 hours per week in the federal and state institutions, and 16 hours in the private university. They study 16 hours per week in the federal institutions, 13 in the state one, and 14 in the private institutions. However, when the data are broken down by course of study, the most prestigious majors require nearly four hours additional study time per week than least prestigious courses, and students work fewer hours per week. Students expenditures per month are mainly for books (70% of total expenditures). However, when broken down by course of study, humanities students spend about \$15 per month compared to the more prestigious majors which are above \$24 per month. Overall students also spend US\$27 on clothing, US\$19 on entertainment, and US\$8 on travel.

SES in a private university in São Paulo

As noted above, the situation in Ceará is very different from that in the Southeast, since higher education in the Northeast serves a small elite. To determine whether the situation in Ceará is similar elsewhere, information was gathered on the private University of Mogi das Cruzes located in the city of the same name in the state of São Paulo and enrolling 17,000 students, offering courses in engineering, medicine, law, administration, economics, accountancy, and various liberal arts courses for prospective secondary school teachers. Table 16 summarizes the background of students in the seven courses of study at the university.

Table 16
Characterization of students at the University of Mogi das Cruzes (%)

	Proportion of new admissions	≤18	Father higher education	Public secondary	Not “cursinho”
Engineering (day)	7.8	30.4	30.4	49.6	53.5
Engineering (night)	18.0	20.5	23.7	68.9	67.3
Biomedical sciences (day)	15.4	24.8	34.2	39.9	25.6
Biomedical sciences (night)	8.8	11.4	12.2	62.8	69.5
Law (day)	2.8	24.3	35.7	43.7	56.3
Law-Adm-Eco-Acc. (night)	27.1	15.5	16.0	59.0	68.6
Teacher training	20.1	14.8	13.1	61.6	72.6
Total	100.0	18.7	20.9	57.5	61.1

As can be seen, the same pattern occurs in this institution as in Ceará. Engineering, biomedical science (day) and law (day) are more likely to have younger students, students whose fathers have higher education degrees, and who attended private secondary schools. On the opposite extreme are night courses and teacher training courses. Compared to Ceará, the students in this institution on average are likely to be older, to have attended public secondary schools, and to have fathers with lower levels of education. Furthermore, in Ceará, students in the more prestigious courses of study were less likely to have attended the *cursinho*, while they are more likely in São Paulo.

In summary, the socioeconomic status of students attending higher education in Brazil appears to vary greatly by subject of study. Private institutions are heterogeneous and offer a variety of courses to students with different socioeconomic backgrounds. The most prestigious courses of study, especially medicine and engineering, are more likely to have students from the upper classes. The main difference is that all students prefer the federal institutions because of the free tuition and a perception of higher quality and reputation. If well-to-do students are not accepted into high prestige courses in federal institutions, then they attend the same courses in private institutions. Students of lower socioeconomic status, as well as women, are likely to attend the lower prestige courses in either the public or private institutions. Women are concentrated in the lower prestige courses of teaching and nursing; however, they also predominate in dentistry and administration.

It should be noted that only a small elite attend any higher education institution in the Northeast. In the South, where twice as high a percentage of the cohort attends higher education institutions, the vast majority of which are private, the differences between public and private institution may be significant even among the lower prestige courses.

7. The labor market for graduates

Studying the labor market for graduates can provide a way to analyze the production function of higher education institutions in Brazil. Private institutions are more technically efficient in producing graduates, in the sense that they have a higher internal productivity and lower unit costs. But it is important to check whether the shorter time to produce a graduate and the lower costs in the private institutions do not result in lower quality of the output. Few studies have tried to relate the characteristics of the college and the earnings. A good example of such an attempt is the research by James, Alsalam, Conaty and Duc-Le (1989) conducted in the USA. This study showed that the effect of the institution was small, while curriculum choice was important.

Paul and Ribeiro (1991b) undertook a tracer study of graduates from the three institutions in Ceará to try to shed light on the question of earnings of higher education graduates by institution and subject of study. A random sample of 5,500 graduates out of 12,944 graduates from 1984 to 1986 was drawn. After two mailings, 2,140 (39%) responded to the questionnaire. A second random sample of 100 graduates who did not respond was also undertaken. It was found that about half had moved and did not receive the questionnaire. The 50 who were finally located were found to have the same characteristics as those who answered the original questionnaire, with the exception of mobility. Based on this sample, it can be safely concluded that the respondents were good representatives of the universe.

