Tertiary Education in Portugal

Background Report prepared to support the international assessment of the Portuguese system of tertiary education

A WORKING DOCUMENT: Version 1.1

April 2006

Ministry of Science, Technology and Higher Education

Prefácio

Este relatório apresenta uma descrição global do sistema de ensino superior em Portugal, evidenciando as principais preocupações que fundamentam futuras acções de política. Foi concebido tendo por base os termos de referência acordados em Novembro de 2005 entre o Governo Português e a OCDE para a avaliação internacional do sistema de ensino superior e considera as linhas de orientação indicadas pela OCDE em Janeiro de 2006 para a realização do exercício de avaliação.

O relatório inclui a informação básica sobre o sistema de ensino superior português, incluindo dados estatísticos, legislação e capacidade instalada. Apresenta também uma caracterização do número, tipo, dimensão, localização geográfica e distribuição das instituições de ensino superior, bem como dos programas de estudos em curso. Considera o ensino superior público e privado, universitário e politécnico, e responde, no essencial, a tópicos que incluem o acesso ao ensino superior; o perfil dos estudantes; tendências do número de inscritos no ensino superior; modelos e níveis de financiamento; e a avaliação de actividades de investigação.

A elaboração deste relatório incluiu uma discussão alargada e profunda com os principais actores no sistema de ensino superior português, na sequência da circulação, em Março de 2006, de uma versão preliminar do documento. A presente versão incluiu contribuições de muitos desses actores, mas trata-se ainda de um documento de trabalho em progresso, sujeito a contínuas melhorias e actualizações. Adicionalmente, lembramos ainda que a OCDE convidou todos os interessados a submeter directamente as suas próprias reflexões sobre a evolução do ensino superior em Portugal, de uma forma que a equipa internacional de avaliadores tenha acesso a diferentes visões e, sobretudo, a eventuais diferentes interpretações dos dados estatísticos disponíveis.

Neste contexto, reforçamos aqui os agradecimentos a todos indivíduos e instituições que contribuíram e ajudaram neste processo das mais diversas formas. Agradece-se em particular ao Conselho Nacional de Educação (CNE), ao Conselho de Reitores das Universidades Portuguesas (CRUP), ao Conselho Coordenador dos Institutos Superiores Politécnicos, CCISP, à Associação Portuguesa do Ensino Superior Privado (APESP), ao Conselho dos Laboratórios Associados (CLA), à Confederação da Indústria Portuguesa (CIP), à Associação Industrial Portuguesa (AIP), e aos vários sindicatos e associações de estudantes que forneceram os seus comentários, críticas e informações, os quais viabilizaram a preparação desta versão do relatório.

Agradece-se, ainda, a contribuição de todas as instituições que disponibilizaram a informação necessária para a elaboração do relatório, incluindo a Direcção-Geral do Ensino Superior (DGES), o Observatório da Ciência e do Ensino Superior (OCES), o Gabinete de Gestão Financeira da Ciência e do Ensino Superior (GEFCES) e a Fundação para a Ciência e a Tecnologia (FCT).

Lisboa, 5 de Maio de 2006

Manuel Heitor

Secretário de Estado da Ciência, Tecnologia e Ensino Superior

Preface

This Background Report provides an overview of the tertiary education system in Portugal and raises the main concerns that need policy attention. It was written based on the terms of reference agreed in November 2005 between the Portuguese Government and OECD and considers the guidelines provided by OECD in January 2006 for the accomplishment of the evaluation exercise.

The report includes the necessary information on the Portuguese tertiary education system, including statistical data, legislation and installed capacity. It also considers a characterisation of the number, type, dimension, geographical location and distribution of higher education institutions, as well as their study programme and networking activities, including both public and private, university and polytechnic institutions and addressing at least the following topics: access to tertiary education; the profile of the students' population; enrolment trends; funding schemes and levels; research assessment and statistics.

The writing-up of this report has included a throughout discussion with major actors in tertiary education, following the circulation of an initial draft document in March 2006. The present version includes contributions received from many of them, but is still to be considered a working document, in progress, subject to continuous improvements and actualizations. In addition, it should be remembered that the OECD has invited all interested parts to submit directly to them their own views and reflections about tertiary education in Portugal.

In this context, thanks are due to those individuals and institutions that helped in various ways. We are grateful to the National Council of Education, CNE, the Council of Rectors, CRUP, the Council of Polytechnic Institutes, CCISP, The Association of Private Institutions of Higher Education, APESP, the Council of Associate Laboratories, CLA, the Confederation of Industries, CIP, the Association of Industries, AIP, and the various unions and student associations that have provided a continuous criticism, comments and information that has allowed the preparation of the report.

We acknowledge the contribution of all the institutions that made available the information necessary for the report, including the Directorate General for Higher Education, DGES, The Observatory for Higher Education and Science, OCES, The Planning Office, GEFCES, and the Foundation for Science and Technology, FCT.

Lisboa, May 5, 2006

Manuel Heitor

Secretary of State for Science, Technology and Higher Education

Introductory Note

The review of the tertiary education system and policies requested by the Portuguese Government to the OECD in November 2005 is expected to examine the performance of the Portuguese tertiary education by reference to other OECD countries and provide recommendations for its improvement. The goal is to conduct an extensive, independent and objective assessment of the Portuguese system of tertiary education following international criteria with the ultimate goal of guiding the reorganisation and rationalisation of the system.

The review is being complemented by two other major exercises. First, the European Network for Quality Assurance in Higher Education, ENQA, will review the accreditation and quality assurance practices of Portuguese tertiary education and will provide advice on appropriate structures for implementing a national accreditation and evaluation agency following examples of quality assurance and accreditation practices in Europe. Second, an independent, voluntary and objective review of Portuguese higher education institutions (universities and polytechnics, public and private, and their units) has been launched under the coordination of the European University Association, EUA, following international criteria.

The overall exercise was designed to ensure that the tertiary education system and its stakeholders gain maximum benefit from comprehensive evaluations by teams of experienced international experts and that the procedures and processes in place in the Portuguese tertiary education system can be benchmarked against best practice internationally. The Government will use the results of the review as a contribution to the decision-making process of reforming Portuguese tertiary education.

In this context, and following the terms agreed with OECD, this Background Report provides an overview of the tertiary education system in Portugal to support the evaluation exercise. It was based on a thorough discussion with major actors in tertiary education, following the circulation of an initial draft document in March 2006 (i.e., version 1.0). The present version (i.e., version 1.1) includes written contributions received from many of those actors and thanks are due to many individuals and institutions that helped in various ways.

The report raises various concerns that need policy attention and the reviewers will certainly select those that require particular analysis. Nevertheless, from a national point of view, we believe that particular attention should be focused on the following points of concern:

1. Regulating and accrediting the supply of tertiary education: how to foster diversity and quality, with the necessary specialization? Which level of public regulation to facilitate the adequacy of the supply of tertiary education to the labour market? How should tertiary education contribute to reform and promote the knowledge base of the labour market in Portugal?
   The overall structure and network of tertiary education institutions is a major concern. The system grew unabated in the last decades, with a number of institutions achieving excellence, but many others still requiring the necessary human resources to provide quality education and research. Initially the growth and rapid increase in the number of higher education institutions responded to student demand, but this has slowed down due to declining student enrolment. At the same time, the needs of the labour market have changed. The use of *numerus clausus* as a policy instrument has become increasingly questionable in many fields of study. As a result, the objective and mission of public and private universities and polytechnics needs clarification, while the rationalisation of the overall system has been questionable. Main issues to be assessed include the number and type of higher education institutions; the accreditation of degree courses; the geographical spread of higher education institutions throughout the country, as well as the level of internationalization of most institutions. But in order to address the overall system, it is important to look carefully at the various sub-systems, in a way that foster their individual and specific characteristics. How can the binary model (university – polytechnic) best meet the needs of Portuguese society in Europe, given the historical context in which these higher education institutions developed?

Should public policies differentiate the adequacy of the supply of tertiary education to the labour market in function of the specific characteristics of each sub-system? Also, which doublet public/private?

2. Strengthening scientific excellence in higher education: Which level of public funding to guarantee the adequate level of science and technology and the growth of the knowledge base? Which implications for the organization of the supply of higher education and, in particular, for post-graduation education? Which research and academic careers?
   Strengthening science and technology in Europe has become a major concern, while the duality between research intensive universities and teaching institutions is strengthened in many countries. At the same time, the need to promote learning societies leading to knowledge economies has called our increasing attention to the overall role of research in any learning environment. How to promote at the same time scientific excellence and the growth of the knowledge base? Does Portugal provide enough human resources to fulfil this ambition, as well as adequate access to research infrastructures and skills? How to ensure that all students in any Portuguese higher education institution have access to quality research? How to regulate and organize the supply of undergraduate and post-graduate degree programs in order to guarantee the necessary research-based environments for higher education? Which level of national and international networking for research centres, the role of associated laboratories and of other R&D institutions beyond the higher education system?
   Still under this context, it is clear that women have a remarkable significant participation in Portuguese higher education and science, but their participation in S&T careers remains low at senior levels. In addition, while the attractiveness of research careers is the focus of much policy action throughout OECD countries, which policy measures should be implemented to foster modern academic and scientific careers in Portuguese higher education institutions? How can public policies foster a network of Portuguese institutions competing internationally with an increasingly diversified and sophisticated system of institutional arrangements and research and academic careers?

3. Governance and institutional autonomy in higher education: Which legal statutes and systems to foster modern institutions?
   New structures of governance of tertiary education have been layered in Portugal, as well as in many other OECD countries, creating an amalgam of complex, and sometimes ineffective, systems of governance. Nevertheless, the majority of the system of tertiary education remains within public administration, with teachers, researchers and staff managed as public servants. This has led many authors to argue that tertiary education needs modern and efficient governance systems, focusing on emerging challenges and opportunities facing institutions and their resources. They need to be attuned to the social and economic needs of the market and society, as well as to the increasingly emerging opportunities of science and technology. This requires an examination of the legal status and regulatory framework of the tertiary education institutions to make them more responsive to societal needs, but in a way to foster their own independence in guiding the frontiers of science and knowledge.

4. Broadening the tertiary education spectrum: How to enlarge the number of students and help qualifying the Portuguese population? Which social support and loan systems?
   Although the large increase in tertiary education over the last decades, Portugal is still characterized by low qualification levels of the population in general, together with high retention and drop-out rates from the education system. Which public policies to guarantee broadening access to higher education and to foster post-secondary education? How can policy measures facilitate tertiary education institutions to attract new publics for life-long learning, adult and vocational training? Furthermore, under current financial restraints, how to ensure equity in the access to tertiary education, together with adequate loan and social support systems to students?

Improving our understanding of these main aspects of concern will definitely contribute for implementing the necessary system level reforms, including the definition of the network of tertiary education institutions and study programme, widening participation to non-traditional publics and promoting lifelong education activities in order to develop a national system for tertiary education following best worldwide concepts.

In order to achieve these objectives, this Background report provides basic information to the OECD team of evaluators, which is to be complemented with interviews, meetings and visits to a range of people and institutions. In addition, the OECD has invited institutions, teachers, students, unions and professional associations to submit their own independent brief assessments of tertiary education in Portugal, so that complementary views of emerging challenges will be brought together. In general, we believe the review is taking place in the wider context of the Government's strategic objective of guarantying a system of tertiary education fully integrated at the European level, namely in terms of quality, levels of participation and employability of graduates.

Thanks are due to all the institutions that make available the information necessary for the report.

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A2. List of higher education Institutions

A3. Overall evaluation report of academic research Units, 2004-05

A4. List of Associated Laboratories

LIST OF ABBREVIATIONS

ADISPOR – Association of the Portuguese Polytechnics Institutes
APESP – Portuguese Association of Private Higher Education Institutions
AdI – Innovation Agency
CCISP – Coordinating Council of the Portuguese Polytechnics Institutes
CERN – European Organisation for Nuclear Research
CET – Specialised Technology Courses
CESE – Specialised Higher Education Courses
CIES – Centre for Research and Scholarship in Sociology
CIRIUS – Research Centre on Regional and Urban Economics
CLES – Comprehensive Law of the Education System
CNASES – National Council of Student Social Support
CNAVES – National Council for Evaluation of Higher Education
CRUP – Council of Rectors of Portuguese Universities
DAPP – Department for Evaluation, Prospective and Planning (Ministry of Education)
DEPGEF – Department for Financial Management and Planning
DGES – Directorate General for Higher Education
EFTA – European Free Trade Association
EHEA – European Higher Education Area
EMBL – European Molecular Biology Laboratory
EMBO – European Molecular Biology Organisation
ESA – European Space Agency
ESF – European Social Fund
ESO – European Southern Observatory
ESRF – European Synchrotron Research Facility
EU – European Union
EUROSTAT – Statistical Office of the European Communities
FAE – Federation of Student Unions
FCT – Foundation for Science and Technology
FEANI – European Federation of Engineering National Associations
FTE – Full Time Equivalent
FUP – Foundation of Portuguese Universities
GDP – Gross Domestic Product
GNP – Gross National Product
HEI – Higher Education Institution
ICT – Information and Communication Technologies
IICTI – Research Institute for Industrial Science and Technology
INE – National Institute for Statistics
ISCED – International Standard Classification of Education
ISCTE – Higher Institute for Work and Enterprise Sciences
IT – Information Technologies
JNICT – National Committee of Scientific and Technological Research
MCTES – Ministry for Science, Technology and Higher Education
NEOTEC – New Technologies Initiative
NEST – New Technology Based Companies
NUTS – Nomenclature of Territorial Units for Statistics
OCES – Observatory of Science and Higher Education
OCT – Observatory of Sciences and Technologies
PALOPs – African Countries with Portuguese as Official Language
POCTI – Operational Program for Science, Technology and Innovation
POSI – Operational Program for Information Society
RCTS – Network of Science, Technology and Society
R&D – Research and Development
SILATEE – Longitudinal Information System for Following the Entrepreneurial Trajectories and Enterprises
S&T – Science and Technology
UBI – University of Beira Interior
UTAD – University of Trás-os-Montes e Alto Douro

PART I

THE CONTEXT

1. Introducing tertiary education in Portugal

1. The current evaluation of the Portuguese tertiary education system corresponds to a period of slightly declining and/or relative stagnation in the growth of students after a period of more than 30 years of consecutive growth, as quantified in Figures 1.1 and 1.2. The system has rapidly grown from 30.000 students in the sixties, to nearly 400.000 students by the end of the 20th century, as it was opened to young people of all social classes since the early 70s. This rapid increase in the student population, comparatively to the development in other European countries during the same period, Figure 1.3, should be acknowledged, although the recent decrease in the number of students since 2002 has been expected for a number of years based on consecutive estimates[1,2]. It raises a series of new challenges and opportunities for the higher education system in the national context, namely in terms of the need to strengthen its capacity and level of specialization, as well as to help broadening the qualification of the Portuguese population and its knowledge base in an international context.

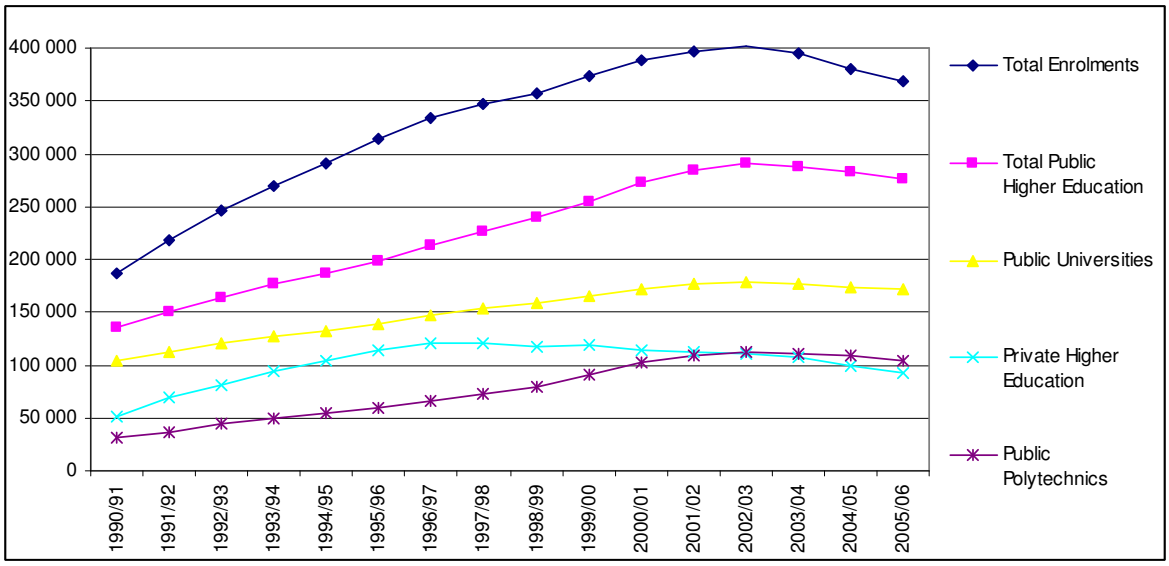


Figure 1.1. Evolution of the overall number of students (graduate and post-graduate) enrolled in higher education in Portugal, 1990/91 – 2005/06
Source: OCES-MCTES;

[1] CIPES, *Previsão da Evolução do número de alunos e das necessidades de financiamento Ensino Superior 1995 a 2005*, February 1999, through which there was an expected decrease in 32.600 students of the 12th year (or 26.6%), between 1995/1996 and 2005/2006.

[2] Expectation of decrease in the number of students of the secondary education of 51.442 students of the 12th year, between 1997/1998 e 2002/2003, as in *"Alunos matriculados no ensino público e privado – Evolução e projecção"* em: http://www.min-edu.pt/Scripts/ASP/estatisticas.asp

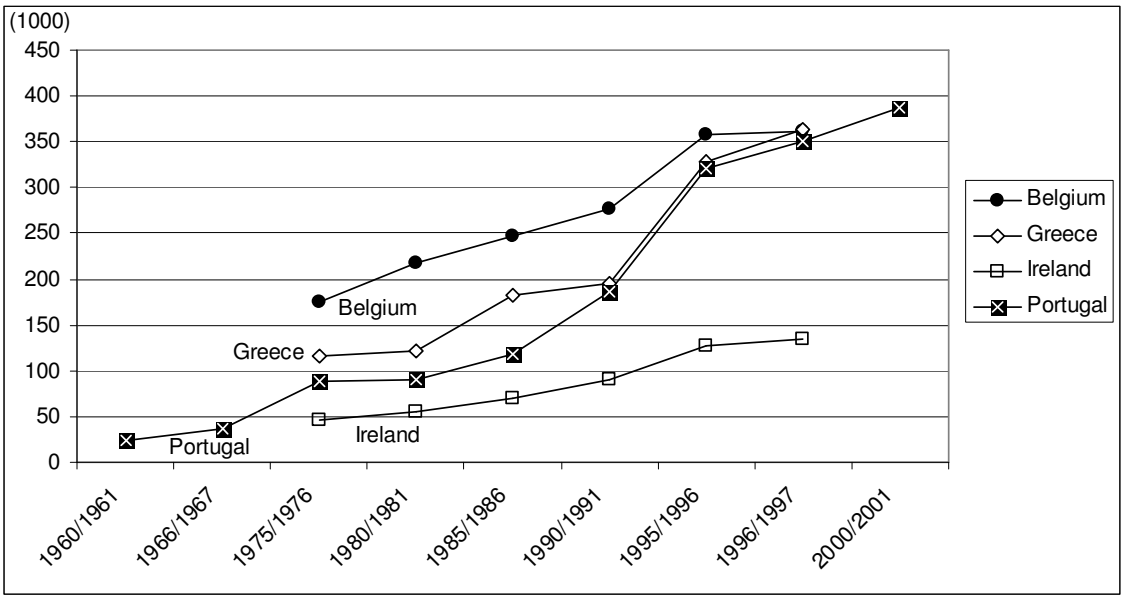


Figure 1.2. Total number of students in the higher education system for the period 1960-2002 in a selected group of small European countries

Source: Conceição and Heitor, (2005), "Innovation for All? Learning from the Portuguese path to technical change and the dynamics of innovation". Westport and London: Praeger; Primary data from Eurostat, UOE, INE, DAPP.

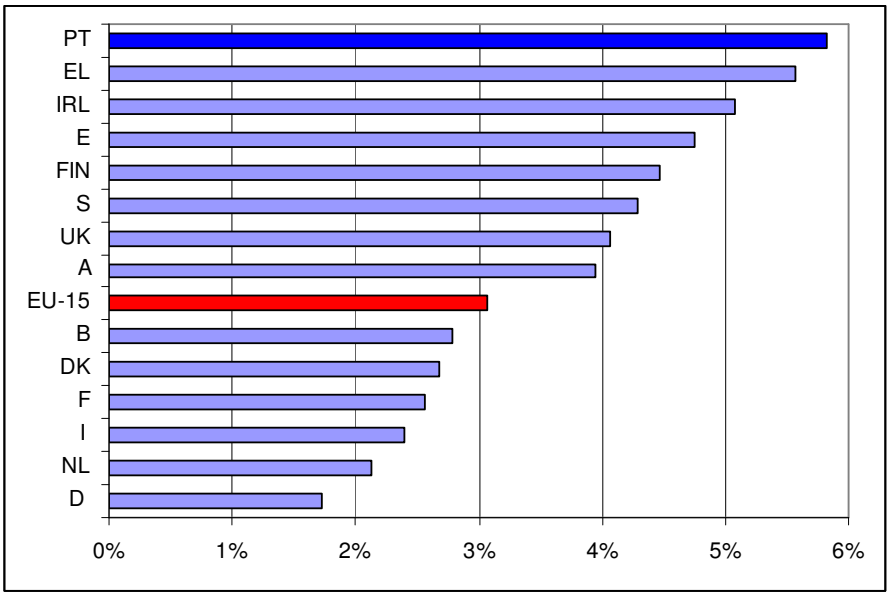


Figure 1.3. Compound annual growth rate of the number of students enrolled in tertiary education (ISCED 5 and 6), 1975/76 – 2000/01

Source: Eurydice (2005), Key data on Education in Europe 2005, Luxembourg, Office for Official Publications of the European Communities

2. Within the students enrolled in tertiary education in Portugal, female population represents about 61% of the overall number of students, Figure 1.4, with 55% of them staying with their families after enrolment in tertiary education, Figure 1.5. This shows a pattern typical of most southern European countries, although analysis has shown it has evolved with time.