Three parameters were studied, whether graduates were working; what type of occupation they were in; and what their income was. Table 17 presents the estimated employment situation of the universe of students (based on a weighted average of the sample).

Table 17
Labor market for graduates in Ceará
Employment and unemployment by institution

	Federal	State	Private	Total
Employed (%)	95.9	95.6	94.6	95.4
Unemployed (%)	4.1	4.2	5.4	4.6
Total (%)	100.0	100.0	100.0	100.0
Total number	4,545	3,506	4,414	12,465

Job level by institution

	Federal	State	Private	Total
High level jobs (%)	50.8	29.4	50.8	44.8
Middle level jobs (%)	28.1	36.0	28.2	30.3
Low level jobs (%)	21.1	34.6	21.0	24.8
Total (%)	100.0	100.0	100.0	100.0
Total number	4,598	3,492	4,364	12,454

Graduates by categories of courses of study

	Federal	State	Private	Total
Administration, accountancy, economics (%)	11.3	16.4	31.5	19.8
Teacher training (%)	19.9	54.8	7.8	25.5
Nursing (%)	2.7	5.5	5.7	4.5
Others (%)	66.2	23.3	55.0	50.2
Total (%)	100.0	100.0	100.0	100.0
Total number	4,786	3,643	4,515	12,944

There is low employment among graduates in all three institutions. This is contrary to popular opinion in Brazil. However, it should be noted that 50% of these graduates were already working while they were attending school. In terms of high, middle, and low prestige jobs,² the federal and private institutions are roughly similar, while the state university has

² High: executives, engineers, professional, professors. Middle: secondary teachers, mid-level staff. Low: primary teachers, low level staff.

more graduates at the lower levels. The low results of the state institutions appear to be mainly a result of their large primary and secondary teacher training programs.

The raw data show that medical sciences have the highest incomes, followed by data processing, engineering, and psychology/social communication. The lowest incomes are in chemistry/statistics, domestic science, library science, ancillary medical service, nutrition and social service, agronomy, and teacher training.

Two regression models were built to determine the effects of courses of study, institution, and other effects on earnings. The first model includes the universe of courses of study and the three institutions. The second model examines engineering, law, nursing, teaching and social sciences, which are common to all three institutions. The results of the first model are summarized in table 18.

Table 18
Global earnings (logarithm) models

Regressor	Coef.	Std Er.	Elast. (%)
Constant	6.479	0.0610	
Adm.-Acc.-Ecop. ¹	-0.001	0.0236	
Teacher training ¹	-0.6657***	0.0252	-94.5
Nursing ¹	-0.0209	0.0432	
Working at graduation ²	0.3066***	0.0224	35.8
Graduate in 1985 ³	-0.0813***	0.0235	8.4
Graduate in 1986 ³	-0.2236***	0.0237	25.0
Age	0.0033**	0.0016	0.3
Federal ⁴	0.1924***	0.0244	21.2
Private ⁴	0.1256***	0.0251	13.3
Female ⁵	-0.5532***	0.0184	73.9
Father with sec. or sup. ⁶	0.1671***	0.0193	18.2
R ²		0.3019	
N		7,281	

¹ Compared with the majors not supplied by the three universities together.

² Compared with people not working at graduation.

³ Compared with graduate in 1984.

⁴ Compared with state university.

⁵ Compared with male.

⁶ Compared with father with educational level lower than secondary.

Level of significance: *** 1%; ** 5%.

As expected, recent graduates earn less than those in earlier years. Females earn strikingly less than males (-60.8%), even after taking into account course of study. Graduates with fathers having secondary or higher education earn 14% more than those with fathers with lesser education. After taking into account course of study, graduates of the federal university earn 6.5% more than those in the state and private universities. This is more than likely a measure of the increased quality of the federal institutions.

To further examine the effects of the three institutions, a second analysis was made of only those courses of study common to all three institutions, as shown below:

Table 19
Elasticities for the models by major
(variables significant at least at 10% level)

Regressor	Adm. Acc. Eco. (%)	Teaching (%)	Nursing (%)	Engineering (%)	Law (%)
Working at graduation ¹	19.7	35.5	34.9		389.3
Graduate in 1985 ²		12.0	-28.2	-10.8	-55.5
Graduate in 1986 ²	-21.3		-1.47	-38.2	-83.4
Age					1.0
Federal ³	-9.1	8.4			
Private ³	-10.3	-12.5			47.5
Female ⁴	-44.1	-93.9		-19.2	-21.9
Father with sec. or sup. ⁵	14.5		29.2	13.5	178.5
R ²	0.0932	0.1701	0.3000	0.0804	0.4829
N	1,583	1,845	357	598	832

¹ Compared with people not working at graduation.

² Compared with graduate in 1984.

³ Compared with state university.

⁴ Compared with male.

⁵ Compared with father with educational level lower than secondary.

It shows that the income of graduates of the private law faculty is higher than that of graduates of the state and federal institutions. Graduates of teacher training in the private university have low incomes compared to the state and federal institutions, while graduates of the state university do better in social sciences. The lack of a clear difference is surprising, since the federal university is widely reported to be the highest quality institution. This may partly be a result of the fact that many graduates in areas such as teaching and nursing go to work for the state at salaries which are relatively equal. A longer time series might show better income results for the federal university.

Overall, the results of the tracer study in Ceará provide a number of surprising results. In the first place, the earnings differences among graduates from different institutions are due more to differences in course of study rather than to the institution. Teacher training is particularly poorly remunerated. The quality element in the federal university is at best of relatively minor importance. Higher education in Ceará, though very selective, does not equalize market opportunities in the labor-market. Gender and social origin have a very important effect on earnings.

8. Conclusions

This paper has relied on a combination of original data and opportunistic analysis of existing data to try to shed some light on the economics of higher education in Brazil. The conclusions of this paper must be considered tentative, pending further corroboration of the results in other studies. Since we know very little about these questions, an important conclusion in itself is that much additional research is needed to help insure informed policy decisions. The most important conclusions are summarized below.

As expected, public institutions tend to focus on high cost areas such as medicine and engineering. The internal efficiency of private institutions is higher than most of public institutions. This is more than likely a result of the fact that private institutions charge tuition. The socioeconomic background of students entering higher education institutions is much higher than that of the population as a whole. The higher s.e.s. students as well as males enter the more prestigious courses of study in public and private institutions. Contrary to popular belief, the s.e.s. of students *within* individual public and private institutions varies greatly and depends more on the type of course offered than on whether the institution is public or private.

In the Northeast (Ceará), public institutions do not appear to be significantly superior to private institutions in terms of quality of training, as measured by income after graduation and type of student attending. Rather, the main difference appears to be in course of study. Each university offers a range of courses of study and the student with the best scores on the university entrance examinations enter the more prestigious courses of study. Students overwhelmingly prefer the public institutions, which are free. But students who choose a high prestige course of study who are unable to enter a public institution will go in a private institution offering a similar course of study. Overall upper class students, who are more likely to have attended private secondary schools, attend the most prestigious courses of study in both public and private institutions. Holding constant the course of study, the students receive similar earnings, whatever the kind of institution.

It should be noted that only a small elite attends any higher education institution in the Northeast. In the South, where twice as high a percentage of the cohort attends higher education institutions, the vast majority on which are private, the differences between public and private institutions may be significant even among the lower prestige courses.

The federal institutions have higher input quality, as measured by percentages of teachers with advanced degrees, library holdings, student-teacher ratios, and costs per student. However, it is difficult to explain the high costs of public institutions solely by higher quality instruction, and much of these high costs may be due to inefficient use of resources. For example, physical space in federal institutions, as measured by square meters per students, appears to be far higher than needed as compared to international norms as well as to the practice in Brazilian private institutions. Also student-staff ratios in federal institutions are far lower than in comparable private institutions in Brazil or when compared with average in countries of similar or higher income level.

References

- Gaetani, F. & Schwartzman, J. *Indicadores de produtividade nas universidades federais*. São Paulo, Nupes/USP, 1991. (Documento 1/91.)
- Gomes, M. Personal background of the Brazilian university student. 1990. mimeo. (Preliminary results of doctoral dissertation.)
- Hanushek, E. The economics of schooling. *Journal of Economic Literature*, 24 (3), 1986.
- James, E. Product mix and cost disaggregation: a reinterpretation of the economics of higher education. *Journal of Human Resources*, 12 (2), 1979.
- . *Differences between public and private higher education: an international perspective*. 1989. mimeo.

———; Alsalam, N.; Conaty, J. & Duc-Le, To. College quality and future earnings: where should you send your child to college? *American Economic Review*, AEA Papers and Proceedings, 79 (2), 1989.