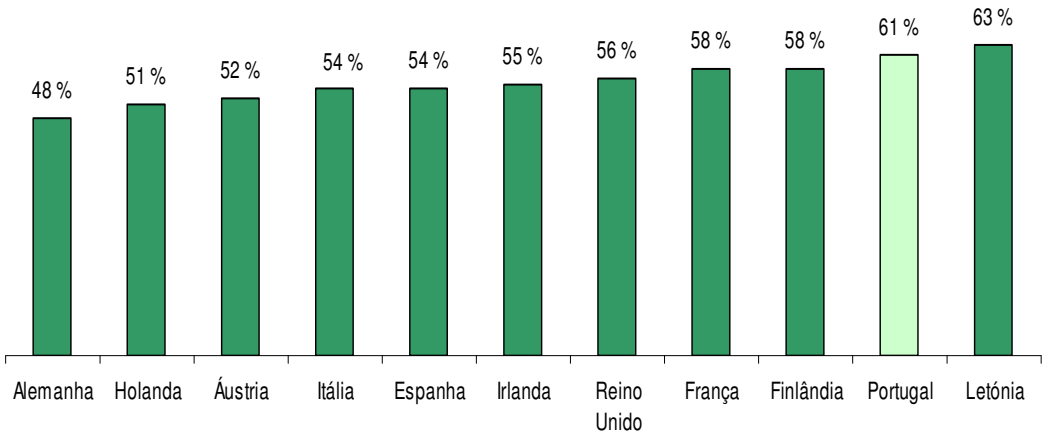


Figure 1.4. Overall percentage of women enrolled in higher education, 2004
Source: CIES-ISCTE, Eurostudent 2005

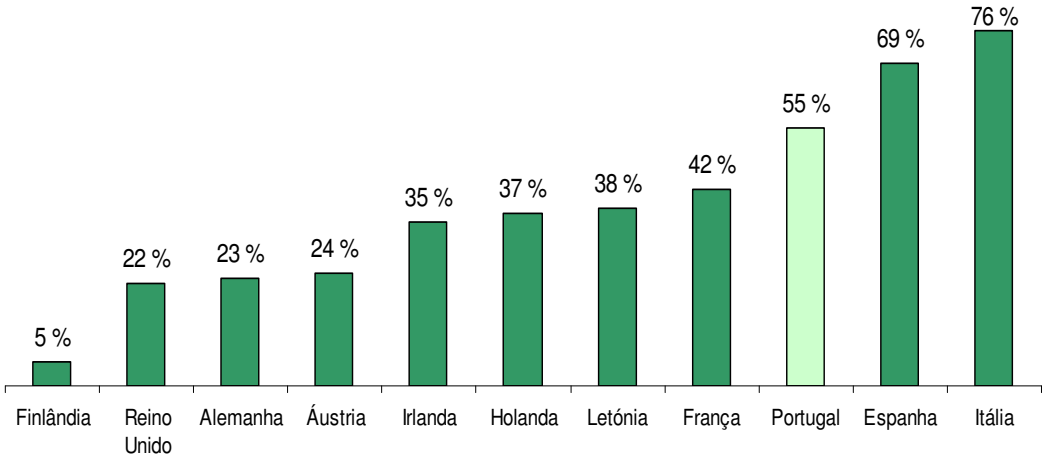


Figure 1.5. Overall percentage of students staying at their parent's house, 2004
Source: CIES-ISCTE, Eurostudent 2005

3. About 24% of higher education students receive direct public support in the form of a grant, Figure 1.6, which represents a fraction similar to that in Spain and considerably higher than that of Italy, but still considerably smaller than those typical of northern European countries. The Portuguese grants are provided through the system of social support operating at full expenses. In addition, a loan system is provided through commercial banks, at commercial rates, covering a very limited number of students.

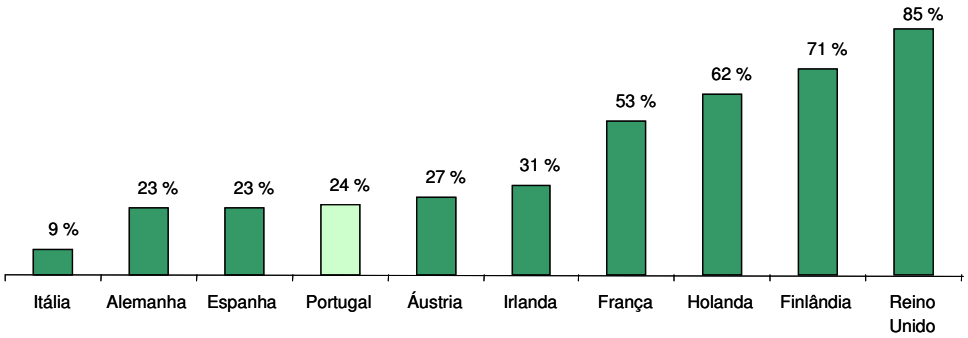


Figure 1.6. Overall percentage of students receiving direct public support, 2004
Source: CIES-ISCTE, Eurostudent 2005

4. In a similar way, occupancy of student residences covers only about 4% of the overall population in higher education and, therefore, is still comparatively lower than in most European countries, Figure 1.7.

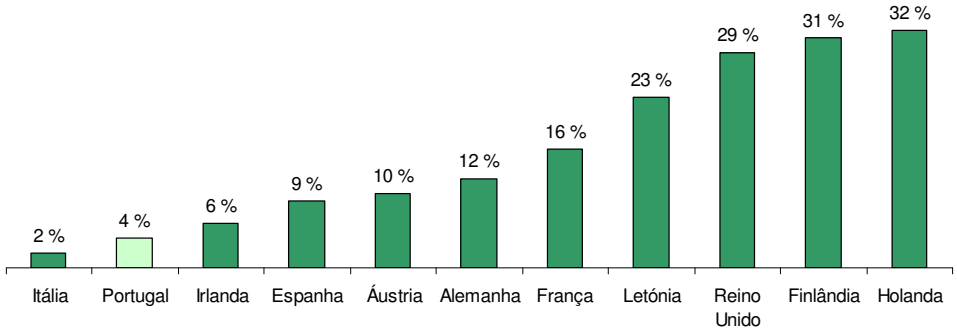


Figure 1.7. Overall percentage of students staying at student residences, 2004
Source: CIES-ISCTE, Eurostudent 2005

5. Figures 1.8 and 1.9 show that a large fraction of the student's income is provided by their families, independently of where the students are living, in a way that differs from most European countries.

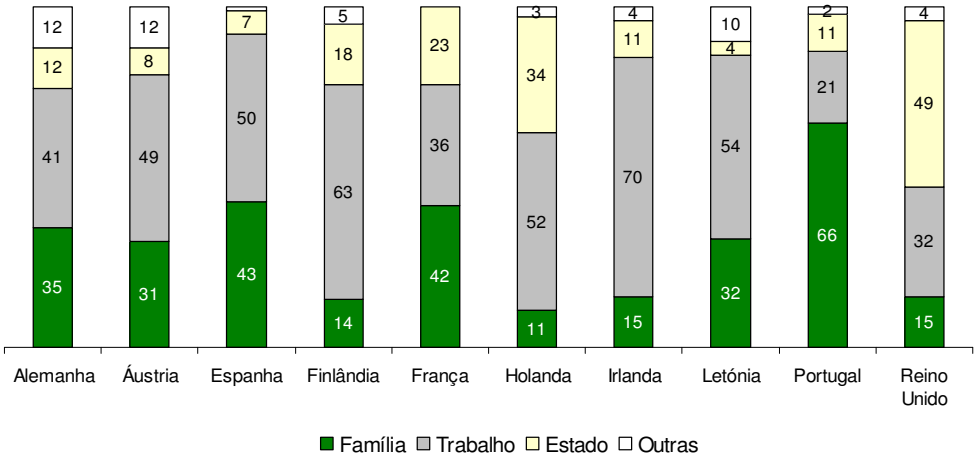


Figure 1.8. Relative level of the sources of income for students staying at their parent's house, 2004; Source: CIES-ISCTE, Eurostudent 2005

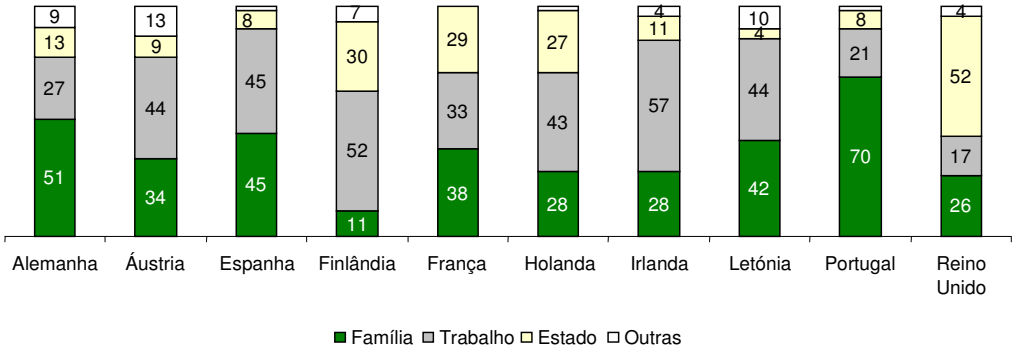


Figure 1.9. Relative level of the sources of income for students that are <u>not</u> staying at their parent's house, 2004; Source: CIES-ISCTE, Eurostudent 2005

6. Higher education is provided through a diversified arrangement of institutions, Table 1.1, including 27 universities, 40 university schools (not integrated), 17 polytechnic institutes and 76 polytechnic schools (not integrated), with an overall of 160 units. This includes 14 Public universities, with 6 of them organized in terms of 48 independent schools (i.e., "faculdades").

Table 1.1 Number of university and polytechnic institutions, 2006

	University		Polytechnic	
	Universities	Other Schools (not integrated)	Polytechnic Institutes	Other Schools (not integrated)
Public	14*	5	15	16
Private	13	35	2	60
TOTAL	**27**	**40**	**17**	**76**

Note:* A total of 6 of these 14 universities are organized in terms of schools, including <u>48 independent units</u> ("Faculdades", or schools)

7. The system includes 15 Public Polytechnic Institutes and 2 Private Polytechnic Institutes, but Table 1.2 quantifies the network of polytechnic schools, including those integrated in universities and in polytechnic institutes, with an overall number of 173 schools.

Table 1.2 Number of polytechnic schools, 2006

	Polytechnic schools integrated in polytechnic institutes	Polytechnic schools integrated in universities	Other polytechnic schools (not integrated)	**TOTAL**
Public	75	15	16	**106**
Private	4	3	60	**67**
TOTAL	**79**	**18**	**76**	**173**

8. Overall, these institutions offer in 2005/06 about 80 bachelor degree programmes (i.e., three-year degrees, "bacharelato"), 1932 "licenciaturas" and 622 masters, Table 1.3.

Table 1.3 Number of degree programmes registered for the academic year 2005/06

Sub-system of Higher Education		Number of degree programmes registered, 2005-2006		
		"Bachalerato"	"Licenciatura"	"Mestrado"
Public Higher Education	University	5	723	528
	Polytechnic	27	619	--
	Sub-total	**32**	**1342**	**528**
Private Higher Education	University	10	308	63
	Polytechnic	38	213	--
	Sub-total	**48**	**521**	**63**
Catholic University	University	--	69	31
	Sub-total		**69**	**31**
TOTAL		**80**	**1932**	**622**

Source: DGES

9. Table 1.4 quantifies the number of new entrants, total students and new graduates for 1995/96 and 2004/05, including graduate and post-graduate degree programmes in public and private institutions. The results show that the number of higher education graduates have duplicated over the last decade, with those in the field of science and technology accounting for about 20% of the overall number of new graduates, while those in social sciences and management accounted for 29% (in relation to 2003/04). It should be pointed out that the higher education expansion process resulted mainly from the increase of the non-university higher education over the 80´s and 90´s, which grew at a rate considerably higher than that of university education, representing, in 2001, nearly 42% of overall students (Figure 1.1). However, it is important to stress that, according to the prospective analysis published in 1994[3], the education level that most contributes to the strengthening of school qualification of the Portuguese middle management staff is still the undergraduate level. In this context, the "bacharelato" (three-year degree) has been partly a "passage corridor" to the undergraduate degree and its lack of specificity is confirmed by the overall decrease in the weight of three-year university graduates in engineering sciences in middle management staff.
10. New graduates in the field of science and technology represent about 31% of the overall new graduates from the public university system and only 11% of those graduating from the private system, with these relative figures keeping rather constant over the last years. On the other hand, new graduates in the health field have grown from 6% to 11% of the total number of graduates from the public system, while they increased from 16% to 20% of the graduates from the private system.

[3] See Gago, J.M. (1994), Prospective study of Higher education in Portugal.

Table 1.4 New entrants, total students and new graduates for different fields of study

a) Number of overall (public and private systems) new entrants, total students and new graduates for different fields of study (graduate and post-graduate degree programmes): 1995/96 to 2005/06

Field of Study	Total Registrations			Registrations 1st year/1 st time			Graduations		
	1995/96	2004/05	2005/06	1995/96	2004/05	2005/06	1995/96	2003/04	2004/05
Education	30.290	32.928	26.277	8.765	8.293	7.185	6.131	12.166	10.246
Arts & Humanities	28.627	32.658	31.553	6.961	7.738	8.199	4.270	6.037	6.144
Social Sciences, Law	125.499	119.339	116.262	32.133	26.320	25.565	15.361	19.664	19.638
Science &Technology	87.502	111.999	107.430	22.085	20.331	19.098	7.200	14.000	14.696
Agriculture	8.974	7.585	7.045	2.014	1.061	1.024	834	1.331	1.359
Health Sciences	21.708	55.201	58.823	5.516	15.937	16.899	4.101	11.643	13.528
Services	10.835	20.842	20.544	3.629	4.657	4.720	1.319	3.827	4.412
Total	**313.435**	**380.552**	**367.934**	**81.103**	**84.337**	**82.690**	**39.216**	**68.668**	**70.023**

Source: OCES

b) Total registrations, new entrants and graduations per type of system (public vs private)

System	Total registrations					New entrants: 1st year; 1st time					Graduations			
	2001/02	2002/03	2003/04	2004/05	2005/06	2001/02	2002/03	2003/04	2004/05	2005/06	2001/02	2002/03	2003/04	2004/05
Public	284789	290532	288309	282273	275961	65921	67640	64801	63365	63700	42200	46499	46854	49220
Private	111812	110299	106754	98664	91973	26915	26806	24468	20998	18990	21898	22012	21814	20803
Total	**396601**	**400831**	**395063**	**380552**	**367934**	**92836**	**94446**	**89269**	**84363**	**82690**	**64098**	**68511**	**68668**	**70023**

Source: OCES

c) Total new entrants and graduations in higher education per system and area of study

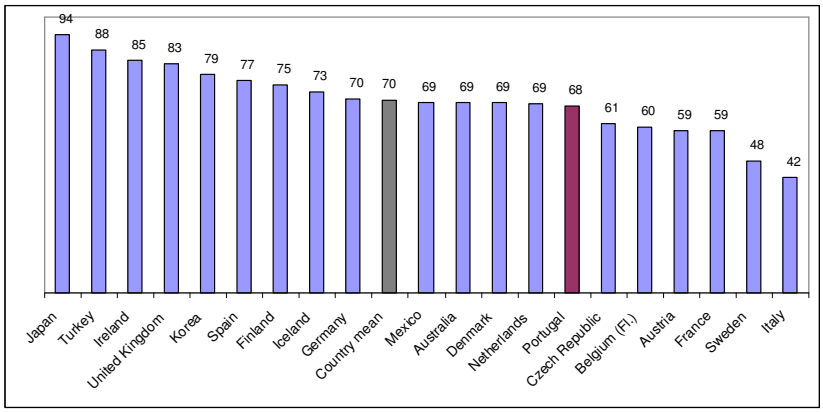
Field of study	New entrants: 1st year; 1st time 2004-2005				Graduations 2003-2004			
	Public Universities	Public Polytechnics	Private	**Total**	Public Universities	Public Polytechnics	Private	**Total**
Agriculture	1%	2%	1%	**1%**	3%	3%	0%	**2%**
Arts & Humanities	12%	6%	7%	**9%**	12%	6%	8%	**9%**
Social sciences & Managem.	31%	26%	37%	**31%**	25%	24%	37%	**29%**
Science & Technology	32%	22%	11%	**24%**	31%	19%	11%	**20%**
Education	9%	9%	12%	**10%**	16%	16%	21%	**18%**
Health sciences	9%	28%	29%	**19%**	7%	26%	19%	**17%**
Services	5%	7%	4%	**6%**	6%	7%	5%	**6%**
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100**	**100%**

Source: OCES

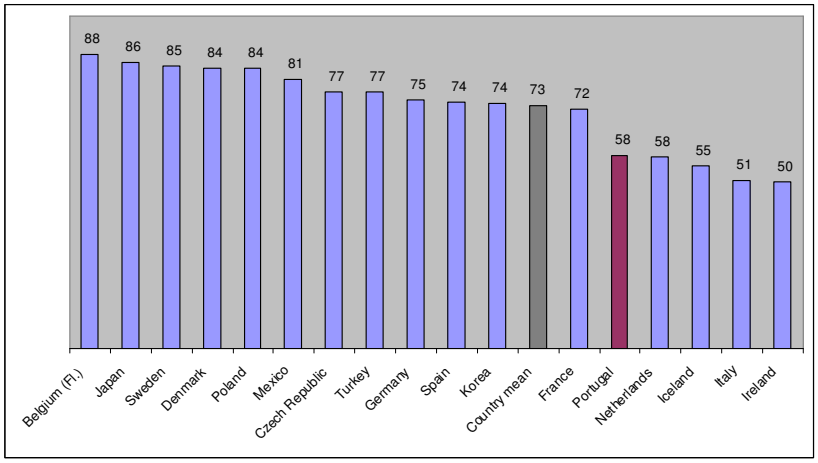
11. Although the results show that there has been a large increase in the number of Master and post-graduate programmes in recent years, the current fraction (i.e., before the implementation of the Bologna process) of post-graduate students and graduates remains significantly low in all the institutions, achieving values as high as 20% of the overall number of students in the most

research intensive schools in Lisbon and Porto (namely in engineering and natural sciences), Table 1.5b (see also below, Table 1.9). It is clear that any international comparison made on the basis of these figures must be carefully assessed, because it reflects the current duration of undergraduate education in Portugal. Although undergraduate education is dominant, it should also be noted that the main challenge in the last few years has been based on the tentative generalisation of the research university model in public universities. At the same time, the dichotomy between public and private universities has been encouraged, as the model of "teaching university" has been recognized mainly in private universities and in private and public polytechnics.

12. Figure 1.10 indicate measures of success (i.e., "survival rate") in public higher education, using the methodologies referred by OECD[4], suggesting average values comparable to those reported at international levels.



a) - Survival rates in tertiary-type A education (mainly portuguese 'licenciatura')



b) Survival rates in tertiary-type B education (portuguese 'Bacharelato')

Figure 1.10. Survival rates in tertiary-type education in OECD countries (2000)
Note: according to the OECD´s "survival rate index", which quantifies the number of graduates divided by the number of new entrants in the typical year of entrance)

4 see, OECD Education at Glance, 2005

13. Figure 1.11 indicate measures of drop-out rates in public higher education, indicating comparatively lower drop-out rates in health sciences, with values increasing in recent years.

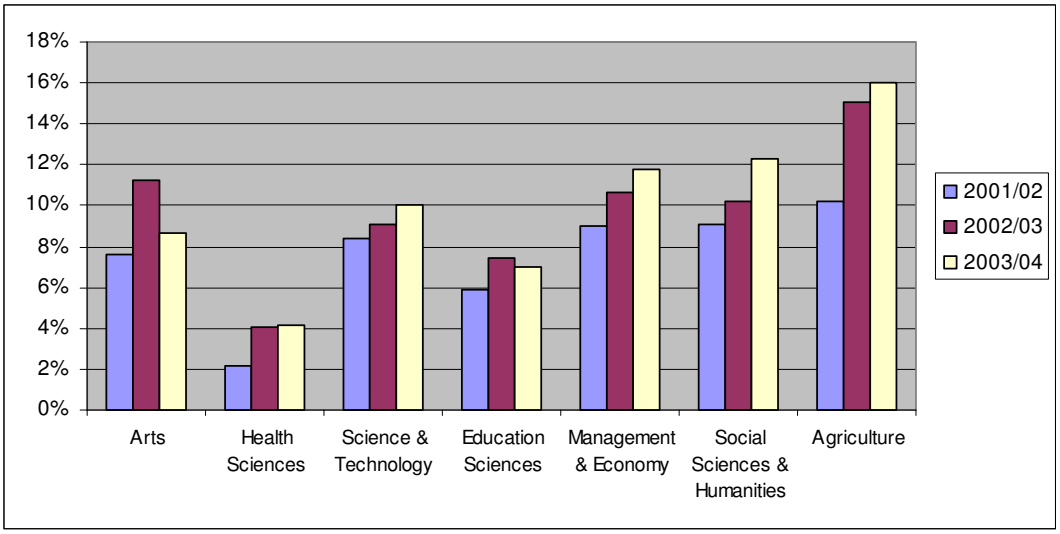


Figure 1.11 – Academic drop-out rates in <u>public</u> higher education for 2002 – 2004
Note: the "drop-out rate" represents the fraction of students enrolled that have left the programme without a diploma, as calculated in percentage of that year's total enrolments.
Source: OCES

14. Table 1.5 quantifies the evolution of the number of graduates (undergraduate and post-graduate) from higher education institutions in recent years and, for comparative purposes, Figure 1.12 shows the percentage of engineering graduates in the active population aged between 25 and 64 in several OECD countries throughout the 20th century. This indicator is clearly limited in scope, but confirms a considerable rate of change since the 80's, after a remarkable poor Portuguese performance over most of the 20th century in graduating the population.