OECD. Evolution des modes de financement de l'enseignement supérieur. Paris, OECD, 1979. (OECD Monographs on Higher Education.)

Paul, J.-J. & Wolyne, E. *O custo do ensino superior nas instituições federais*. São Paulo, Nupes/USP, 1990. (Documento 11/90.)

Paul, J.-J. & Ribeiro, Z. D. As condições de vida e de trabalho dos alunos do ensino superior brasileiro. *Educação Brasileira*, 26, 1991a.

———. O mercado de trabalho para os egressos do ensino superior de Fortaleza. Universidade Federal do Ceará, Pró-Reitoria de Planejamento, 1991b. mimeog.

Tramontim, R. & Braga, R. Ensino superior: perspectivas para a década de 90. Brasília, Ipea, 1990. mimeog.

Vahl, T. R. Universidades públicas e privadas: síntese comparativa de alguns indicadores de universidades comunitárias e universidades federais. 1991.

Annex

Table1
Distribution of the majors by type of institution¹

	FEUN	FEFC	ESUN	ESFC	MUIN	SPUN	SPFF	SPFC	RPUN	RPFC	Total
ACCO	12.5	0.0	4.4	4.3	6.9	6.0	16.4	34.5	11.5	3.5	100.0
ADMI	8.8	0.2	4.0	3.7	6.6	6.6	21.0	32.3	12.2	4.6	100.0
AGRO	49.1	7.9	16.8	0.7	9.6	2.9	0.6	10.1	2.3	0.0	100.0
ARQU	31.2	0.0	7.2	0.0	0.8	16.1	9.4	9.4	21.9	4.0	100.0
ARTS	35.5	0.0	7.2	6.0	2.2	11.1	11.1	18.1	5.6	3.2	100.0
BIOL	30.8	0.2	14.9	1.5	1.4	10.9	1.4	18.5	19.4	1.0	100.0
DATA	14.7	0.4	8.5	4.4	7.1	15.0	7.8	8.2	28.8	5.1	100.0
DENT	31.0	2.2	13.7	2.4	3.9	12.1	6.5	13.2	9.1	5.9	100.0
DOEC	53.5	0.0	3.0	0.0	8.4	17.0	15.6	0.0	0.0	2.5	100.0
ECON	20.1	0.3	5.8	2.5	6.0	8.9	15.1	22.5	14.7	4.2	100.0
ENGI	28.1	3.6	9.9	6.1	2.1	12.3	5.6	18.0	13.3	1.0	100.0
GEOG	29.2	0.0	15.8	11.1	12.0	3.1	5.6	11.2	9.0	3.0	100.0
GEOL	70.4	0.0	16.5	0.0	0.0	6.3	0.0	0.0	6.8	0.0	100.0
IIIST	22.4	0.0	13.7	9.8	10.5	3.6	6.3	16.1	11.8	5.8	100.0
IDRA	16.4	0.0	12.9	15.3	0.0	17.4	13.1	17.3	7.6	0.0	100.0
INDQ	39.0	0.0	8.0	0.0	0.0	8.9	30.9	0.0	13.2	0.0	100.0
LAW	14.3	0.0	5.5	0.4	5.0	12.7	15.2	27.8	16.9	2.2	100.0
LIBR	66.6	0.0	8.1	0.0	1.5	0.0	8.4	8.6	5.7	1.1	100.0
LITE	18.0	0.1	11.0	6.3	6.2	4.5	10.8	25.9	11.2	6.0	100.0
MATH	27.6	0.0	19.7	3.2	3.1	4.3	1.5	26.2	11.6	2.8	100.0
MEDI	42.5	3.4	8.7	3.9	1.8	3.8	1.0	28.6	6.3	0.0	100.0
MUSI	46.1	0.0	16.0	7.7	0.0	1.8	7.1	14.0	3.4	3.9	100.0
NURS	35.3	2.5	11.9	5.5	3.6	11.0	4.2	6.6	12.2	7.2	100.0
NUTR	43.9	0.0	8.4	0.0	0.0	15.5	3.6	1.8	15.4	11.4	100.0
PAME	5.7	1.5	2.0	2.1	0.0	11.0	11.1	37.4	22.6	6.6	100.0
PEDA	12.1	0.2	6.8	5.2	5.4	6.6	13.5	29.9	8.4	10.9	100.0
PIIAR	56.1	2.2	18.1	0.8	1.8	5.3	3.7	0.9	11.1	0.0	100.0
PIIIL	29.6	1.2	16.3	1.9	0.4	5.9	2.4	3.5	22.6	16.2	100.0
PIITE	10.7	0.0	9.8	1.2	1.2	12.5	14.4	28.0	15.9	6.2	100.0
PHYS	46.2	0.0	36.3	0.0	1.7	1.1	0.0	4.2	10.5	0.0	100.0
PSYC	12.6	0.5	5.9	1.9	0.8	14.2	16.0	19.6	20.4	8.1	100.0
QUEM	45.3	0.0	25.3	0.0	0.9	9.4	0.4	8.3	9.0	1.4	100.0
SCIE	9.8	0.1	4.8	9.4	10.5	11.1	16.5	24.6	7.2	6.0	100.0
SOCO	16.6	0.0	5.5	0.0	0.9	8.7	15.9	26.6	22.8	3.0	100.0
SOCs	29.9	0.0	12.9	2.5	0.9	1.3	9.4	22.8	13.4	6.9	100.0
SOSE	25.7	0.0	11.3	1.3	1.3	5.6	10.8	13.2	27.1	3.7	100.0
SOST	4.9	0.0	5.6	3.5	6.8	12.3	21.8	32.3	7.1	5.7	100.0
SPOR	19.5	0.0	10.2	6.0	9.0	13.6	7.9	19.1	8.0	6.7	100.0
STAT	41.7	8.3	27.5	0.0	0.0	0.0	11.5	5.7	5.3	0.0	100.0
TEAC	2.0	0.8	18.0	1.7	8.5	19.4	11.6	30.4	0.0	7.6	100.0
TOUR	7.5	1.9	0.9	4.0	0.0	5.2	27.8	38.0	14.6	0.0	100.0
VAIN	8.9	22.6	0.0	6.3	0.0	10.6	37.9	0.0	6.8	6.9	100.0
VETE	61.7	2.1	20.6	0.0	0.0	3.7	2.2	7.2	2.5	0.0	100.0
Total	20.7	0.9	8.5	4.0	5.0	8.7	11.9	23.3	12.6	4.4	100.0

¹ The meaning of each abbreviation is given in tables 2 and 3.

Table 2
List of majors abbreviations

Abbreviation	Major	Proportion in total enrollment (%)
ACCO	Accountancy	5.9
ADMI	Business Administration	11.1
AGRO	Agronomy	2.0
ANCI	Ancillary Medical Services	0.5
ARCH	Architecture	1.4
ARTS	Arts	1.4
BIOL	Biology	1.4
CHEM	Chemistry	0.5
DATA	Data Processing	1.6
DENT	Dentistry	1.8
DOEC	Domestic Economy	0.1
ECON	Economics	4.5
ENGI	Engineering	9.6
GEOG	Geography	1.7
GEOL	Geology	0.2
HIST	History	2.3
INDC	Industrial Chemistry	0.2
LAW	Law	10.2
LIBR	Librarian	0.3
LITE	Literature	6.7
MATH	Mathematics	1.4
MDRA	Mechanical Drawing	0.3
MEDI	Medicine	3.3
MUSI	Music	0.2
NURS	Nursing	1.4
NUTR	Nutrition	0.5
PEDA	Pedagogy	8.1
PHAR	Pharmaceutics	1.0
PHIL	Philosophy	0.7
PHTE	Psyiotherapist	0.5
PHYS	Physics	0.5
PSYC	Psychology	3.1
SCIE	Sciences	4.2
SOCs	Social Sciences	1.2
SOCO	Social Communication	1.2
SOSE	Social Service	1.3
SOST	Social Studies	1.8
SPOR	Sports	2.5
STAT	Statistics	0.2
TEAC	Teacher Training	0.3
TOUR	Tourism	0.4
VAIN	Various Industrial Majors	0.2
VETE	Veterinary	0.7
Total		100.0

Table 3
List of institution abbreviations

Abbreviation	Kind of Institution	Proportion in total enrollment (%)
FEUN	Federal university	20.7
FEFC	Federal faculty	0.9
ESUN	State university	8.5
ESFC	State faculty	4.0
MUIN	Municipal institution	5.0
SPUN	Secular private university	8.7
SPFF	Secular private federation of faculties	11.9
SPFC	Secular private independent faculty	23.3
RPUN	Religious private university	12.6
RPFC	Religious private faculty	4.4
Total		100.0