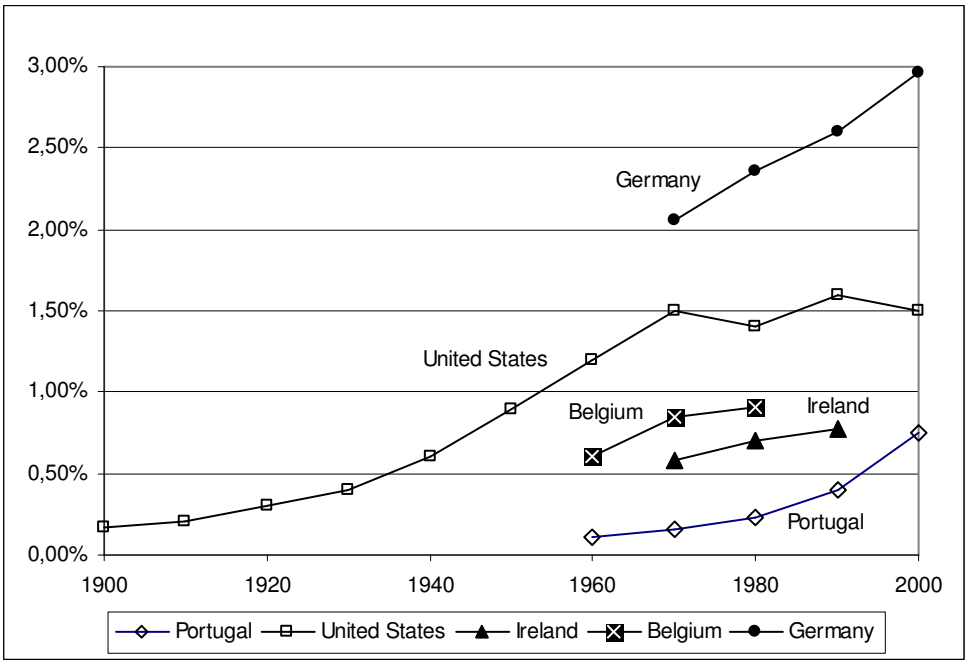


Figure 1.12 – Percentage of graduated engineers in active population aged between 25 and 64 years old in a selected group of OECD countries

Sources: Conceição and Heitor (2005). Primary data from: Germany - Bundesanstalt für Arbeit/German Federal Statistics Office/International Labour Organization; USA – U.S. Department of Labor, Department of Labor Statistics, Digest of Education Statistics, 2001, U.S. Education Department/International Labour Organization; BE – Statistics Belgium/ International Labour Organization; Ireland – Central Statistics Office/International Labour Organization; Portugal – Instituto Nacional de Estatística/DAPP/DGES/ International Labour Organization.

Table 1.5 - Evolution of the number of graduates (undergraduate and post-graduate) from public higher education institutions

a) Public Polytechnics: number of graduation degrees awarded ("Bachaleratos" and "licenciaturas") for 2001/02 – 2003/04

Institutions	2001-2002	2002-2003	2003-2004
TOTAL	17 973	19 843	19 943
INST POLITÉCNICO DE BEJA	818	840	716
INST POLITÉCNICO DO CAVADO E DO AVE	173	228	286
INST POLITÉCNICO DE BRAGANÇA	839	954	978
INST POLITÉCNICO DE CASTELO BRANCO	939	900	880
INST POLITÉCNICO DE COIMBRA	1 613	1 819	1 887
INST POLITÉCNICO DA GUARDA	968	834	784
INST POLITÉCNICO DE LEIRIA	1 238	1 591	1 418
INST POLITÉCNICO DE LISBOA	2 345	2 582	2 589
INST POLITÉCNICO DE PORTALEGRE	655	754	832
INST POLITÉCNICO DO PORTO	2 369	2 547	2 769
INST POLITÉCNICO DE SANTARÉM	824	992	898
INST POLITÉCNICO DE TOMAR	580	594	711
INST POLITÉCNICO DE SETÚBAL	940	1 076	1 032
INST POLITÉCNICO DE VIANA DO CASTELO	756	859	910
INST POLITÉCNICO DE VISEU	1 136	1 310	1 397
ESC SUP DE ENFERMAGEM DE BISSAYA BARRETO	284	343	308
ESC SUP DE ENFERMAGEM DR. ÂNGELO DA FONSECA	155	358	340
ESC SUP DE ENFERMAGEM DE ARTUR RAVARA	166	152	70
ESC SUP DE ENFERMAGEM DE MARIA FERNANDA RESENDE	140	167	142
ESC SUP DE ENFERMAGEM DE FRANCISCO GENTIL	114	95	113
ESC SUP DE ENFERMAGEM DE CALOUSTE GULBENKIAN DE LISBOA	187	157	119
ESC SUP DE ENFERMAGEM CIDADE DO PORTO	157	156	163
ESC SUP DE ENFERMAGEM DE SÃO JOÃO	352	258	296
ESC SUP DE ENFERMAGEM DE D. ANA GUEDES	96	120	97
ESC SUP HOTELARIA E TURISMO DO ESTORIL	129	157	208

b) Public Universities: number of graduation degrees awarded ("Bachaleratos" and "licenciaturas") and post-graduate diplomas (non-degree specializations, master degrees, and doctorate degrees) for 2001/02 – 2003/04

Institutions	2001-2002					2002-2003					2003-2004				
	Bacharelatos Licenciaturas Compl Form	Especializ	Mestres (Master)	Doutor (PhD)	TOTAL	Bacharelatos Licenciaturas Compl Form	Especializ	Mestres (Master)	Doutor (PhD)	TOTAL	Bacharelatos Licenciaturas Compl Form	Especializ	Mestres (Master)	Doutor (PhD)	TOTAL
TOTAL	**19 675**	**907**	**1 865**	**642**	**23 089**	**20 949**	**1 112**	**2 382**	**813**	**25 256**	**21 173**	**1 249**	**2 534**	**854**	**25 810**
UNIVERSIDADE DOS AÇORES	**504**	**0**	**12**	**0**	**516**	**603**	**29**	**45**	**8**	**685**	**565**	**0**	**43**	**0**	**608**
UNIVERSIDADE DO ALGARVE	**1 735**	**6**	**23**	**15**	**1 779**	**1 610**	**0**	**70**	**13**	**1 693**	**1 751**	**57**	**67**	**24**	**1 899**
UNIVERSIDADE DE AVEIRO	**1 146**	**0**	**98**	**37**	**1 281**	**1 295**	**0**	**139**	**44**	**1 478**	**1 450**	**75**	**152**	**50**	**1 727**
UNIVERSIDADE DA BEIRA INTERIOR	**475**	**0**	**35**	**18**	**528**	**480**	**11**	**18**	**19**	**528**	**538**	**42**	**48**	**17**	**645**
UNIVERSIDADE DE COIMBRA	**2 447**	**95**	**169**	**52**	**2 763**	**2 655**	**72**	**267**	**93**	**3 087**	**2 437**	**53**	**265**	**69**	**2 824**
UNIVERSIDADE DE ÉVORA	**627**	**14**	**47**	**28**	**716**	**875**	**44**	**54**	**27**	**1 000**	**800**	**16**	**73**	**27**	**916**
UNIVERSIDADE DE LISBOA	**2 348**	**121**	**225**	**88**	**2 782**	**2 477**	**194**	**377**	**106**	**3 154**	**2 473**	**181**	**377**	**123**	**3 154**
UNIVERSIDADE TÉCNICA DE LISBOA	**2 208**	**290**	**310**	**142**	**2 950**	**2 254**	**354**	**348**	**143**	**3 099**	**2 255**	**362**	**368**	**129**	**3 114**
UNIVERSIDADE NOVA DE LISBOA	**1 208**	**118**	**166**	**49**	**1 541**	**1 326**	**116**	**197**	**93**	**1 732**	**1 476**	**86**	**183**	**107**	**1 852**
UNIVERSIDADE DO MINHO	**1 938**	**94**	**227**	**64**	**2 323**	**2 305**	**173**	**243**	**81**	**2 802**	**2 200**	**153**	**289**	**82**	**2 724**
UNIVERSIDADE DO PORTO	**2 594**	**169**	**450**	**132**	**3 345**	**2 756**	**117**	**436**	**130**	**3 439**	**2 908**	**217**	**472**	**150**	**3 747**
UNIVERSIDADE TRAS-OS-MONTES E ALTO DOURO	**1 328**	**0**	**14**	**0**	**1 342**	**1 232**	**0**	**48**	**24**	**1 304**	**1 204**	**0**	**54**	**32**	**1 290**
UNIVERSIDADE DA MADEIRA	**475**	**0**	**0**	**1**	**476**	**455**	**0**	**0**	**5**	**460**	**488**	**0**	**11**	**12**	**511**
INST SUP DE CIÊNCIAS DO TRABALHO E DA EMPRESA	**642**	**0**	**89**	**16**	**747**	**626**	**2**	**140**	**27**	**795**	**628**	**7**	**132**	**32**	**799**

15. According to the OECD (2005), Portugal has, after Turkey, the lowest share of the population aged 25-64 with at least an upper secondary education level. This share is about 20% for Portugal, while the OECD average is three times larger, at 60%. In the United States it is 76%, in Finland it is 67% and in Ireland it is 50%. In the Czech Republic almost 3/4 of the population aged 25-64 have at least an upper secondary education level.

Table 1.6 – Indicators of the qualification progress of the Portuguese population (%)

	1961	1971	1981	1991	2001
Illiteracy rate	33	26	19	11	9
Students in higher education/population18-22 years old	4	7	11	23	53
% Population with higher education	0.8	1.6	3.6	6.3	10
Schooling rate at 18 years of age	-	-	30	45	62

Sources: INE, General Population Census; Ministry of Education, GIASE, Education statistics

16. Table 1.7 summarises the latest available statistical data on the academic qualification of the Portuguese population aged 25-64. The deficit in qualifications, especially at the level of secondary education, has been considered by many authors and analysts to be the most serious obstacle to the adoption of organisational structures that would allow greater labour flexibility and adaptation, associated with increasingly competitive markets, and scientific development.

Table 1.7 – Academic qualification 2001

No academic qualification	11%
4 years of schooling	36%
6 years of schooling	15%
9 years of schooling	13%
Upper secondary education	13%
Tertiary education	11%
Others	1%

Source: INE, 2001 Population census

17. The issues raised in terms of the evolution of supply and demand in higher education should be complemented with the characterization of the capacity installed, namely in terms of qualified human resources, and Figure 1.13 quantifies the relation student/teachers for various OECD countries. Any extrapolations should be done with caution, because of the diversified methodologies used, namely in the definition of the number of students, with some countries accounting for "full time equivalent", FTE.
18. Table 1.8 shows the qualifications of the teaching staff involved to educate students, as registered in December 2004. Overall, teachers with a doctoral degree represent only 55% of the teaching staff in public universities, Figure 1.14, with values ranging from about 35% to 65% across the various public universities. If the total system of higher education is considered, PhD holders represent only 30% of the overall teachers, Table 1.8.

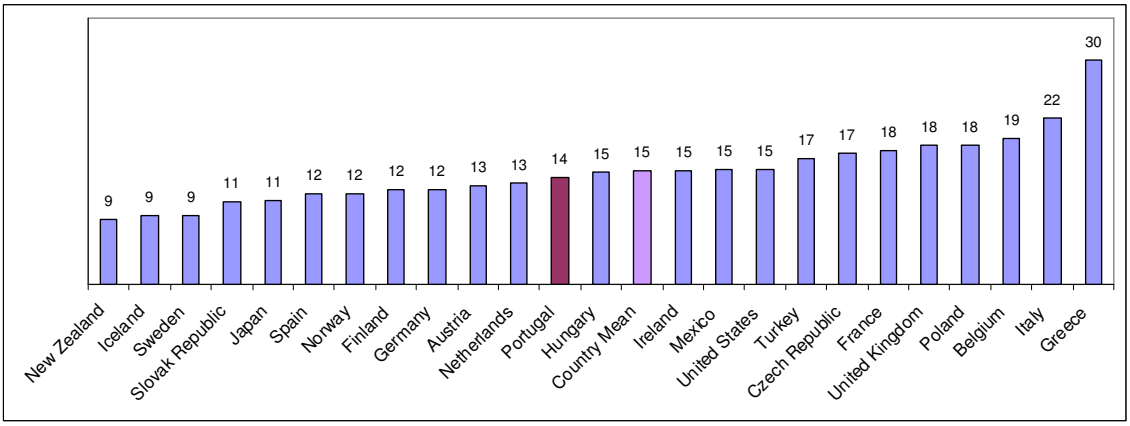


Figure 1.13. Ratio of students to teaching staff in higher education in OECD (2003)

Notes: Teaching staff is based on full-time equivalents, FTEs; Norwegian and Portuguese data refer to public institutions only;

Sources: Portuguese data through DGESUP and OCES; otherwise: OECD(2005), Education at a Glance.

Table 1.8 Teaching staff involved in tertiary education in Portugal (Head counts, as by December 2004)

		Academic qualifications				
		PhD	Master	"Licenciatura"	Other	Total
PUBLIC UNIVERSITIES	Number of teachers	8029	3499	2779	239	14546
	%	55,2	24,1	19,1	1,6	
PUBLIC POLYTECHNICS	Number of teachers	1002	4033	4664	528	10227
	%	9,8	39,4	45,6	5,2	
PUBLIC MILITARY SYSTEM	Number of teachers	114	131	323	21	589
	%	19,4	22,2	54,8	3,6	
PRIVATE UNIVERSITIES	Number of teachers	1177	1372	1688	53	4290
	%	27,4	32,0	39,3	1,2	
OTHERS PRIVATE	Number of teachers	994	2236	3707	213	7150
	%	13,9	31,3	51,8	3,0	
Total	Number of teachers	11316	11271	13161	1054	36802
	%	30,7	30,6	35,8	2,9	

Source: OCES-MCTES

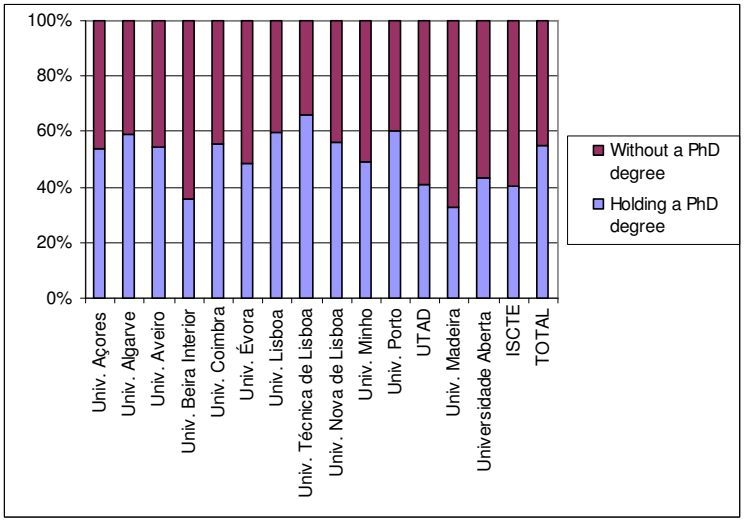


Figure 1.14. Characterisation of public university faculty in terms of qualifications, 2004

Source: OCES, Development of Teaching Staff Qualifications in Public Higher Education: from 1993 to 2003, OCES, August 2004

19. Figure 1.15 quantifies the number of PhDs granted by Portuguese Universities, revealing an increasing capability in offering PhD programmes, although the relative figures are still considerably low when compared internationally. For example, Table 1.9 shows that, in Portugal, each new PhD is graduated for 51 new graduates (as measured four years before), while this number for Spain is about 30, and it is as low as 9 and 7 for Holland and Germany, respectively. This comparison is important in that it reveals the still considerably small dimension of post-graduation education in Portugal, so that the necessary research environments are implemented in universities. Beyond the need to strengthen post-graduate education, this issue also raises new challenges regarding the need to strengthen their internationalization.

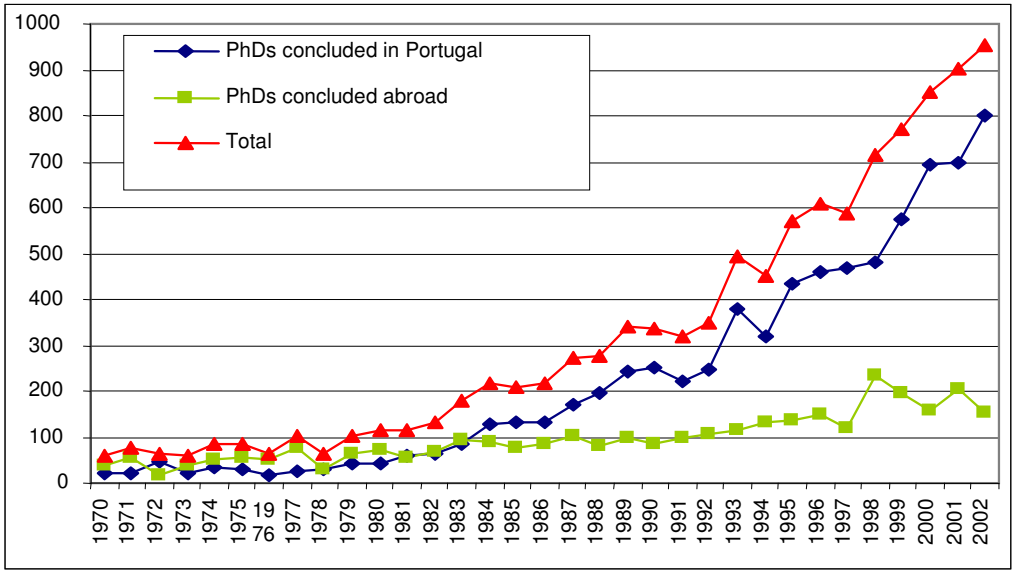


Figure 1.15 – PhDs concluded or recognised by Portuguese universities and abroad, in the period 1970-2002

Source: Science and Higher Education Observatory, PhDs concluded or recognised by Portuguese Universities, April 2003; Official Journal (II Series): Semestrial break down of PhD diplomas obtained abroad and recognised in Portugal under the scope of Decree-Law 216/97, of 18 August; Director-general for Higher Education: Registry of PhDs obtained in the European University Institute of Florence under the scope of Decree-Law 93/96, of 16 July.

20. The continuous increase in the number of doctorates, especially when considering European and international figures, was systematically referred to by the generality of the evaluation panels that visited Portugal since 1996 in the context of international evaluations of R&D Centres as a decisive factor to guarantee the critical mass essential for scientific development[5]. It is also important to note that in 2001 Portugal was, for the first time in history, part of the group of the countries of excellence that contributed to the share of top 1% of the world's highly cited

[5] See detailed report by Heitor, M. V. (2000). *Evaluation of Research Units, 1999/2000—Final Report*. Lisbon: Observatory for Science and Technology, Portuguese Ministry of Science and Technology.

publications[6]. This is important because the number of citations by scientific paper are the best quality and impact measure of research produced by an individual, a group or, in this case, a country. Between 1997 and 2001, Portuguese researchers contributed with 96 publications for this restricted group, accounting for 0.25% of the overall figure. Naturally, the United States are in the leading position with 63% of the overall number of publications, followed by the UK with 13%. Spain is responsible for 2.08%, whereas Ireland and Greece account for 0.36% and 0.3%, respectively. Not only is the Portuguese presence relevant, but it also has significantly increased in the second half of the nineties, Figure 1.15. In fact, between 1993 and 97, Portugal had only been responsible for 0.12%, or less than half of the contribution for the most recent period. It is worth mentioning that between 1991 and 2001, the total funding for R&D activities grew from 0.4% to 0.79% of the GDP, and that the annual flux of new PhD holders was nearly three times higher.

Table 1.9 Relation between annual flux of new graduates and doctorates

a) Average number of new graduates per each new PhD awarded in several countries

Country	Source of information	Number of new PhD's/Year (Latest Available year, Y)	Number of new graduates/Year (4 years before Y)	New Graduates per each new PhD
Portugal	OCES	1068	54255	**51**
Norway	Norway Statistics and NIFU STEP	855	29376	**34**
Spain	Instituto Nacional de Estadística	6936	208543	**30**
United Kingdom	Higher Education Statistics Agency	10660	233610	**22**
Holland	Statistics Netherlands	2556	23954	**9**
Germany	Federal Statistical Office	23138	159115	**7**

b) Number of new graduates per each new PhD awarded in Portugal for various scientific areas

Scientific Area	New graduates in 1998 per each new PhD in 2002	New graduates in 1999 per each new PhD in 2003	New graduates in 2000 per each new PhD in 2004
Agriculture	22	30	30
Arts & Humanities	234	473	404
Social Sciences, Econom,, Managem. & Law	69	67	58
Education	155	169	166
Sciences & Engineering	18	18	18
Health and Social Protection	58	76	91

Fonte: OCES

6 See the analysis of King, D.A., *The scientific Impact of Nations – What difference countries for their research spending*, Nature, vol. 430, 15 July 2004

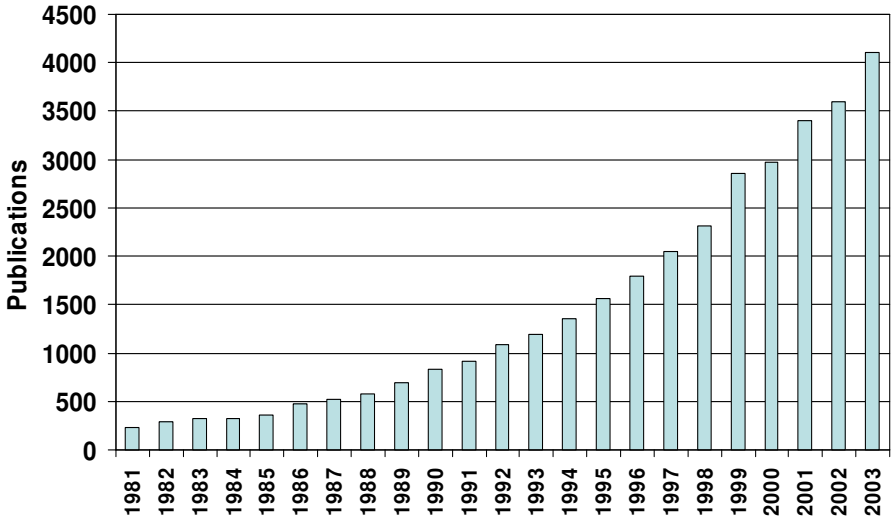


Figure 1.16 – Evolution of the number of scientific publications by Portuguese institutions, as registered by the ISI, in the period 1980-2003
Source: ISI, OCES

21. The facts show the significant development of the national scientific community in the international context, but it should be clear that the European process of integration and the subsequent growth of the S&T system, especially in the second half of the nineties, cannot explain the maturity of the Portuguese system, namely when it is analysed in international terms. It is obvious that the late development in S&T that characterises Portugal at the end of the twentieth century, in comparison with its European counterparts, is due to the close relationship between scientific development and freedom of thought, which was severely encumbered by the dictatorship (i.e., "Estado Novo") until the mid-seventies. It is recognized that the expenditure on Portuguese R&D, comparatively to other OECD countries has always been small, resulting from a slow and late development of its R&D system, associated with few funding programmes and discontinued policies, which have delayed the increase in R&D activities in Portugal.
22. The need to strengthen the science and technology system and to increase doctorate-level training has been associated with the overall research context and Figure 1.17 quantifies the evolution of the overall number of researchers in Portugal and Europe as a function of the workforce. Scale has been a major challenge for Portugal, where for each 1000 workers there are only about 3.6 researchers, compared with 5.4 in EU-25 and 8 in the US.

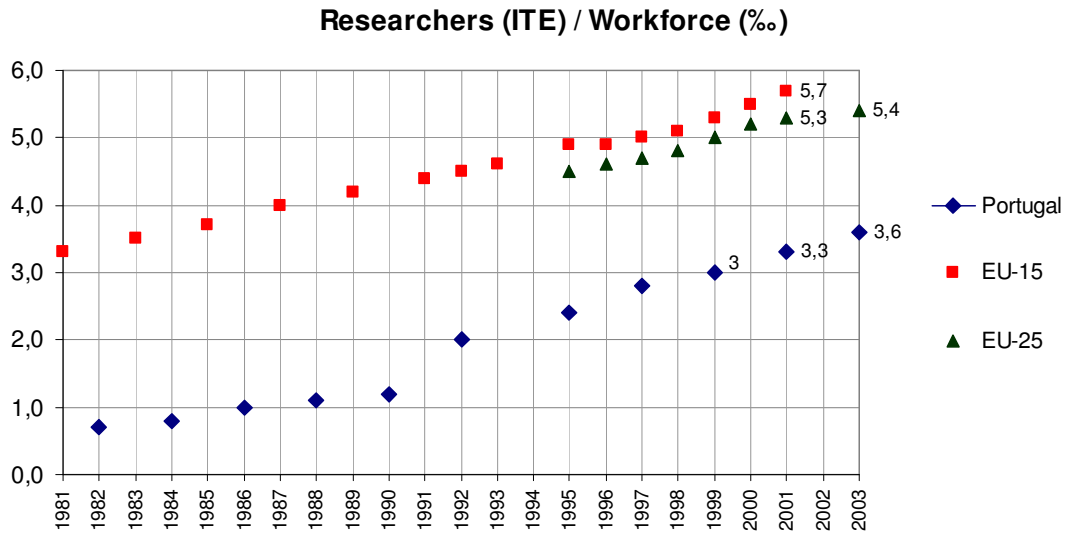


Figure 1.17 – Evolution of the number of researchers (FTE, full time equivalent) in terms of the workforce for Portugal and Europe, in the period 1980-2003
Source: Science and Higher Education Observatory, OCES

23. It should be noted that about 50% of the overall number of researchers (FTE; full time equivalent) work at higher education institutions and related R&D centres, Table 1.10, in a way that is very much specific of Portugal. In addition, 14% of the overall number of researchers work at private, non-profit institutions, which are very much linked to higher education centres. Overall, these two groups represented in 2003 about 64% of Portuguese researchers (FTE).

Table 1.10 Distribution of researchers per type of institution in Portugal, 2001, 2003

Personnel	Execution Sectors									
	Companies		Government		**Higher Education**		**Private, non-profit**		Total	
	2001	2003	2001	2003	**2001**	**2003**	**2001**	**2003**	2001	2003
Researchers										
Head counting	4 625	6 102	5 211	5 027	**17 276**	**19 906**	**4 034**	**4 820**	31 146	35 855
FTE	2 721,9	3 793,9	3 646,4	3 439,6	**8 941,6**	**10 062,4**	**2 415,2**	**2 946,1**	17 725,1	20 242,0
% FTE / Head counts	15	21	21	19	**50**	**57**	**14**	**17**	100	100
Researchers (FTE)/Workforce (‰)	0,5	0,7	0,7	0,6	**1,7**	**1,9**	**0,5**	**0,5**	3,3	3,7
Total I&D personnel										
Head counting	6 821	9 882	8 478	7 273	**19 112**	**21 488**	**4 752**	**5 393**	39 163	44 036
FTE	3 874,9	6 123,7	5 971,4	4 917,0	**10 173,6**	**11 146,9**	**2 951,2**	**3 341,9**	22 971,1	25 529,4
% FTE / Head counts	17	27	26	21	**44**	**49**	**13**	**15**	100	100
Total personnel (FTE)/Workforce (‰)	0,7	1,1	1,1	0,9	**1,9**	**2,1**	**0,6**	**0,6**	4,3	4,7

Source, OCES, IPCTN 2003

24. Beyond scale in science and technology, Table 1.11 refers to intensity figures and shows that the total funding available per researcher in Portugal in 2001 was only 1/3 of the European average (considering the new EU-25), while the average funding available for a university researcher in Europe was half of that for an American university researcher. Also, the gross expenditure in R&D per inhabitant in Portugal in 2001 was about 22% of the related average value for EU-15 and 26% for EU-25 (i.e., only 64% of the related value for Spain). For comparison, the gross domestic product per capita for Portugal was in 2001 only about 75% of the average European value, confirming a considerably low investment in R&D for Portugal.

Table 1.11 Expenditure in R&D per researcher (1000 € / FTE) and per inhabitant, 2001

	Expenditure in R&D per Researcher				Gross expenditure in R&D per inhabitant
	Gross expenditure	Business sector	Higher Education	Government	
	1000 € / FTE				€
Poland	23	49	12	39	34
Hungary	37	54	24	30	53
Greece	54	101	38	86	73
Czech Rep.	55	87	31	41	80
Portugal	**58**	**121**	**41**	**59**	**99**
Turkey	60	125	50	35	-
Spain	78	172	41	74	155
Finland	125	156	76	103	890
Ireland	139	151	111	130	309
UK	145	164	92	214	382
Belgian	153	201	90	127	450
Norway	154	165	137	144	675
UE-25	**156**	**214**	**90**	**147**	**375**
UE-15	171	225	103	170	442
France	180	239	94	205	525
Austria	180	183	168	228	420
USA	182	169	171	361	**845**
Holland	186	223	145	170	490
Denmark	188	254	121	132	666
Italy	188	239	150	165	215
Dermany	199	236	121	186	628
Japan	212	245	103	404	1133
Sweden	227	291	128	132	1175
Switzerland	266	312	171	222	951

Sources: Conceição and Heitor, (2005); OECD (2004); Eurostat; http://europa.eu.int/comm/eurostat/
Notes: data on "PPS", for 2001 or last year available (Áustria, Reino Unido: 1998; Bélgica, Dinamarca, Grécia, EUA: 1999; França, Irlanda, Itália, Holanda, UE-15, UE-25, Turquia, Suiça: 2000); "FTE" refers to "full time equivalent"

2. The country at large

25. Portugal has a population of 10.4 million inhabitants (112.4 inhabitants/km^2) and social indicators show steady progress in the last two decades (Table 1.12). The country is formed by three territorial areas: mainland (88,889 km2) and the archipelagos of the Azores (2,355 km2; nine islands) and Madeira (741 km2; two main islands).

Table 1.12 – Social indicators

	1980	1990	2002
Mean life expectancy	71.5	74.1	77.3
Infant mortality (deceased/1000 births)	21.8	21.8	5.0
Medical doctors/100 000 inhabitants	196.9	196.9	324.0
Women average at first birth	23.6	24.7	27
Higher education enrolments	106 316*	187 193	400 831
Schooling rate – upper secondary	-	8.4%	13.0%
Schooling rate – higher education	-	6.6%	11.4%
Families with computers (%)	-	11**	28
Mobile phone subscribers	-	340 845**	8 530 410

* 1985 ** 1995

Source: The Ministry of Finances, The Portuguese Economy, Lisbon, July 2005

26. A long period of consistently declining birth rates associated to increasing life expectancy has resulted in an ageing population (Table 1.13) and had a negative effect on the number of student enrolment.

Table 1.13 – Population forecasts, Portugal

Ages	2000	2005	2010	2015	2020
0-4	534 286	554 738	522 843	484 303	446 623
5-9	532 394	550 703	558 604	524 290	485 886
10-14	573 995	548 906	555 003	560 471	526 237
15-19	682 010	599 837	555 763	558 865	564 391
20-24	783 305	721 495	610 807	561 357	564 596
25-29	806 880	821 305	731 002	614 891	565 785
30-34	754 144	837 913	827 765	732 825	617 507
35-39	763 331	778 298	841 519	827 097	732 966
40-44	721 530	777 749	778 315	837 926	823 878
45-49	679 543	727 562	773 422	772 191	831 660
50-54	636 353	678 434	718 900	763 155	762 691
55-59	565 965	629 529	664 695	703 914	748 239
60-64	545 635	552 795	608 967	642 918	682 286
65-69	533 000	517 321	523 242	577 425	611 654
70-74	449 620	483 070	470 957	479 771	532 401
75-79	344 734	377 783	410 450	404 530	417 368
80-84	199 783	256 904	288 368	319 940	321 398
85+	150 150	147 489	185 443	220 817	253 586
Total	10 256 658	10 561 829	10 626 062	10 586 682	10 489 152

Source: INE, 2005

27. The total Portuguese active population was 5,475,800 (2,954,100 men and 2,521,700 women) in 2004, with an activity rate equal to 52,2% (58,1% for men and 46,6% for women), and a low schooling level, as quantified in Table 1.14.

Table 1.14 – Active population (%) by age group and qualification level

Age range	Year	None	Basic 1st cycle[a]	Basic 2nd cycle[b]	Basic 3rd cycle[c]	Upper secondary[d]	Higher education
16-64	1998	10.1	34.6	19.2	16.7	12.4	7.1
	2004[e]	5.7	29.3	19.3	19.3	15.6	10.8
15-24	1998	2.2	7.5	29.2	36.2	22.2	2.8
	2004[e]	1.0	3.5	20.7	42.5	28.4	3.9
24-44	1998	4.7	33.1	24.4	13.8	13.7	10.2
	2004[e]	3.2	20.0	26.7	16.9	17.4	15.7
45-64	1998	21.9	54.2	6.2	7.4	4.4	6.0
	2004[e]	11.2	54.7	9.2	10.2	6.4	8.3

a - 4 years of schooling b – 6 years c – 9 years d – 12 years e – First three trimesters
Source: INE, "Inquérito ao Emprego"

28. Portuguese GDP (current prices) is 135,078 million € (2004) and the *per capita* GNP (ppp) is 16,370 € (2004), Tables 1.15 and 1.16.

Table 1.15 – Economic indicators, Portugal

	Real GDP		Work Productivity (ppp; EU = 100)	Inflation rate (%)
	Rate of change %	Difference to EU pps		
2002	0.4	-0.6	62.4	3.6
2003	-1.1	-2.0	59.8	3.3
2004	1.0	-1.4	59.0	2.4
2005[a]	0.8	-1.2	58.4	2.7

Sources: INE, Eurostat, European Commission, Bank of Portugal, Ministry of Finances
a – estimate, Ministry of Finances, Programmea de Estabilidade e Crescimento 2005-9, July 2005

Table 1.16 – *Per capita* GDP

	Per capita GDP, current prices		Per capita GDP, current prices (in ppp)	
	EUR	UE15 = 100	EUR	UE15 = 100
1998	9 907	48.7	13 922	68.5
1999	10 620	49.8	14 979	70.2
2000	11 300	49.9	15 953	70.4
2001	11 931	51.1	16 481	70.6
2002	12 495	51.9	17 048	70.9
2003	12 536	51.6	16 727	68.8

Source: European Commission, AMECO data base, April 2004;
ppp – purchasing power parity

29. The evolution of the overall economic situation has negatively reflected upon the unemployment rate (Table 1.17) and some traditional sectors, such as the textile and shoe, have been badly hit

by competition from emerging economies. As it has been well recognised in various OECD documents, the population's lack of qualifications is one of the factors that most contributes to the low Portuguese productivity in comparison with other OECD's countries.

Table 1.17 – Labour market indicators

	2003	2004	2005
Homologous change rates (%)			
Salaries implicit in collective contracts	2.9	2.9	2.7
Work cost index[1]	3.0	1.6	3.5
Total employment	-0.4	0.1	-0.3
Unemployment rate (%)[2]	6.3	6.7	7.5
Activity rate (15-64 years) (%)[3]	72.8	72.9	73.1

Sources: INE, Ministry of Work and Social Security and Ministry of Finances
1 – Without the Public Administration; 2 – Unemployed population/Active population;
3 – Active population (15-64 years)/Total population (15-64 years)

30. The Portuguese population is ageing. As a direct consequence of low birth rates combined with increasing life expectancy, the number of elderly people has been steadily increasing while the number of young people has been consistently decreasing. During the 1990s, the population of Continental Portugal lost 390,000 people of the "normal" age cohort expected to enrol in basic and in upper secondary education. Population forecasts made by the National Institute of Statistics (INE) for 2006 show that the situation will not significantly change in the near future, Table 1.18[6]. So far the effects of immigration have not compensated this phenomenon.

31. Table 1.18 shows that, for 2006, the number of students in the second cycle of basic education (10-11 years), or in the third cycle (12-14 years) and in upper secondary education (15-17 years) is lower than in 2001 by up to 12%. There is a slight increase relative to 2001 only for the age group 6-9 years (first cycle of basic education).

Table 1.18 – Population by age groups (mainland Portugal)

Age interval	1991 (1)	2001 (2)	Δ [(2)–(1)]	Δ (%)	2006* (3)	Δ [(3)–(2)]	Δ (%)
6 – 9	494.495	406.428	-88.067	-18	410.199	+3771	+1
10 - 11	277.757	213.368	-64.389	-23	199.680	-13.688	-6
12 - 14	457.871	330.128	-127.743	-28	315.292	-14.836	-4
15 - 17	484.535	372.523	-112.012	-23	328.660	-43.863	-12
Total: 6 – 17	1.714.658	1.322.447	-392.211	-23	1.253.831	-68.616	-5

* estimates Sources: XIII and XIV Population census, INE

6 The 2006 estimate includes both the resident population (by age intervals, data from 2001) and the migratory flows. It was assumed that all the individuals below 12 years of age have survived until 2006, as mortality is very low at this age, and that migration flows, which in the 1990s have resulted in a net population increase of 405,000 people, will continue at the same rate over the next lustrum, originating an additional increase of 202,500 people and were divided following a specified age structure).

32. The importance of the population decrease is not the same for all age groups, due to changes in the birth rates. Until 1995 there was a consistent decline in the number of births (although this decline was very low between 1990 and 1993), followed by a five year period (1996 to 2000) of increase in the annual number of births. This explains that the most significant population decrease from 2001 to 2006 occurs for the population older than 15 years. The ageing of the population also explains the illiteracy rate's slow decrease, which has only fallen from 11% to 9% between 1991 and 2001. Indeed, it is among individuals older than 65 years that the illiteracy percentage is highest, Table 1.19, while among the younger age groups the illiteracy rate is negligible. In 1991 the number of people aged 15 years or less was 1.5 times higher than those aged 65 years and more. However, in 2001 this relation was reversed, with the number of older people surpassing the number of younger people.

Table 1.19 – People (%) without any schooling, by age groups (Portugal) – 2001

	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75+
Total	1.0	1.4	1.5	1.8	2.3	2.9	6.0	18.7	25.8	31.2	42.2
Men	1.1	1.5	1.7	1.9	2.1	2.5	4.3	13.1	18.8	23.4	31.5
Women	0.9	1.2	1.4	1.8	2.4	3.4	7.6	23.5	31.6	37.2	48.7

Source: XIV Population census, INE

33. The high proportion of illiterate people is observed for women, mainly above 60 years old. For people aged over 75 years, almost half of the women are illiterate against a third of the men.

3. The duality of the Portuguese society

34. It is important to note that the deficiency noted above on the overall level of qualifications in the Portuguese population is not so much due to the differences on levels of accomplishment on university or tertiary education. In fact, while the share of the Portuguese population with university education is also low (about 9%), it is only about half of the OECD average, and is comparable to that of countries such as Italy and Austria. This points to the duality of the Portuguese society, a duality that looking at average and aggregate numbers may obscure[7].

35. Figure 1.18 shows that, for the entire population, Portugal exhibits one of the lowest scores in average literacy, as measured by OECD. But the low literacy levels do not seem to be dramatically punished by the Portuguese economy, as Portugal has one of the highest levels of labour participation for those people with the lowest level of literacy, Figure 1.19. This is partially explained by the overall high rate of labour participation in Portugal (note the high figure for the United States and Switzerland as well), but low unemployment rate is not the only explanation (compare with the Netherlands and Ireland). Part of the reason may be associated with the

[7] See, for details, Conceição and Heitor (2005)

demands of large sectors of the economy, which so far have not required advanced skills, not even literacy.

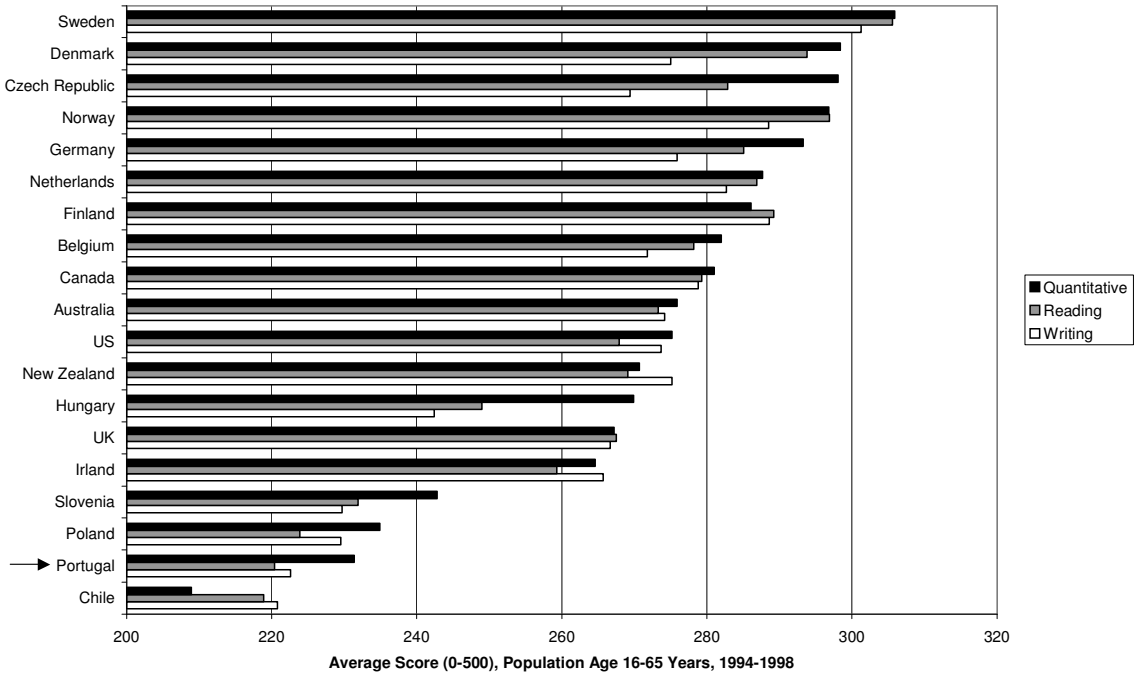


Figure 1.18 – Average Literacy Survey Results in OECD Countries[3]

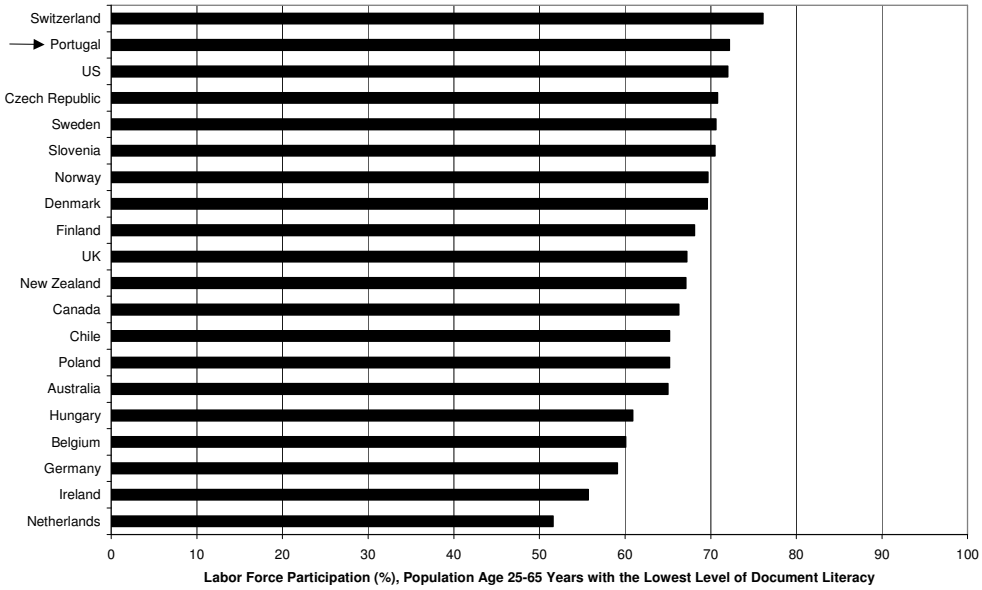


Figure 1.19 – Labour Force Participation of the Population Segment with the Lowest Level of Literacy in OECD Countries[3]

[3] Primary data from OECD (2002). See Conceição and Heitor (2005), for details and related analysis.

36. The duality of the Portuguese society clearly emerges after segmenting the overall population into finer segments. As an example, consider only young people that are relatively educated (20 to 25 years of age with upper secondary education). For this segment of the population, Portugal ranks on a par with the Netherlands, Germany and Norway, Figure 1.20.

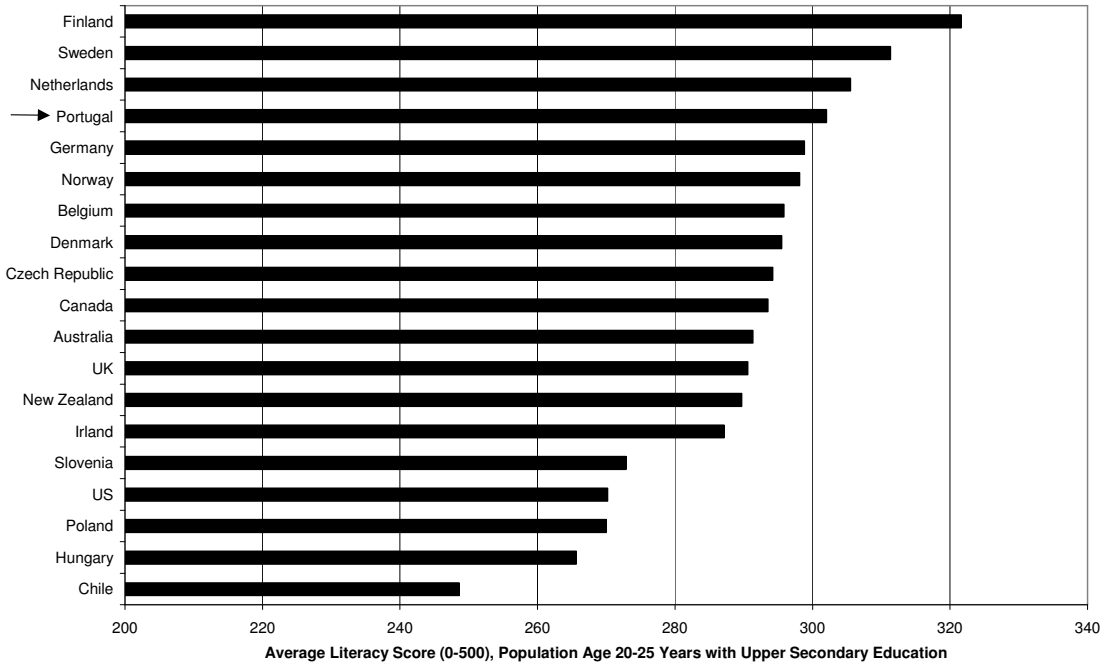


Figure 1.20 – Literacy Scores of People Aged 20-25 Years and with Upper Secondary Education in OECD Countries[3]

37. To complete the analysis, Figure 1.21 compares the share of university degrees in various OECD countries by the end of the 20th century, illustrating the relative weakness of the Portuguese society in terms of technical qualifications (considering both engineering and natural sciences), which to a large extent is due to high school retention rates in these areas of study. Comparable 1st year enrolments reached 25% (against 19% of degrees), which was approximately Switzerland's position, and quite closer to the European average. But looking at Portugal in an international context does require considering both absolute and relative figures, so that the scale and intensity are taken into account over time.

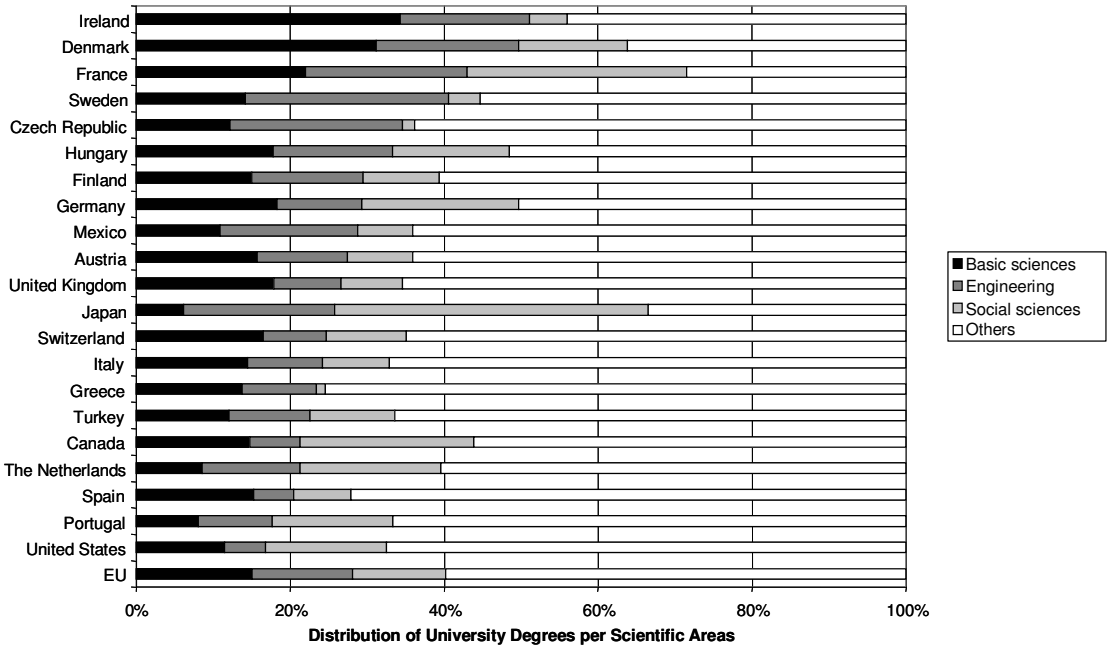


Figure 1.21 National shares of university degrees among different fields (2003)
Source: National Science Foundation.

38. Duality is also present when one looks at science and technology indicators. Figure 1.22 shows both the scale and the intensity of national expenditures on R&D for several OECD countries, with the horizontal axis, representing the scale of the expenditure, on a logarithmic scale. The relationship between scale and intensity shows decreasing returns: as the scale of the investment grows, the increase in intensity also grows but at a decreasing (in fact, logarithmic) rate. The results also suggest that there are three different "paths" in which this relationship is expressed. The thick line in Figure 1.22 represents a simple fitting of the position of most countries. Nordic countries have a path of their own, with a much higher responsive intensity to increases in scale. Portugal is shown in the lower left-hand corner of the figure, part of a line that includes other Southern European countries.
39. The duality is manifest when one looks not at static comparisons of levels, but at dynamic comparisons of rates of change. Portugal shows one of the largest increases on R&D gross domestic expenditure of all OECD countries from 1995 to 2000. During this five-year period, R&D expenditure has grown at an annual rate of 10% in Portugal, while in the European Union as a whole it has grown at a 3% annual rate. This growth represented a recovery from the slowdown of 1991-1995, when the Portuguese R&D expenditure has grown only 3.8%, while from 1985 to 1990 it has grown 14%.

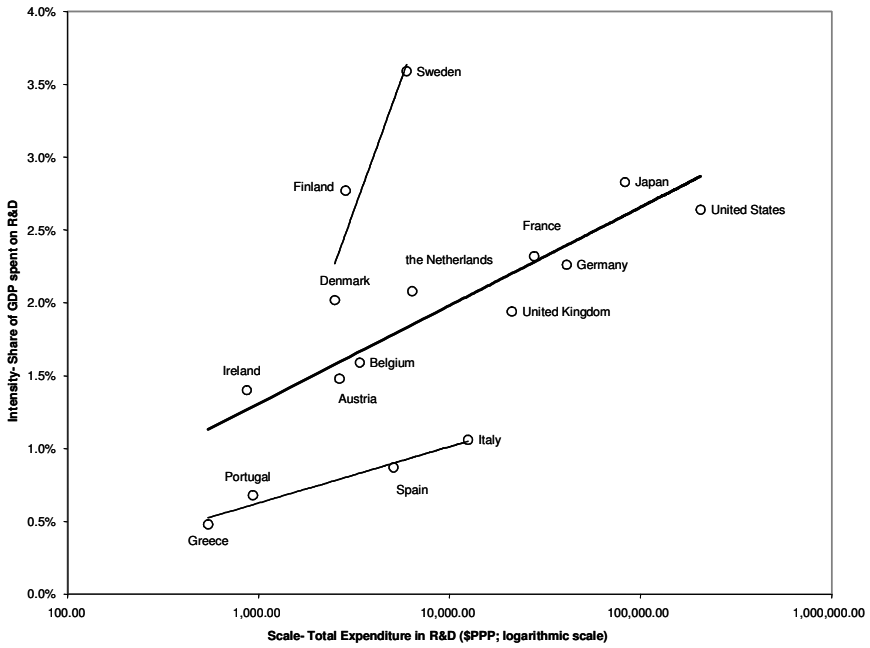


Figure 1.22 – Intensity and Scale of R&D Expenditure in the OECD
Source: OECD, 2003

40. The same duality is present if one looks at other features. For example, Portugal has one of the lowest shares of new science and technology PhDs per thousand of population aged 25-34 years (only 0.23%, compared with 0.55% in the European Union; figures are for 2000). However, it has, by far, the largest growth rate: 12% growth from 1998 to 1999, compared with no growth at all at the European Union level. In terms of publications, Portugal, in 1999, had 248 scientific publications per million of population, and in 2003 it had 406 (Figure 1.16). The average annual growth rate from 1995 to 2000 was almost 16%, while for Greece (the second ranking country) it was 7%, and in the EU below 3%.
41. The duality argument should not be read as meaning that Portugal is free from structural weaknesses. In fact, even in the age segments that exhibit better education performance structural weaknesses remain. For example, in basic education retention rates are still one order of magnitude higher than the European average. Portugal also exhibits the highest rates of school leavers from the 10th to the 12th year of schooling, Table 1.20. And in the active population (with ages between 20 and 34) Portugal still manifests deficit in qualifications.

Table 1.20 – Early leaves from secondary school (2005) in European Countries

	UE15	B	DK	D*	EL	E	F	IRL	I	L	NL	A	Pt	FIN	S	UK
Total	17%	13.%	9%	12.%	13%	31%^{b}	13%	12%^{p}	22%	13%^{p}	14%	9%	39%	9%^{p}	9%^{p}	14%^{p}
Female	15%	11%	8%	12%	9%	25%^{b}	11%	10%^{p}	18%	13%^{p}	11%	9%	30%	7%^{p}	8%^{p}	13%^{p}
Male	19%	15%	9%	12%	18%	36%^{b}	15%	15%^{p}	26%	13%^{p}	16%	10%	47%	11%^{p}	9%^{p}	15%^{p}

Source: EUROSTAT (http://europa.eu.int/comm/eurostat). b – break in series p – provisional value

42. To conclude, there is a wide diversity of performance across the Portuguese society and economy. Averages are low, but they may be misleading, since there is a large dispersion across cohorts. Portugal can be characterised as exhibiting a dual nature, with high levels of performance co-existing with low levels. This, however, does not mean that it is enough to hope for the best-performing cohorts to "take over" the low-performing ones, since structural weaknesses remain and may affect even the best performing sectors.

4. The education system: from basic to higher education

43. Figure 1.23 presents a schematic diagram of the Portuguese educational system, as by January 2006, which in includes the following components:
    - Pre-school education (i.e., "educação pré-escolar") complements and/or supplements the role the family plays in early learning for children aged 3 to 6. Attendance is optional.
    - Basic education (i.e., "ensino básico") lasts 9 years and begins at 6 years old. The education programmeme at this level aims to provide all individuals with a general and common education, enabling them to continue to higher levels of education or to join programme geared to working life. Basic education involves three successive cycles with duration between 2 and 4 years, namely: 1st cycle of 4 years, 2nd cycle of 2 years, and a 3rd cycle of 3 years. There is also a system of basic education for adults (i.e., "ensino básico recorrente") that provides a second opportunity to those who failed to complete their education at the usual age, or who dropped out of school early, or to those seeking cultural or professional improvement.
    - Secondary education in Portugal (i.e., "ensino secundário") corresponds to what in Europe is currently called "Upper Secondary Education". It is structured in different ways to provide general programmes (i.e., "cursos gerais"), aimed at those wishing to continue to higher education, and other programmes aimed at those seeking to enter the labour market, as listed in Table 1.17. Students may change from one programme to another. Each of these programmes lasts three years, corresponding to the 10th, 11th and 12th grades of school.

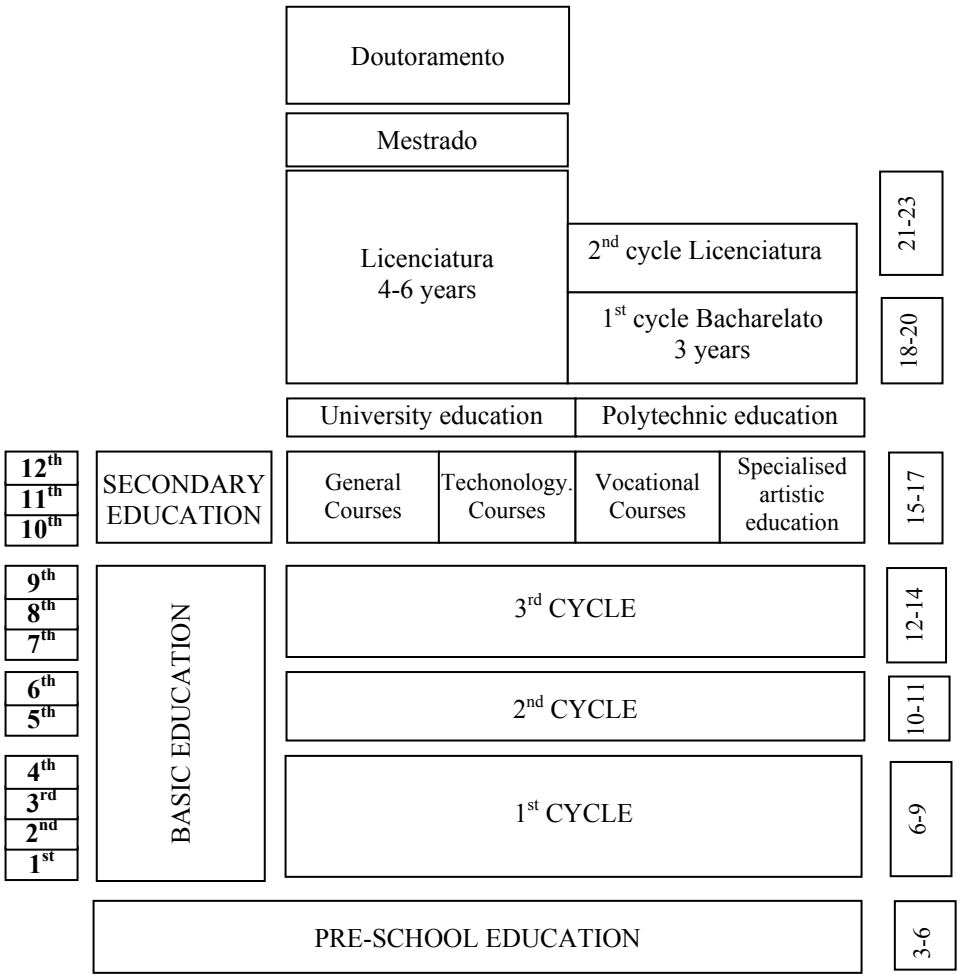


Figure 1.23 – Diagrammatic representation of the Portuguese education system, as by January 2006, before the implementation of the Bologna Process
Source: Estia, 2003, http://www.des.min-edu.pt/estia/edu/diagindex.html

44. Technological programmes represent only 22% of regular upper secondary education, which contrasts with the situation in most European countries where vocational-type education represents in general more than 50% of the number of students.

Table 1.21 – Number of students enrolled in secondary education in 2005/06

	Total	**Public**	**Private**
General	**175154**	158290	16864
Technological	**49800**	44114	5686
Specialised artistic	**2063**	1948	115
Professional	**33341**	3607	29734
Qualifying	**3103**	2411	692
Recurrent	**61660**	54277	7383
Total	**325121**	**264647**	**60474**

Source: Ministry of Education, 2006

45. “Professional education” in Table 1.21 is usually considered in a perspective of lifelong education and provides students with a diploma of upper secondary education and a professional qualification at ISCED level 3 (also level 2 for a few cases). Students can continue studies by enrolling in "Technological Specialisation Programmes" (i.e., CET) to obtain a ISCED level 4 qualification and later can continue to higher education, preferably in a polytechnic. Most of the students enter the labour market after completing their studies due to the high employment rate of these courses.
46. “Qualifying education” in Table 1.21 aims at people having completed basic education, aged less than 22 years when they start the programme, and requiring to enter the labour market by obtaining a professional qualification at ISCED level 3 and an upper secondary school diploma.
47. “Recurrent education” in Table 1.20 addresses adult education and aims at offering a second opportunity to adult students or to young people already integrated in the labour market. It is based on credit accumulation.
48. “Specialised art education”, also in Table 1.21, is aimed to provide different types of art training, at a secondary level, which is associated to a social demand exclusively directed at deepening certain artistic languages independently of a vocational option. Within the scope of the reform of specialised art education, rules were laid down for the creation of specialised art programmes directed, depending on the art area, at pursuing higher education studies or at the dual perspective of integration in the labour market, with the issuance of a level 3 vocational qualification certificate, and the pursuance of higher education studies.
49. Post-secondary education has been recently reinforced with a new legal framework expanding "Technological Specialisation Programmes" (i.e., "CETs - Cursos de Especialização Tecnológica"), which aim at conferring students a diploma of technological specialisation and a level IV professional qualification. These programmes are offered mainly to students that have completed upper secondary education or that have qualifications equivalent to a level III professional qualification, and are run under the supervision of one of four ministries: Education, Economy, Work and Social Solidarity, and Science, Technology and Higher Education.
50. As described in chapter 1 above, higher education comprises university and polytechnic education, public and private, both with different aims, programme and characteristics. It should be noted that the structure of Figure 1.23 will change with the implementation of the Bologna process, as the framework legislation has just been approved and published (March 2006) and is under implementation.
51. Until 2002 the Ministry of Education had overall responsibility for education at all levels (pre-school education, basic education, upper secondary education and higher education). Since then, two different ministries share this responsibility: while the Ministry of Education is responsible for all pre-higher education levels, the Ministry for Science, Technology and Higher Education is responsible for higher education and research. The Ministry for Work and Social Solidarity plays a relevant role in professional training and in the certification of professional competencies.
52. Educational reforms are generally based on government initiatives resulting in decree-laws, or leading to laws to be passed by Parliament, including a systematic consultation process involving

all major stakeholders. In general all proposals for new legislation are discussed by the National Education Council and require consultation of the appropriate relevant bodies (such as CRUP, CCISP, APESP, professional unions and student associations, in the case of higher education). In addition, the Parliament often organises auditions with experts and stakeholders to debate new reforms. The President of the Republic oversees the Constitutional conformity of the legislation and may ask for the opinion of the Constitutional Court before promulgating any new legal diploma. Employers' organisations are in general conspicuously absent from the policy processes of the Portuguese higher education system. Paradoxically, at a time when there is a more market-friendly rhetoric and concern about the articulation of higher education and economic activity, Portuguese employers and their organisations are far from taking on the status of effective political actors involved in setting up higher education policies. However, it should be noted that major reforms have been extensively debated in the appropriate bodies and, in a number of cases, public enquires and debates have been organised.

5. The levels and perspectives for student enrolments

53. Pre-primary education has been assumed as an important tool to address social inequalities, which explains governmental efforts to increase its attendance over the last years (Tables 1.22 and 1.23).

Table 1.22 – Pre-schooling attainment rate

1985/86	1990/91	1995/96	2003/04
30	51	58	77

Source: Ministry of Education, GIASE, Education Statistics.

Table 1.23 – Age distribution of pre-school enrolments, 2003-04

	3 years	4 years	5 years	≥ 6 years	Total
North	15 155	22 685	25 106	378	63 324
Centre	11 249	14 277	14 669	410	40 605
Lisbon	9 955	14 432	14 330	346	39 063
Alentejo	2 990	3 867	4 030	215	11 102
Algarve	1 437	2 390	2 363	77	6 267
Azores	917	1 804	2 828	387	5 936
Madeira	1 748	2 534	3 121	158	7 561
Total	43 451	61 989	66 447	1 971	173 858

Source: Ministry of Education, GIASE, Education Statistics.

54. In mainland Portugal the number of students enrolled in basic education has fallen by about 17.6% over the 1990s, which is explained by demographic changes. Table 1.24 shows that this decreasing trend has continued in more recent years, with an additional 4% decrease in enrolments from 1999/2000 to 2003/04. One may also notice that since the early 1990s, basic education, which is compulsory, has lost around 21% of its students.

55. Despite the decrease in enrolments, one observes an increase in the number of those completing basic education. For instance, in 1991, 35% of the population aged 15-19 years had at least completed basic education, a percentage that has almost duplicated by 2001 to 67%.

Table 1.24 – Enrolments and attainment rate for basic (compulsory) education

	1st cycle		2nd cycle		3rd cycle		Total	Attainment Rate (%)
	Public	Private	Public	Private	Public	Private		
1990/91	616 410	53 115	330 377	26 043	419 629	38 682	1 484 256	x
1991/92	605 606	52 699	327 240	27 391	451 023	45 223	1 509 182	x
1992/93	567 199	46 498	311 729	27 515	443 922	45 026	1 441 889	x
1993/94	541 387	44 647	315 183	28 254	457 985	42 368	1 429 824	x
1994/95	532 913	47 570	296 332	25 160	464 661	41 813	1 408 449	123.8%
1995/96	505 514	47 210	289 482	25 727	429 818	41 998	1 339 749	121.2%
1996/97	492 089	46 033	277 154	27 233	419 062	44 152	1 305 723	121.1%
1997/98	489 700	45 412	258 257	26 831	413 851	42 325	1 276 376	121.0%
1998/99	489 193	49 080	253 517	27 584	398 094	42 005	1 259 473	121.7%
1999/00	489 049	50 894	248 364	28 165	382 288	42 076	1 240 836	122.1%
2000/01	483 329	52 251	243 735	28 058	372 837	42 941	1 223 151	122.1%
2001/02	468 241	51 970	241 637	29 188	358 987	42 908	1 192 931	120.0%
2002/03	458 684	49 788	243 246	30 923	347 423	44 348	1 174 412	118.5%
2003/04*	412 349	46 014	223 757	28 995	318 025	42 811	1 071 951	x

Source: Ministry of Education, Office for Information and Evaluation of the Educational System (data for 1990-2003). Notes: Data for 2003/2004 are preliminary.

56. The Portuguese participation rates in upper secondary education are still far from average European levels. Total enrolment in upper secondary education – an education level that is not yet compulsory in Portugal – increased until the mid-1990s, and then decreased as consequence of declining birth rates. The increase took place in spite the fact that the population at the "normal" attendance age (15-17 years) had decreased 23% over the 1990s (less 117,000 people), which can be explained by the wider age range of students attending upper secondary education.

57. Notwithstanding the improvement of the overall situation, there are still some factors that negatively influence the students' career in this phase of schooling. Over the last few years thousands of students completed 16 years of compulsory education without completing basic schooling (9 years). There were also a very large number of students under 24 years old enrolled in upper secondary education but who left the education system without graduating (Table 1.25).

Table 1.25 – Upper secondary education – enrolments

Year	Public	Private	Total
1990/91	318 239	29 672	347 911
1991/92	360 924	40 339	401 263
1992/93	367 083	48 778	415 861
1993/94	385 348	52 952	438 300
1994/95	400 102	57 092	457 194
1995/96	416 309	60 912	477 221
1996/97	398 166	60 066	458 232
1997/98	382 261	60 522	442 783
1998/99	362 143	58 862	421 005
1999/00	354 832	62 873	417 705
2000/01	344 135	69 613	413 748
2001/02	326 045	71 487	397 532
2002/03	316 848	68 741	385 589
2003/04*	283 678	62 314	345 992

* Only for the mainland Source: Ministry of Education, GIASE, 2005

Table 1.26 – Population aged 18-24 years, not enrolled in education, 1991-2001.

	1991		2001	
	n	%	n	%
Total population, 18-24 years	1 097 208	100	1 083 320	100
Without completing the 3rd cycle of basic education	594 004	54	266 052	25
Without completing upper secondary education	104 560	10	219 155	20
Total, < upper secondary education	698 564	64	485 207	45

Source: INE, General Population Census, 1991 and 2001

58. Each year a significant number of students with low education level will enter segments of the labour market that employ workers with low qualifications. These young people will most likely not return to the education system to complete secondary school. One of the possible reasons for the lack of attractivity of secondary education is the predominantly academic character of this education level. Indeed, most of the upper secondary education provision aims at providing a route to enter higher education, with only less than 30% having a technological or vocational emphasis.
59. Table 1.27 shows that in 2001 the drop-out rate (abandonment rate)[7] in basic education is no longer significant, but anticipated leaves[8] and early leaves[9] are still a major problem.

7 Drop-out rate (%) – students in the compulsory education age (6-15 years) leaving the education system without completing compulsory education (9 years) for every 100 people in that age range.

8 Anticipated leave (%) – students in the age range 18-24 years that have left the education system without completing compulsory education for every 100 people in that age range.

9 Early leaves (%) – students in the age range 18-24 years that have left the education system without completing upper secondary education (12 years) for every 100 people in that age range.

Furthermore, persistently high retention rates in upper secondary education continue to be around 35% since 1995 (Table 1.28).

Table 1.27 – Abandonment rates, anticipated leaves and early leaves (%)

	1991	2001
Abandonment rates	13	3
Anticipated leaves	54	25
Early leaves	64	45

Source: INE, General Population Census, 1991 and 2001

Table 1.28 – Evolution of retention rates and drop-outs

	95/96	96/97	97/98	98/99	99/00	00/01	01/02	02/03
Basic education	13.8	15.2	13.8	13.2	12.6	12.7	13.6	13.0
Upper secondary	33.1	35.7	35.6	36.0	36.8	39.4	37.4	33.7

Source: Ministry of Education, GIASE, Education statistics

60. The highest percentage of retention and drop-out occurs in the first year of every cycle and it is especially significant in the 10th grade, which marks the transition from basic education to upper secondary education.
61. The recent initiative of the present government "New Opportunity Programme" includes a set of actions aiming at improving the qualification of the Portuguese population and developing life-long learning. These objectives are an integral component of the national effort under the EU Lisbon Strategy and consider the following goals:

a) Increase the offer of vocational education in upper secondary education to enrol an additional number of 100,000 students. By 2010 vocational education should represent 50% of the total offer of upper secondary education, the other 50% corresponding to general education leading directly to higher education.

Table 1.29 – Estimated increase of vocational education in upper secondary education

	2005	**2006**	**2007**	**2008**	**2009**	**2010**
Additional vacancies		+ 5,000	+5,000	+10,000	+10,000	+5,000
Accumulated new vacancies		+5,000	+10,000	+20,000	+30,000	+35,000
Total yearly vacancies	**110,000**	**115,000**	**120,000**	**130,000**	**140,000**	**145,000**

Source: Ministry of Education and Ministry of Work and Social Solidarity, Programme New Opportunities

b) Offer a new opportunity to students that would leave the education system before completing basic education. Until 2010 there will be an adequate number of vacancies in vocational programme offering an alternative route for the completion of basic education.

Table 1.30 – Estimated increase in the supply of vocational education in basic education

	2005	2006	2007	2008	2009	2010
Additional vacancies		+2,500	+2,500	+2,500	+2,500	+2,500
Accumulated new vacancies		+2,500	+5,000	+7,500	+10,000	+12,500
Total yearly vacancies	**15,000**	**17,500**	**20,000**	**22,500**	**25,000**	**27,500**

Source: Ministry of Education and Ministry of Work and Social Solidarity, Programme New Opportunities

c) Integrate vocational courses in upper secondary schools that traditionally only provided general courses leading to higher education.

Table 1.31 – Estimated new vocational programmes in upper secondary schools

	2005/06	2006/07	2007/08	2008/09	2009/10
New courses	40	100	200	300	450

Source: Ministry of Education and Ministry of Work and Social Solidarity, Programme New Opportunities

d) Implement a system for the recognition and certification of competencies and to offer new vocational training opportunities to adults with low qualifications.

62. The decreasing number of young people is diminishing the demand for higher education, and enhanced competition for students among higher education institutions. This phenomenon favours the reconfiguration and rationalisation of the network of higher education institutions and their study programme. As demographic trends will take time to reverse, possible ways to increase demand for higher education include improving success rates in upper secondary education, increasing the access of new publics and eventually making upper secondary education compulsory.
63. The implementation of the Bologna process is also providing pressure for change at the level of higher education. Parliament has passed a law adapting the Education System Act (Law 46/86 of 14 October) to the Bologna degree structure and a decree regulating the implementation of the new degree system has been passed (Decree-Law 74/2006 of 24 March). Higher education institutions will be able to start implementing the new system from 2006/07.
64. The implementation of the Bologna process will also influence the present national system of quality assessment, as an accreditation system will be implemented in order to meet the European Standards and Guidelines for Quality Assurance in the European Higher Education Area, EHEA, as adopted by ministers in Bergen in May 2005.

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PART II

PUBLIC REGULATION
and
INSTITUTIONAL DEVELOPMENT

1. This part of the report addresses main aspects of public regulation and institutional development in higher education, which represent areas of particular concern in tertiary education in Portugal and worldwide. They shape the relationships between governments, higher education institutions and society at large, which have been subject of recent reforms in many countries.
2. Public regulation of tertiary education has been implemented through four basic processes discussed in this part of the report, namely: i) access; ii) social support to students; iii) accreditation and quality assessment; and iv) public funding. The efficiency of most of past and existing schemes in Portugal in these four areas has been a major question of concern, which has been increasingly questionable by many actors in society. It has certainly justified the overall evaluation requested to OECD, together with that requested to ENQA in November 2005, and main data available is briefly described in this part of the report.
3. Beyond the four processes mentioned above, the development of higher education has been particularly determined worldwide by the level of institutional development and autonomy, including the management of human resources, which has determined most of the relationship between Government and the institutions. This is also briefly described in this part of the report. Details related with the institutional characteristics of the network of higher education institutions are provided in Part III of the report.

1. Access to higher education and overall enrolment trends

4. Table 2.1 presents the increase in enrolments in the public and private sectors, as well as total enrolments for the higher education system. The 90´s were characterized by the duplication of students' enrolment, in a way that exhibits an unevenly distribution throughout the system. Enrolment in public universities increased by 62%, while enrolment in public polytechnics increased 225% and enrolments in the private sector increased by 122%. In 1983/84 the share of enrolments was 78 % in public universities, 11% in public polytechnics and 11% in the private sector. In 1990/91 those shares became, respectively, 56%, 17% and 28%, while in 1996/97 those values were 44%, 20% and 36%. In 2000/01 enrolment shares were, respectively, 44%, 27% and 30%, and in 2004/05 these values were 45%, 29% and 26%.
5. Initially the development was mainly determined by the private sector, which in 1991 registered a 34% annual enrolment increase (Table 2.2), after increase rates of 23% in 1989 and 33% in 1990. This expansion started to slow down after the mid 1990s and in 1997 it has become negative, a trend that has not changed until today. Public Polytechnics have registered a more sustained expansion (Table 2.2) and their total enrolment is today higher than the total private sector, although one can also observe a recent tendency towards decreasing enrolments. This slow-down of enrolments is also observed for public universities since 2003.
6. Successive governments have consistently used access to higher education to regulate the system and parts of the sub-sectors, with *numerus clausus* used to control the number of

vacancies in every study programme. Students enter higher education by means of a national competition and a centralised placement system that takes into account students preferences and their grades. After an education route of 12 years (9 years of basic education and 3 years of upper secondary education), the condition for becoming eligible to enter a higher education programme combines the students' performance in upper secondary education with their performance in the disciplines that are considered core disciplines for the chosen study programme.

Table 2.1 – Enrolments for the different sectors of the higher education system (Graduate and post-graduate degree programmes)

	Enrolments in higher education institutions at 31st December													
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Public														
University	111550	119292	126009	131309	138286	146499	150493	155563	160970	167435	171014	171667	169481	165866
Armed forces[a]	1042	1015	994	890	835	850	907	917	996	1082	1138	1163	1252	1352
Total P.Univ.	112592	120307	127003	132199	139121	147349	151400	156480	161966	168517	172152	172830	170733	167218
Polyt- General	36220	43085	48262	53032	58482	64187	71458	78889	89101	100481	106889	110761	109641	107518
Polyt- Others	532	702	722	755	897	885	928	839	929	1116	1279	1430	1473	502
Armed forces[a]	323	339	222	300	294	305	305	279	256	198	318	341	368	356
Total P. Polyt.	37075	44126	49206	54087	59673	65377	72691	80007	90286	101795	108486	112532	111482	108376
Total Public	**149667**	**164433**	**176209**	**186286**	**198794**	**212726**	**224091**	**236487**	**252252**	**270312**	**280638**	**285362**	**282215**	**275594**
Private														
University	29637	33750	36541	41369	43623	48528	46207	50022	48560	43949	41331	38789	36071	31981
Other schools	31285	39228	48426	53220	61444	62380	64243	57313	59711	59501	60186	60915	59797	56161
Catholic univ.	7728	8671	8813	9473	9574	10491	10327	10528	10267	10560	10136	10412	10641	10213
Total Private	**68650**	**81649**	**93780**	**104062**	**114641**	**121399**	**120777**	**117863**	**118538**	**114010**	**111653**	**110116**	**106509**	**98355**
TOTAL	**218317**	**246082**	**269989**	**290348**	**313435**	**334125**	**344868**	**354350**	**370790**	**384322**	**392291**	**395478**	**388724**	**373949**
GPR 20-24[b]%	27.6	30.5	32.8	34.6	37.0	40.0	42.2	44.2	47.3	49.8	51.7	52.9	52.9	-

NOTES: a – Police and military schools; b – Gross participation rate 20-24 years; Source: OCES, 2005

Table 2.2 – Higher education enrolments' annual increase (%)

	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Publ. University	6.9	5.6	4.1	5.2	5.9	2.7	3.4	3.5	4.0	2.2	0.4	-1.2	-2.1
Publ. Polytechnics	19.0	11.5	9.9	10.3	9.6	11.2	10.1	12.8	12.7	6.6	3.7	-0.9	-2.8
Sub-Total Public	9.9	7.2	5.7	6.7	7.0	5.3	5.5	6.7	7.2	3.8	1.7	-1.1	-2.3
Private sector	18.9	14.9	11.05	10.25	5.9	-0.5	-2.4	0.6	-3.8	-2.1	-1.4	-3.3	-7.7
TOTAL	12.7	9.7	7.5	8.0	6.6	3.2	2.7	4.6	3.6	2.1	0.8	-1.7	-3.8

Source: OCES, 2005

7. Figure 2.1 quantifies the evolution of public vacancies and candidates since late 70´s and identifies a major change in 1989, associated with an increase of over 20,000 candidates (more than 60%) relative to the previous year (which the public sector could not accommodate). This

was due to the Governmental decision that entrance examinations were to be used for ranking students in the national tender for vacancies, without minimum required marks. As a result, the private share of student enrolments jumped from 10% in 1982-83 to 24% in 1989-90, and to 36% in 1996-97.

8. A second major alteration in the number of candidates occurred in 1994 with a new reform of upper secondary education, which has facilitated access to higher education. However, access conditions have become very much determined by demographic factors, and the number of candidates continuously decreased until 2002, becoming stable since then.
9. Legislation introduced in the mid 1990s has implemented pass examinations at the end of the 10th and 11th grades of secondary education, and national examinations for each subject at the end of the 12th grade, while allowing higher education institutions, or even encouraging them, to set minimum marks in the access examinations to higher education.
10. Analysis from the mid 90´s shows different factors affecting access to higher education, namely: a consistent decline in the number of candidates due to changes in demography; increasingly difficult conditions to enter higher education; and increasing public vacancies, as a result of large investments made in the public sector. As a result, institutional responses differed, with a few of the most recognized institutions setting high minimum marks, while less prestigious institutions set lower entrance standards.

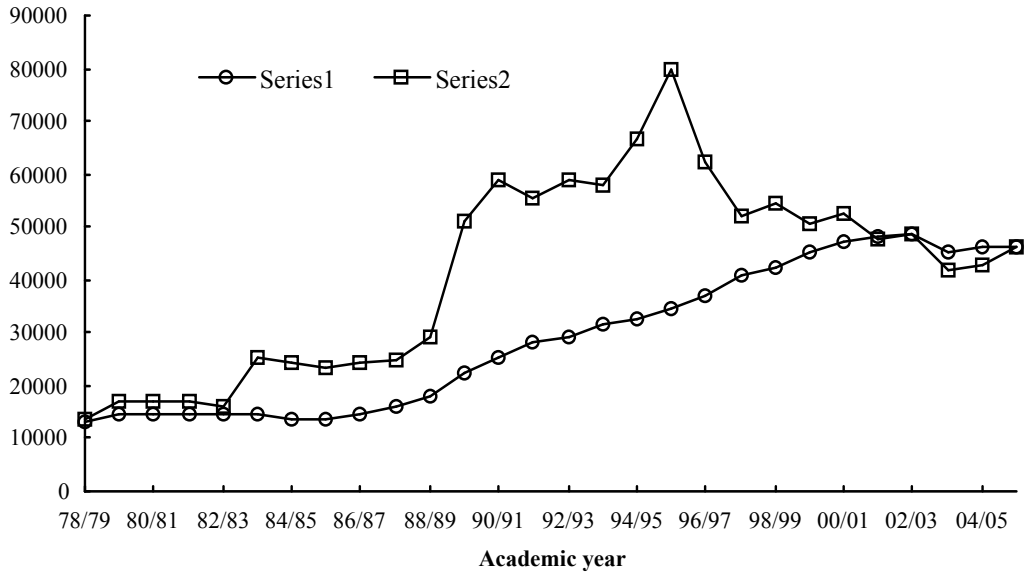

Figure 2.1 – Number of public vacancies (series 1) and candidates (series 2), for 1978 - 2005
Source: OCES, 2006

11. The recent alteration of the Portuguese *Comprehensive Law on the Education System* (i.e., "Lei de Bases do Sistema Educativo") in August 2005, followed by the Decree-Law 74/06, from the

24th March 2006, that adapts the system to the Bologna principles, introduces a national accreditation system and a new regulatory framework based on best international practices.

12. In parallel with the "Bologna reform", two major regulatory initiatives have been implemented from the academic year 2005/06, namely:
    a. access rules have enforced minimum grades of 95/200 in the national access examinations for all candidates in every sector of higher education; and
    b. a minimum number of 10 students per degree programme has been required for public funding, with this limit being announced to increase to 20 students from 2006/07.
13. Table 2.3 quantifies number of education programmes with less than 10 enrolments in 2004-2005 in public universities and polytechnics (i.e., 186 degree programmes, overall) and shows the impact of the measure implemented in 2005/06 to contribute to rationalize resources in higher education.

Table 2.3. Number of education programmes with less than 10 new enrolments in 2004-2005 in public higher education (ISCED 5)

	Fields of education and training	Number of Education Programmes (ISCED 5)		%
		1st year, 1st time <10 in 2004-2005	Still open in 2005-2006	
1	Education	30	14	47%
2	Humanities and Arts	47	30	64%
3	Social Sciences, Business and Law	5	3	60%
4	Science, Mathematics and Computing	27	16	59%
5	Engineering, Manufacturing and Construction	26	18	69%
6	Agriculture and Veterinary	16	10	63%
7	Health and Welfare	5	2	40%
8	Services	30	17	57%
TOTAL		**186**	**110**	**59%**

14. Tables 2.4 and 2.5 characterize the overall degree programmes offered through public and private institutions in 2005/06 in terms of the number of new students enrolled in the 1st year for the 1st time. It shows that only 32% of the supply of degree programmes in public universities have more than 49 new students, while this value is as low as 17% and 15% in the public polytechnic and private sub-systems, respectively. These degree programmes accommodate 67% of the new students enrolled in public universities, while 42% and 56% of those enrolled for the 1st time in public polytechnics and in private institutions, respectively.
15. Table 2.5 shows that, regarding the current year of 2005/06, there are 174 degree programmes in public universities with less than 20 new students, which represent only 6% of the overall number of new enrolments. Also, 215 degree programmes in public polytechnics with less than 20 new students, which represent only 11% of the overall number of new enrolments in polytechnics.
16. Regarding the private system, Table 2.5 shows that 189 degree programmes did not have any students, while there are 210 degree programmes with less to 20 new students, which represent only 14% of the overall number of new enrolments.

Table 2.4. Number of education programmes in higher education, according to the level of total enrolments, 2005-2006 (ISCED 5)

Nr. of enrollments in the 1st year, first time	Public System				Private System		TOTAL
	Universities	%	Polythecnic	%	Total	%	
0	13	2%	12	2%	189	30%	214
1-9	69	12%	96	17%	87	14%	252
10-19	92	16%	107	18%	123	19%	322
20-49	211	37%	263	45%	138	22%	613
>49	181	32%	101	17%	94	15%	376
TOTAL	**566**	**100%**	**579**	**100%**	**631**	**100%**	**1778**

Table 2.5. Number of new enrolments in higher education, according to the level of total enrolments in specific education programmes, 2005-2006 (ISCED 5)

Nr. of enrollments in the 1st year, first time	Public System				Private System		TOTAL
	Universities	%	Polythecnic	%	Total	%	
0	0	0%	0	0%	0	0%	0
1-9	343	1%	518	3%	508	3%	1.369
10-19	1.283	5%	1.545	8%	1.747	11%	4.575
20-49	7.074	26%	8.880	47%	4.451	29%	20.406
>49	18.055	67%	7.786	42%	8.549	56%	34.391
TOTAL	**26.755**	**100%**	**18.729**	**100%**	**15.255**	**100%**	**60.741**

Female enrolment in higher education

17. Table 2.6 quantifies the increasing percentage of female students in higher education, which is explained by various factors, including the progressive liberalisation of social conventions, but above all due to the high rate of female participation in the labour force. This occurred initially at the lower qualification levels, due to the acceleration of industrialisation, largely supported by labour intensive industries, and associated with the integration of the Portuguese economy within the European Free Trade Association (EFTA). These industries heavily recruited female workers. Later, during the 1960s and early 1970s, a growing proportion of males were drafted to the colonial war, thus opening new opportunities for women in terms of higher education and the labour market.

Table 2.6 – Percentage of female students in higher education

Sector	1961	1971	1980	1991	1997	2003	2004
Public	–	43.8	43.6	55.4	54.6	54.1	53.8
Private	–	53.6	46.3	56.4	60.8	61.6	61.3
University	–	45.8	46.4	55.2	55.2	54.2	53.3
Polytechnic	–	34.6	33.3	60.1	58.5	58.6	58.9
All institutions	29.1	44.4	43.9	55.5	56.6	56.2	55.8

Source: Barreto 1996; OCES various years

18. In the early 1990s women became the majority of enrolled students and graduates in all sub-systems of higher education. This might be explained by the higher success rate of female students in compulsory education and upper secondary education (See Table 1.20, early leaves from secondary school). However, the expansion has not been uniform across disciplines. Initially it began in those areas regarded as socially more acceptable and that more easily allow women to pursue a professional career. Eventually, a growing proportion emerged in less traditional areas such as economics, law and engineering, and today they are a majority in every programme except the more technological ones. Their significant presence in polytechnic schools (Table 2.6) might be explained by the fact that this sector includes the colleges of education and nursing with high percentage of female students. Also, the high percentage of women in the private sector might be explained by factors such as fewer technological programmes and a higher percentage of teacher training and health courses in this sub-sector.

On the socio-economic origins of students

19. The nature of the Portuguese higher education system is reflected in the socio-economic composition of enrolments. Until the 1970s enrolments were low, the number of candidates being restricted by the low literacy levels of the population. Those few students graduating from secondary education and struggling to remain in the system faced adversity, as families were unwilling or unable to invest in their children's education. Employment opportunities were somewhat limited. Qualified labour could either join the civil service or find employment with a few industrial groups that expanded their activities in the highly protected economic system of corporativism and colonialism.
20. The expansion of higher education during the 1960s was associated with important economic transformations occurring during that decade, namely a period of accelerated economic growth and, above all, increasing pressure for economic liberalisation. The student population in the 1960s had a high proportion of students whose father had a higher education degree, or at least some secondary education. Bearing in mind the poor levels of literacy of the overall population, this shows a clear over-representation of those groups with higher cultural capital and an under-representation of those from more deprived backgrounds. Analysis has shown that in the following decades this picture changed, with increasing access for students from families with limited qualifications. However, families with formal qualifications well above the average retained some of their traditional prominence.
21. Nevertheless, changes to the social composition of the student population were not homogeneous across sub-sectors, Table 2.7. First, public universities have a more homogeneous population in terms of cultural capital than public polytechnics, suggesting that students from families with lower qualifications choose shorter vocational degrees. Second, there are no major differences between public universities and private institutions in terms of cultural capital of origin.
22. The analysis of enrolments by level of income mostly confirms the influence of cultural capital on

enrolment patterns, Table 2.8. Public polytechnics are clearly more socially inclusive than public universities. Again, in terms of the students' economic level there are no major differences between public universities and private institutions. This suggests that middle and upper class groups with higher cultural capital retained a good grip on access to the most prestigious institutions and programme (see also Vieira, 1995).

23. The survey published in 2005 within the framework of the EUROSTUDENT 2005 initiative, confirms that the university-polytechnic divide presents a clearer difference between the socio-economic family origins of the students in the Portuguese higher education system than the public-private divide.

Table 2.7 – Distribution of enrolments by level of schooling of the household[a] (%)

Level	63/64	91/92	1997				2004			
			Public univer.	Public polytech.	Private	**Total**	Public univers.	Public polytech.	Private	**Total**
Illiterate/ Primary	**35.2**	**25.3**	39.3	53.3	47.2	**45.0**	30.0	50.0	27.2	**34.9**
Secondary	**27.4**	**19.2**	35.7	36.3	34.4	**35.4**	29.2	29.6	29.4	**29.4**
Vocational degree	**8.7**	**8.1**				**6.5**	–	–	–	**–**
Higher education	**27.5**	**18.1**	24.7	10.4	18.3	**13.1**	40.8	20.4	43.4	**35.7**
Other/NA	**1.2**	**27.1**					–	–	–	**–**

a – level of schooling of the parent with highest income
Source: Vieira (1995); CNASES (1997); Martins et al. (2005)

Table 2.8 – Enrolments by level of household income, 2004

Household income €	Public university %	Public polytechnic %	Private institution %	Total %
Less than 720	13.6	20.1	11.2	14.8
721–1440	28.5	38.8	26.0	30.7
1441–2160	21.6	22.2	19.3	21.1
2161–2880	15.2	10.9	16.9	14.5
More than 2880	21.1	8.0	26.6	18.9

Source: Martins *et al* (2005)

24. It should be noted that about 19% of the overall number of higher education students in Portugal report having some work experience prior to enrolment in higher education. This clearly contrasts with typical figures in northern European countries, Figure 2.2.

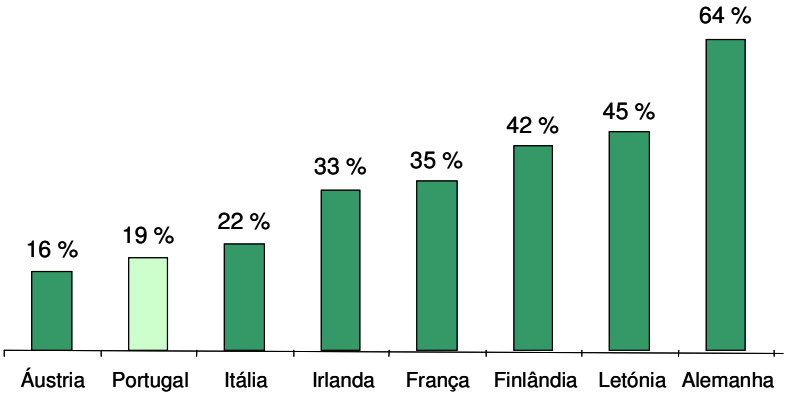

Figure 2.2. Fraction of higher education students with previous work experience, prior to enrolment in higher education, 2004; Source: CIES-ISCTE, Eurostudent 2005

25. In addition, Figure 2.3 shows that the large majority of students in Portugal do not receive any remuneration from working during their enrolment in higher education, which makes families the main source of income for students (see Figures 1.8 and 1.9).

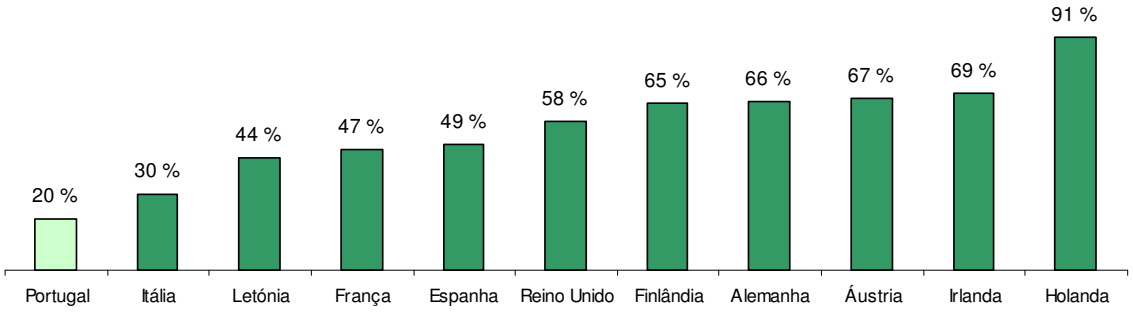

Figure 2.3. Fraction of higher education students with remunerations for working at least 1 hour/week (i.e., "Trabalhadores estudantes"), 2004; Source: CIES-ISCTE, Eurostudent 2005

Student mobility

26. Figure 2.4 compares the fraction of higher education students with experience in studying abroad for several European countries and, for example, shows that the fraction of Spanish students with experience abroad is almost three times larger than that for Portugal. This experience has been promoted above all through the Erasmus Programme and, again, analysis has shown that families must support a large part of the costs for their students to study abroad.
27. In terms of national mobility, another dimension of the selective nature of the Portuguese higher education system was its high regional concentration. Until the early 1970s there were no universities outside the three major cities (Lisbon, Porto, Coimbra). The regional expansion of the system started slowly, before becoming an important characteristic from the mid-1980s onwards.

Arguably, the main driving force of regional diversification was the development of the polytechnic public sector. Public polytechnics had strong regional orientation ever since their creation and were always regarded as the primary instrument for providing higher education to the more remote areas of the country.

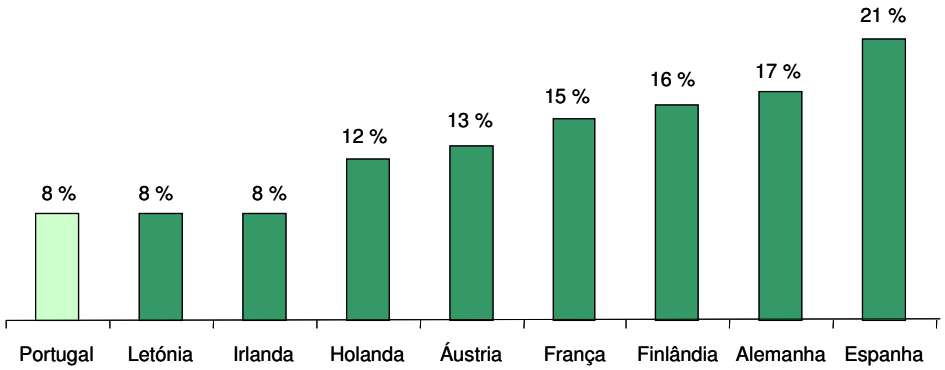

Figure 2.4. Fraction of higher education students with experience in studying abroad, 2004; Source: CIES-ISCTE, Eurostudent 2005

28. Regional expansion of higher education – especially of the public network – had initially a small impact on geographical mobility, as the establishment of new institutions start by attracting candidates of the surrounding regions. By the mid-1990s the proportion of the total number of applicants and successful applicants coming from the same region to the institutions located in the two most populated regions (Lisbon and Porto) was over 60%. In contrast, regions with smaller populations are filling about half of their vacancies with candidates from outside their region. Distance to the institution is one of the main determinants of students' preferences.
29. There is an increasing pattern of student mobility between study programme and between institutions, which is determined by the number of vacancies that institutions open for specific purposes. Table 2.9 quantifies the students changing programme and institutions for the academic year 2004/05 (first year enrolments) and shows that some 12% of students change their choice of programme, 3% move to other institution and only 1% are students aged over 25 years and have access to the university through a special entrance system for students not holding an upper secondary school diploma.[6]

Table 2.9 – Students changing programme and institution, 1st year, 2004-05

	% filled vacancies	New students	Change of programmeme	Change of institution	≥ 25 years old
Public universities	86.8	21 201	2 083	524	238
Public polytechnics	79.6	14 111	1 799	418	145
Private institutions	48.0	13 362	1 880	711	168
Total	69.7	49 674	5 762	1653	551

Source: OCES, 2005

6 There is also mobility in the other years of each programme but the data is not available.

2. Students' social support system

30. The Portuguese higher education student support system aims to mitigate the economic difficulties faced by students from disadvantaged social backgrounds. This is particularly important since the last decade was characterised by increasing cost-sharing both by raising the level of tuition fees in public institutions and by expanding full-cost fee private institutions.
31. Decree-Law 132/80 of 17 May established a comprehensive student support system by creating an autonomous service associated to each university or university institute. At the time these services were given more financial and administrative autonomy than universities, as well as a flexible human resources management system, as the staffs for students' residences and restaurants was hired under private law. Services were managed directly by the rectors, assisted by a vice-president nominated by the rector but appointed through the Government.
32. The implementation of institutional autonomy, in 1988, for the Universities, and 1990, for the Polytechnics, had an important impact upon the students' support system. In fact, the University Autonomy Act conferred public universities an increased degree of autonomy and responsibility for staff and students, and committed to the rector the definition of the policy for the students support system. Decree-Law 129/93 of 22 April extended the authority of the universities over the social support services, by formally integrating them into the university as one of its units. However, some of the former management flexibility was lost, as all the staff became public servants. Polytechnics followed a similar path.
33. In the early 1990's social support policies became entangled with the governments' attempts at increasing cost-sharing by raising tuition fees for the public sector. In Portugal the nominal value of public tuition fees has been frozen since 1941 and in 1990 students enrolled in public HEIs paid only about € 6/year: Furthermore, the 1976 Portuguese Constitution determines that higher education must become progressively free of charge. However, the Constitutional Court ruled that although tuition fees could not be raised, updating their value by taking into account inflation since 1941 was not considered a price increase. Therefore, the Parliament passed Law 20/92 of 14 August updating tuition fees under strong student protests. The new Law stated that tuition fees were revenue of the institutions to be used mainly for the students' social support and for promoting academic success, thus attempting to pacify students.
34. Tuition fees have remained a hot political issue throughout the 1990s. In 1997, the Parliament (Law 113/97 of 16 of September) reintroduced updated tuition fees but limited its yearly value to the national minimum wage, thus protecting students against any sweeping tuition increases. The law also extended 'progressively' student social support services to students enrolled in private institutions.
35. In 2002 Parliament passed a new law (Law 37/2003, of 22 August that replaced Law 113/1997) establishing a new framework for financing higher education. The major change was that it allowed public HEIs to set the value of tuition fees between a minimum of 1.3 times the minimum monthly wage and a maximum determined by updating the value of 1941 to inflation.
36. The new 2003 law maintained that tuition revenues should be used to promote quality to be measured by appropriate performance indicators, and emphatically stated that students from

disadvantaged social-economic backgrounds should not be excluded from higher education for economic reasons, provided their academic merit is demonstrated.

37. At present, the students' social support system includes direct and indirect support mechanisms, independently of the type of institution (public or private, university or polytechnic). The direct support consists of means tested grants (scholarships) for needy students that demonstrate academic merit. These grants are awarded every year and are meant to contribute to the students' expenses (housing, meals, transportation, tuition fees, etc.). The value of grants depends on the per capita income of the student's family (or their own, in the case of independent students[8]), and its value has a monthly maximum equivalent of the minimum wage and a minimum equal to one-twentieth of that value (Oliveira and Pereira, 1999). Because fees are revenue of HEIs, the law determines that the grants include the amount necessary to pay for the fees, instead of adopting a fees remission policy. The indirect support consists of housing in halls of residence (with priority being given to displaced students with grants), subsidised meals in canteens, and other services related to health, culture and sports.
38. The expenditure in students' social support increased faster than the expenditure in higher education, the latter increasing also faster that the expenditure in education (in 2001 higher education represented about 20% of the public expenditure with education). Public expenditure in education increased from 1.5 % of the GDP in 1974 to 5.5% of the GDP in 2001[9]. From 1988 to 2001, public expenditure in education and higher education increased from 4.0% to 5.5% of the GDP and from 0.46% to 1.13% of the GDP, respectively.
39. Figure 2.5 indicates the fraction of students with public grants in the various sub-systems, and show that those at public universities have obtained a higher percentage of grants than their colleagues from public polytechnics, although students from the less affluent backgrounds are more present in the vocational sector.
40. To overcome the differences between the private and the public sub-systems (in 1991 the private sub-system received 29% of all students enrolled in HE and only 3% of the public expenses in student social support), the grants system was extended to the private sub-sector in 1997, with an extra allowance to compensate for the higher fees in the private sector[11]. Nevertheless the State establishes a limit to the amount awarded for fee payment, to deter private institutions from excessively increasing fees.
41. The more equitable treatment of students in public and private institutions is confirmed by the analysis of the evolution of the total funds per sub-system and the average value of grants, as shown in figure 2.6 and table 2.10. Grants have become on average higher for students enrolled

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8 Students are considered independent if live away from their parents' home, having sufficient financial means to maintain themselves (including housing) but not to pay for the course of their studies.

9 The collected data on education, higher education and social support are not always available by source of financing. So the term "public expense" frequently represents different realities, such as the State budget transferences or the transferences from the budget including own resources from public entities. For such a reason in the present paper the data used will be precisely identified.

11 The grant system was extended to private sector only in 1997, when there was already a clear tendency of decreasing enrolments in this HE sub-sector. However decreasing enrolments have continued in private higher education after the extension of the grants' system to this sub-sector.

in the private sector, and that explains why the budget for the private sector already exceeds the budget for public polytechnics. It is important to notice, in this context, that a large fraction of students receive a grant equal to the tuition fee, which explains the low average annual values of grants in public universities and polytechnics.

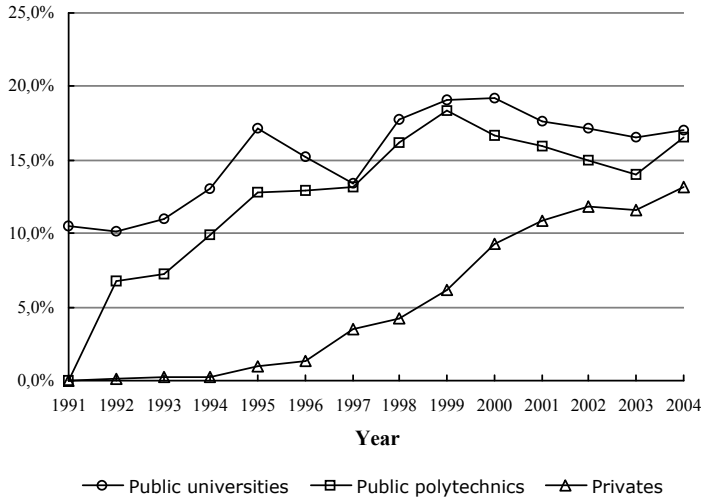


Figure 2.5 – Percentage of students with grants in public universities, public polytechnics and private institutions; Source: DEPGEF, FAE, DGESUP and DSAT.

42. Table 2.11 extends the information of Figure 1.5 and quantifies the type of residence used by higher education students in Portugal.
43. Grants are means-tested, depending on the families' *per capita* income. Table 2.12 presents the monthly income of students receiving grants and shows that 80% of the grant-holders belong to families with a maximum income of € 1,440, while 33% have an income below € 720.

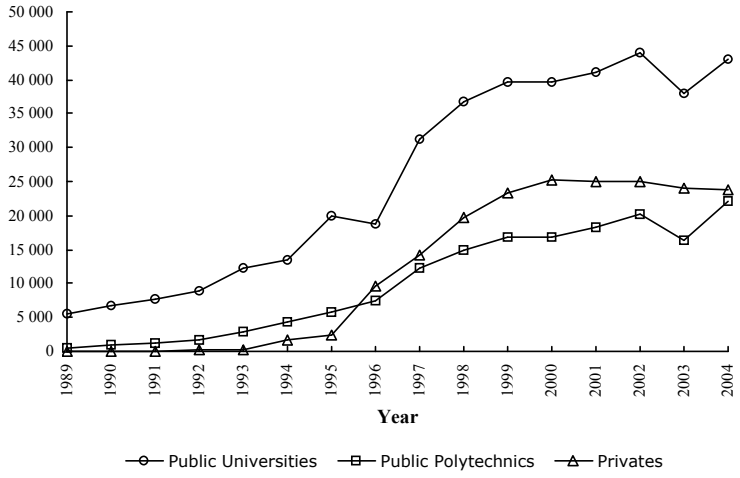


Figure 2.6 – Total expenditure in student support (grants) per sub-system

Sources: Medina (2004), DGES (2006)

Table 2.10 – Average annual values of grants (€)

Year	Public Institutions		Private Institutions
	Universities	Polytechnics	
1997	1 580	1 441	3 334
1998	1 373	1 265	3 829
1999	1 335	1 147	3 218
2000	1 279	1 121	2 281
2001	1 387	1 118	2 003
2002	1 491	1 129	1 892
2003	1 329	1 028	1 878
2004	1 481	1 201	1 698

Source: Martins *et al*, Eurostudent (2005)

Table 2.11 – The residence of higher education students

Students	Age groups (%)			
	< 20 years old	20-23 years old	24-27 years old	>28 years old
Parents/relatives	56.6	59.0	51.0	25.8
Own house/apartment	5.7	7.3	12.9	53.3
Rented house/apartment	16.8	15.4	14.4	11.6
Individual rented room	11.9	12.2	14.6	5.8
Shared rented room	3.7	2.4	3.3	1,2
Student residence	5.3	3.7	3.8	2,3

Source: Martins *et al*, Eurostudent (2005)

Table 2.12 – Parents' net monthly income of students receiving grants (€)

families' *per capita* income	% of studentes receiving grants
< 720 €	32.9
721 € – 1440 €	47.1
1441 € – 2160 €	11.6
2161 € – 2880 €	5.0
> 2880 €	3.4
Total	100.0

Source: Martins *et al*, Eurostudent (2005)

44. Table 2.13 characterises the families of grant-holders in terms of their socio-professional category and level of educational attainment. As for education it is not surprising that 73.5% of grant-

holders' families have at most completed basic education due to the low qualification level of the mature Portuguese population. What is perhaps more surprising is that 7.5% of grant-holders belong to families of "entrepreneurs, top management and liberal professionals" and 20.3% belong to families of "executives and specialised professionals".

Table 2.13 – Characterisation of the parents of undergraduate students with grants

Household of origin	**%**
Socio-professional categories	
Entrepreneurs, top management, liberal professionals	7.5
Executives and specialised professionals	20.3
Independent workers	8.2
Independent workers, > 1 activity	7.2
Administrative employees	17.0
Blue colar workers	21.2
Salaried workers, > 1 activity	18.6
Total	100.0
Education	
Not more than basic education	73.5
Upper secondary education	13.8
Tertiary education	12.7
Total	100.0

Source: Martins *et al*, Eurostudent (2005)

45. Table 2.14 extends the information of figures 1.8 and 1.9 and quantifies the contribution from both families and students to the costs of attending higher education at undergraduate level. Some 15.5% of all undergraduates contribute to the costs of higher education through their work

revenues. For post-graduate education the annual expenditure is much higher than for undergraduate studies and the contribution from the state, although more generous in absolute terms, maintains its proportion of the total costs, while the percentage of students contributing with their work revenues increases very substantially to over 70%.

46. Tables 2.15 and 2.16 present the monthly average expenditures of students on different items taking into account the type of accommodation (Table 2.15) and the type of institution (Table 2.16). Accommodation is the most relevant item in the expenditures' list and varies from zero for students living with their parents to an average of € 296 for those living in its own or rented house. Payments to institutions (fees) are lower for students in institutional residences, as a large percentage also has a grant and does not pay fees.

47. Analysis shows that students from private institutions spend more, in absolute terms, than their colleagues from the public sector, the major difference being the higher fees paid to private institutions. Among public institutions, students from polytechnics spend less than those from universities. The item "other expenses" also presents a significant difference between types of institutions, being higher for students enrolled in private institutions, probably because private institutions have a high concentration in the main towns of Porto and Lisbon, where living costs are also higher.

Table 2.14 – Sources of income (monthly average in € and in %)

Sources of income*	€	%
All students		
Family (money)	337	85.3
Family (intangibles)**	251	61.4
State	195	24.3
Work	625	18.1
Others	263	4.1
Undergraduate studies		
Family (money)	320	87.7
Family (intangibles)	250	62.8
State	155	24.4
Work	490	15.5
Others	214	4.0
Post-graduate studies		
Family (money)	1	37.1
Family (intangibles)	299	32.2
State	1	22.4
Work	1	70.6
Others	822	7.0

*NOTE1: The calculated average only takes into account students with income from this source. The percentages refer to the proportion of students who in each sub-group state that they receive money from that source.

**NOTE2: Intangible income refers to transfers in kind or direct payments made by their parents

Source: Martins *et al*, Eurostudent (2005)

Table 2.15 – Expenditure items and monthly average costs by type of accommodation

Monthly expenses*	All students		Type of accommodation							
			Parents' home		Own or rented house		Rented room		Student residence	
	€	%	€	%	€	‰	€	‰	€	‰
Accomodation**	252	89.6	_	_	296	87.3	201	98.8	142	71.3
Food	108	89.1	85	81.4	146	91.4	110	93.9	116	93.9
Clothes/hygiene	68	72.0	67	62.9	81	76.4	52	79.3	47	84.3
Payments to institutions	147	55.4	154	51.1	158	57.5	123	52.0	81	66.1
Study	54	83.4	54	76.5	59	84.1	49	88.1	49	89.6
Transport	59	82.5	59	78.0	66	81.3	51	84.1	39	86.1
Computers/Inter	41	43.7	46	41.8	40	45.7	31	38.9	24	33.9
Other	179	56.4	68	24.8	195	51.0	123	56.2	145	49.6
Total	575	97.0	430	95.8	720	97.5	521	100	472	99.1

*NOTE1: The calculation of the average only takes into account students with income from each source. The percentages refer to the proportion of students who in each sub-group state that they receive money from that source.

**NOTE2: Including intangible income, this refers to transfers in kind or direct payments made by their parents.

Source: CIES-ISCTE, Eurostudent, 2004

48. The rather small percentage of students mentioning expenditure with "accommodation" (31.6% for public universities, 31.8% for public polytechnics and only 19.7% for private institutions) confirms that many students live with their family and that mobility is low. The lower value for the private institutions is consistent with the idea that their students are based locally, as students will try to keep the costs low. The exception seems to be students that already have local independent accommodation, in which case their average costs are also higher than those for their public university counterparts.
49. Although there is a legal framework for developing students' loans for many years, such system remains to be implemented through the approval of regulations and funding. At the same time, students' loans available from the commercial banking system are extremely limited, with available data listing only 397 students having bank loans for studying in higher education (318 of them for undergraduate studies, corresponding to 0.6% of total enrolment, and 79 for post-graduate studies, corresponding to some 1.3% of total enrolment). It should be noted that an universal loan system will require a public investment that is hardly compatible with current EU

rules on public budget deficits. For example, a loan system for 100 000 students with an individual debt limit of € 20,000 and repayable in 15 years would represent a public investment of almost 1.7% of GDP.

Table 2.16 – Expenditure items and monthly average by educational sector

Total monthly expenditure[1]	All students		Public universities		Public polytechnics		Private	
	€	%	€	%	€	%	€	%
Accomodation	190	28.3	199	31.6	161	31.8	212	19.7
Accomodation[2]	216	53.7	201	56.4	181	50.6	317	5.0
Food	108	86.4	115	88.6	92	88.1	112	81.4
Clothes/hygiene	68	69.8	69	68.8	56	72.7	78	68.6
Tuition fees	147	53.7	102	52.3	68	51.9	283	57.9
Study	54	80.9	52	82.5	40	83.5	75	75.8
Transport	59	80.0	57	81.4	57	80.8	65	77.0
Computers/Internet	41	42.4	37	43.4	30	42.6	61	40.6
Other expenses[3]	179	54.7	157	53.0	107	57.6	291	54.4
Total[4]	495	97.0	465	97.5	370	62.2	672	95.2

[1]NOTE1: The calculation of the average only takes into account students with monthly expenditure for the item. The percentages refer to the proportion of students who in each sub-group state that they made expenses on that item in relation to the total number of students in the same sub-group.

[2]NOTE2: Intangibles, corresponding only to values declared by students not living with their parents; percentage of students with this type of expenditure in relation to the total of those living independently in each sub-group. [3]NOTE3: Including intangibles. [4]NOTE4: The average figures for total expenditure on each sub-group do not include payments made directly by the family for accommodation and associated services.

Source: Martins *et al*, Eurostudent (2005)

3. Accreditation and quality assessment

50. A major review of the accreditation and quality assurance practices of Portuguese higher education is being performed by an international review committee formed through the European Network for Quality Assurance in Higher Education, ENQA, following a request made by the Government in November 2005, so that this section only briefly summarizes main issues under analysis. The review committee will provide advice on the current legal framework supporting accreditation and quality assurance methodologies, as well as on appropriate structures for implementing a national accreditation and evaluation agency following current quality assurance and accreditation practices in Europe.

51. Although at present there is no national accreditation system, at least when considering international reference terms for independent accreditation of higher education, public regulation of higher education at the level of degree programmes have been largely exercised through the Directorate-General for Higher Education, DGES. This has involved over the last decade diversified arrangements for the different sub-systems of higher education, which may be briefly summarized as follows:

    - *Public Universities*: full autonomy in the creation and delivery of degree programmes, which are to be registered at DGES;
    - *Public Polytechnics*: the creation of degree programmes require their prior approval from Government, through DGES;
    - *Private Institutions*: the creation of private institutions and delivery of degree programmes require prior approval from Government, through DGES, after assessment by experts teams, which are nominated by Government;

    This system has resulted in increasing manifestations of concern from polytechnic and, above all, private institutions, claiming against discretionary attitudes and considerable bureaucracy. Table 2.17 quantifies the number of degree-programme proposals submitted to DGES over the last three years and the related approvals.

52. As a result, the recent alteration of the Portuguese *Comprehensive Law on the Education System* (i.e., “Lei de Bases do Sistema Educativo”) in August 2005, followed by the Decree-Law 74/06, from the 24th March 2006, that adapts the system to the Bologna principles, introduces a national accreditation system based on best international practices.

Table 2.17 Number of new degree programmes requested, approved and registered at DGES for 2003-2005

a) Number of public university degree programmes registered at DGES

Degree Type	2003	2004	2005
Bacharelato	1		
Licenciatura	33	42	16
Master	103	114	109
PhD	10	7	16
Total	**147**	**163**	**141**

b) Number of public polytechnic degree programmes requested and approved/registered

Degree Type	2003		2004		2005	
	Requests	Approved / Registered	Requests	Approved / Registered	Requests	Approved / Registered
Bacharelato	4	3	4	2	7	4
Bacharelato+Licenciatura	49	10	51	36	80	38
Licenciatura	5	1	5	2	7	1
Total	**58**	**14**	**60**	**40**	**94**	**43**

c) Number of degree programmes requested from private institutions and approved*

Degree Type	2003		2004		2005	
	Requests	Approved	Requests	Approved	Requests	Approved
Bacharelato	0	1	0	2	3	0
Bacharelato+Licenciatura	13	23	24	3	16	10
Licenciatura	39	15	45	34	62	15
Master	37	21	54	15	59	34
PhD	0	0	3	1	17	2
Total	**89**	**60**	**126**	**55**	**157**	**61**

* The presented figures report the granted authorizations in each year, with no direct relation with the year of request.

53. Quality assurance of higher education in Portugal has been based on the *Higher Education Evaluation Act*, Law 38/94, passed by Parliament in November 1994, which was closely developed in collaboration with the Council of Rectors of Public Universities, CRUP.
54. The quality assurance system established by Law 38/94 has been implemented over the last decade very much based on a national-based system of self-evaluation, with characteristics that might be summarised as follows:
    - the evaluation process applies to all higher education institutions and develops in two phases: self- and external evaluation;
    - the responsibility for the coordination of external evaluation lays with representative entities which must be recognised as such by the Government.

- there are no direct links between the results of the evaluation and the financing of teaching activities, although continued negative results may have consequences on financing and on the recognition of degrees. As a result, the formula for the funding of higher education institutions does not contain any component dependent on the results of quality evaluation;
- the system aims at the improvement of the quality of higher education in the different fields of study, taking specially into account the nature and typology of teaching, the qualification of the academic staff and the conditions of functioning;

55. Soon after the publication of Law 38/94, the Minister of Education signed a protocol with the Presidents of CRUP and FUP, which recognised the Foundation of Portuguese Universities (FUP) as the representative entity for the public universities and the Catholic University and defines the general guidelines to be met by the evaluation system. A direct consequence of this process was that the pilot project launched by CRUP in 1993 was integrated into the new framework and considered as the "first round of evaluations" to be concluded until 1999 under the coordination of the evaluation council already established by FUP.
56. The other sectors of higher education organised themselves for the creation of their own evaluation agencies, but had to wait for regulation that was finally established by Decree-Law 205/98, of 11 July, which instituted the practical principles for the recognition of the representative entities and created the National Council for the Evaluation of Higher Education (CNAVES), as a global coordinating body of the evaluation system. It includes people from the different sub-systems (i.e., public universities and polytechnics and private institutions), together with representatives from the Government and, therefore, it represents the system of higher education itself. A few foreign members have been initially considered, but have never had any significant role. For the operation of CNAVES, the protocols for the recognition of the new representative entities – the Association of the Portuguese Polytechnic Institutes (ADISPOR) and the Portuguese Association of Private Higher Education (APESP) – were only signed in December 1998 and March 1999, respectively.
57. The representative entities created four evaluation councils, corresponding to the different higher education sectors:
    - The Evaluation Council for Public Universities (includes also the Catholic University and the military institutions for university education), managed through FUP;
    - The Evaluation Council for Public Polytechnics, managed through ADISPOR;
    - The Evaluation Council for Private Universities, managed through APESP;
    - The Evaluation Council for Private Polytechnics, managed through APESP.
58. The responsibility for the harmony, cohesion and credibility of the national quality assurance system rests with the CNAVES, bearing in mind the observance of standards for the overall operation of the system. Specific responsibilities of CNAVES are:
    - to coordinate the proposals from the evaluation councils to ensure that the same review teams for external evaluation apply to both the public and the private sectors in each field of studies;

- to ensure the same guidelines for self-evaluation within the University and the Polytechnic subsystems, allowing however for differentiation between them;
- to produce global and prospective reports on quality assurance in higher education, as well as to issue recommendations for the rationalisation and improvement of the higher education system.

59. Two rounds of programme evaluations have taken place. The first round (1995-2000) included only the public universities and the Catholic University. It was exclusively a programme–oriented exercise, assessing 376 programmes in 44 fields of study. The second round (2000-2005) continued to be programme-oriented and included programmes at all the higher education institutions, assessing a total of 1209 degree programmes (432 in public universities, 164 in private universities, 421 in public polytechnics and 192 in private polytechnics), Table 2.18. The review teams involved 637 experts for the university subsystem, of which only 16% were foreign and 18% were from the external community, and 524 experts for the polytechnic subsystem (only with 4% foreign, 9% non-academics, while 46% from the universities and 41% affiliated to polytechnic institutions). It should be noted that successive Governments has taken no action or position based on the reports from the evaluation teams.

Table 2.18 Number of degree programmes evaluated through CNAVES

Year	University Study Programmes			Polytechnic Study Programmes		
	Public	Private	Total	Public	Private	Total
2000/01	86	11	97	66	61	**127**
2001/02	141	59	200	57	46	**103**
2002/03	100	24	124	75	13	**88**
2003/04	49	32	81	98	39	**137**
2004/05	56	38	94	125	33	**158**
TOTAL	**432**	**164**	**596**	**421**	**192**	**613**

Source: CNAVES; 2006

Professional accreditation

60. Professional accreditation has been pursued through professional associations. These are public corporations for liberal professions (lawyers, doctors, engineers and pharmacists), which are organized in the form of public bodies with an associative basis (i.e., “statutory membership organisations” in the English terminology), working within the public law. As the Constitution of the Portuguese Republic grants the freedom of professional exercise, professional associations with power to limit or to condition access need to be established by an Act of Parliament of by a government Decree-Law duly authorised by Parliament.
61. The requirements for becoming an effective member of a professional association vary substantially with the profession. In some cases holding the appropriate degree is a sufficient condition. In other cases admission follows a training period and/or an examination. In 1994 the

Engineers' Association (i.e., "Ordem dos Engenheiros") established a system of accreditation, and apparently other professional associations are following suite. As a general rule when an accreditation system exists, graduates from accredited higher education institutions have direct access to effective membership. In the case of engineering, the accreditation system uses a methodology that is quite similar to the national quality assurance system. More complete information can be obtained from FEANI's site in the NET: http://www.feani.org/.

62. The Architects' Association have established an accreditation system similar to that of the Engineering, which has recently been modified. The new statutes of the Pharmacists' Association approved by Decree-Law 288/2001 of 10 of November allow the association to start accreditation procedure. None of the other Professional associations has so far established a system of accreditation, and the statutes of some do not confer this capacity to them.

4. Public Funding of higher education

63. Portugal has spent 5.9% of the GDP in education in 2001, and this figure compares against an average of 5.1% for EU25 and 4.6% for Germany, 3.9% for Greece, 4.4% for Spain, 5.7% for France, 4.3% for Ireland, 5.0% for Italy and the Netherlands, 5.9% for Austria and 4.7% for the UK (EUROSTAT, 2004). Also in 2001, the percentage of the expenditure with education relative to the total public expenditure was 12.8% in Portugal, against 10.8% for EU25 and 9.7% for Germany, 8.2% for Greece, 11.1% for Spain, 11.2% for France, 12.9% for Ireland, 10.2% for Italy, 10.7% for the Netherlands, 11.2% for Austria and 11.9% for the UK (EUROSTAT, 2004).

64. Figure 2.7 shows typical OECD data indicating that public expenditure on higher education was in 2001 similar to that of the average Europe, EU15, and about 1.04% of GDP, although the figures for Portugal do not include the investment of private sources of higher education. However, when comparisons are made using absolute values of total *per capita* funding (i.e., total public and private expenditure per student, including families and other private agents), the results for Portugal (and also for other southern European countries) are lower than for other OECD countries. There are some reasons why this happens in Portugal. First, in Portugal total student enrolments do not take into account the percentage of part-time students, which means that the calculated *per capita* funding is lower than if calculated using enrolments in FTEs. Second, some research funds are directly allocated to financially autonomous research centres, and not through the universities budgets, except the percentage allocated as institutional overheads. Also, reimbursable funds such as income contingency loans have not yet been used in Portugal, namely to support students in their personal and living expenses, which also helps to explain major differences in relation to other northern European and OECD countries, as presented in Figure 2.8.

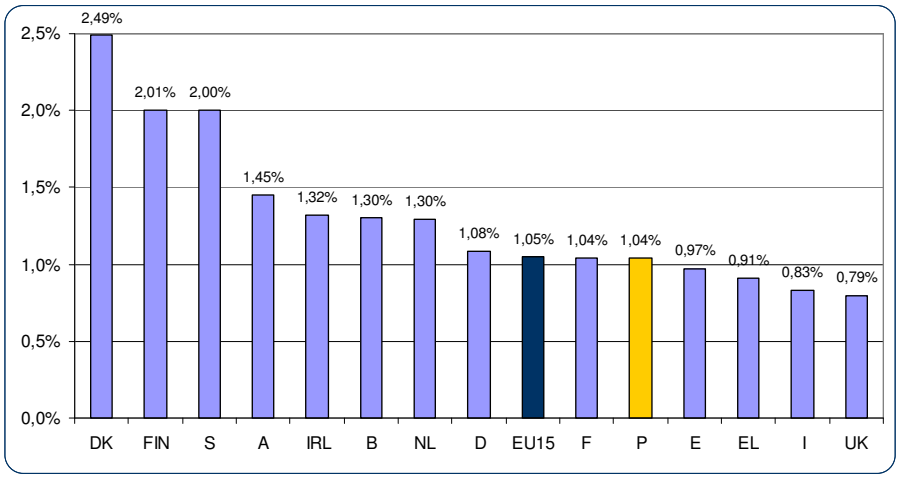


Figure 2.7 – Public expenditure on higher education, as a fraction of GDP (%)
Source: "Education Across Europe 2003", Eurostat; data from last year available or 2000

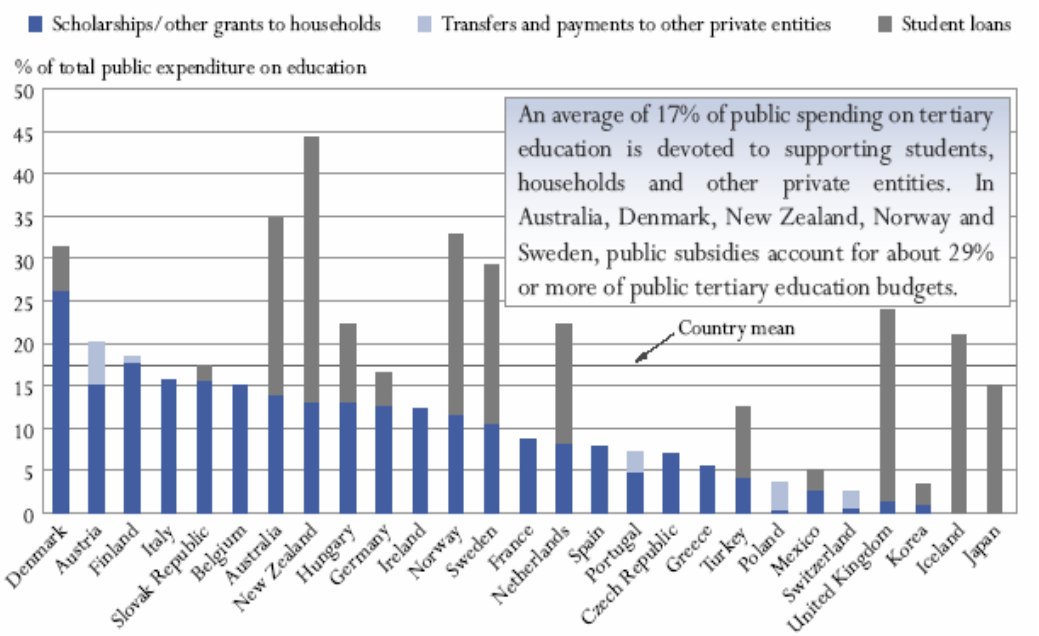


Figure 2.8 – Public subsidies for education in tertiary education, 2002

Adapted from: OECD, Education at a Glance 2005, Paris, OECD

Note: The chart presents different public subsidies for education to households and other private entities as percentage of total public expenditure on education, by type of subsidy. Public subsidies to households provide finance as grants or loans, and include: i) grants/scholarships; ii) public student loans; iii) family or child allowances contingent on student status; iv) public subsidies in cash or kind such as housing and transport; and v) subsidies to permit low-interest loans from private lenders.

65. Table 2.19 shows the evolution of the annual budget for Science and Technology, Information Society and Higher Education for 2005-2006, as presented to the Parliament by Government for MCTES, which quantifies an increase of 17% in S&T, maintaining the overall level of expenditure in higher education, together with a considerable decrease in the public support of infra-structures.

Table 2.19. Overall annual budget for Science and Technology, Information Society and Higher Education (as presented by Government for MCTES) for 2005 and 2006

Unit: €

	2005	**2006**	**Variation (%)**
Science and Technology	**335.022.495**	**392.232.372**	**17,1%**
Information Society	**138.998.098**	**147.904.824**	**6,4%**
Higher Education	**1.734.338.129**	**1.766.861.805**	**1,9%**
Higher Education (current expenses)	1.420.189.201	1.468.370.035	3,4%
Social support system (grants, accommod., meals)	191.900.499	204.744.588	6,7%
Infra-structures (buildings and equipment)	122.248.429	93.747.182	-23,3%
Administration and general services	**11.012.681**	**12.020.234**	**9,1%**
TOTAL	**2.219.371.403**	**2.319.019.235**	**4,5%**

66. Table 2.20 a) quantifies the sources of funding for Science and Technology, Information Society and Higher Education (as presented by Government for MCTES) for 2006. The results show an overall private income (Including tuition fees, but also other income) of about 40% of the overall budget for higher education, with a share among public universities and polytechnics as quantified in Table 2.20 b).

Table 2.20. Sources of funding for 2006

a) Sources of funding for Science and Technology, Information Society and Higher Education (as presented by Government for MCTES)

Unit: €

	State Budget	Private income	European Structural Funds	Total
Science and Technology	**219.989.671**	**21.112.182**	**151.130.519**	**392.232.372**
Information Society	**42.434.946**	**3.343.534**	**102.126.344**	**147.904.824**
Higher Education	**1.266.038.728**	**447.342.049**	**53.481.028**	**1.766.861.805**
current expenses (includes tuition fees)	1.077.303.628	391.066.407		1.468.370.035
Social support system	155.735.100	49.009.488		204.744.588
Infra-structures (buildings and equip.)	33.000.000	7.266.154	53.481.028	93.747.182
Administration and general services	**11.909.545**	**110.689**		**12.020.234**
TOTAL	**1.540.372.890**	**471.908.454**	**306.737.891**	**2.319.019.235**

b) Sources of funding for Higher Education (as presented by Government)

Unit: €

	State Budget	Private income	European Structural Funds	Total
Sub-total for higher education ("Funcionamento")	**1.077.303.628**	**391.066.407**		**1.468.370.035**
Universities	745.486.472	294.417.131		1.039.903.603
Polytechnics	285.405.227	88.882.950		374.288.177
Other (schools not integrated) (1)	26.180.667	7.269.341		33.450.008
Contractual Funding	20.231.262	496.985		20.728.247
Sub-total for social support system	**155.735.100**	**49.009.488**		**204.744.588**
Universities	74.570.472	31.192.138		105.762.610
Polytechnics	34.219.628	13.717.350		47.936.978
EUL: University sports	1.025.000	4.100.000		5.125.000
Other social support (Private system)	45.920.000			45.920.000
Sub-total Infra-structures (buildings)	**33.000.000**	**7.266.154**	**53.481.028**	**93.747.182**
TOTAL	**1.266.038.728**	**447.342.049**	**53.481.028**	**1.766.861.805**

(1) Escolas Superiores de Enfermagem; Escola Superior de Hotelaria e Turismo do Estoril

67. Public funding for higher education, including teaching and research activities, is based on the main mechanisms described in Figure 2.9, namely:
    - Public funding of higher education institutions:
        - Direct basic funding of public institutions (through funding formula);
        - Contractual funding of institutions (through contracts for specific issues);
        - Direct funding of social support services (through funding formula since 2006) for: i) direct funding to students (i.e., social support of individual grants); and ii) indirect funding to students (i.e., meals, accommodation, sports, healthcare).
    - Public funding for science and technology, S&T:
        - Direct funding of institutions through R&D units based on their periodic evaluation and number of PhD researchers (through the Portuguese Science and Technology Foundation, FCT, defined upon evaluations every 3 years)
        - Contractual funding of institutions (e.g., Associate Laboratories);
        - Competitive funding for R&D activities (through R&D projects)
        - Competitive funding for people (through individual grants for research students and contracts for researchers)
    - Public funding for infrastructures (i.e., buildings and equipment)
    - Public funding for the diffusion of information and communication technologies

Public funding of higher education institutions

68. Public funding of higher education institutions is implemented through central administration offices at the level of universities, polytechnic institutes and/or their schools (depending on autonomy levels) and includes three main components, namely: i) basic funding through funding formula; ii) contractual funding; and iii) direct funding of social support services (through funding formula since 2006) for their direct support of individual grants for students and for indirect funding of students through meals, accommodation, sports and healthcare.
69. Direct basic funding of public institutions has been based on a formula since the early 90's, which has been used to distribute the overall annual budget among public universities and polytechnics to cover for their running costs. The initial formula was designed in close collaboration with the Council of Rectors, CRUP, and it has evolved with time based on successive negotiations with CRUP and CCISP.
70. The distribution of funding through the formula is related with the costs supported by higher education institutions in their activity, namely in terms of the number of enrolled students, varying according to specific costs of each institution (in a way to account for diversity in the qualifications of teaching staff) and the field of study (i.e., favouring some degrees that need more practical or laboratory classes, e.g., medical sciences and engineering). In general the formula takes into consideration the following aspects:
    a. the teacher/student ratio;
    b. the non-teaching staff/teacher ratio;
    c. the standard composition of the teaching staff;

d. the expenditure (and structure) of central administration (based on central administration personnel/student ratio); and
e. the budget structure expressed in the percentage composition of personnel costs and other operational costs.

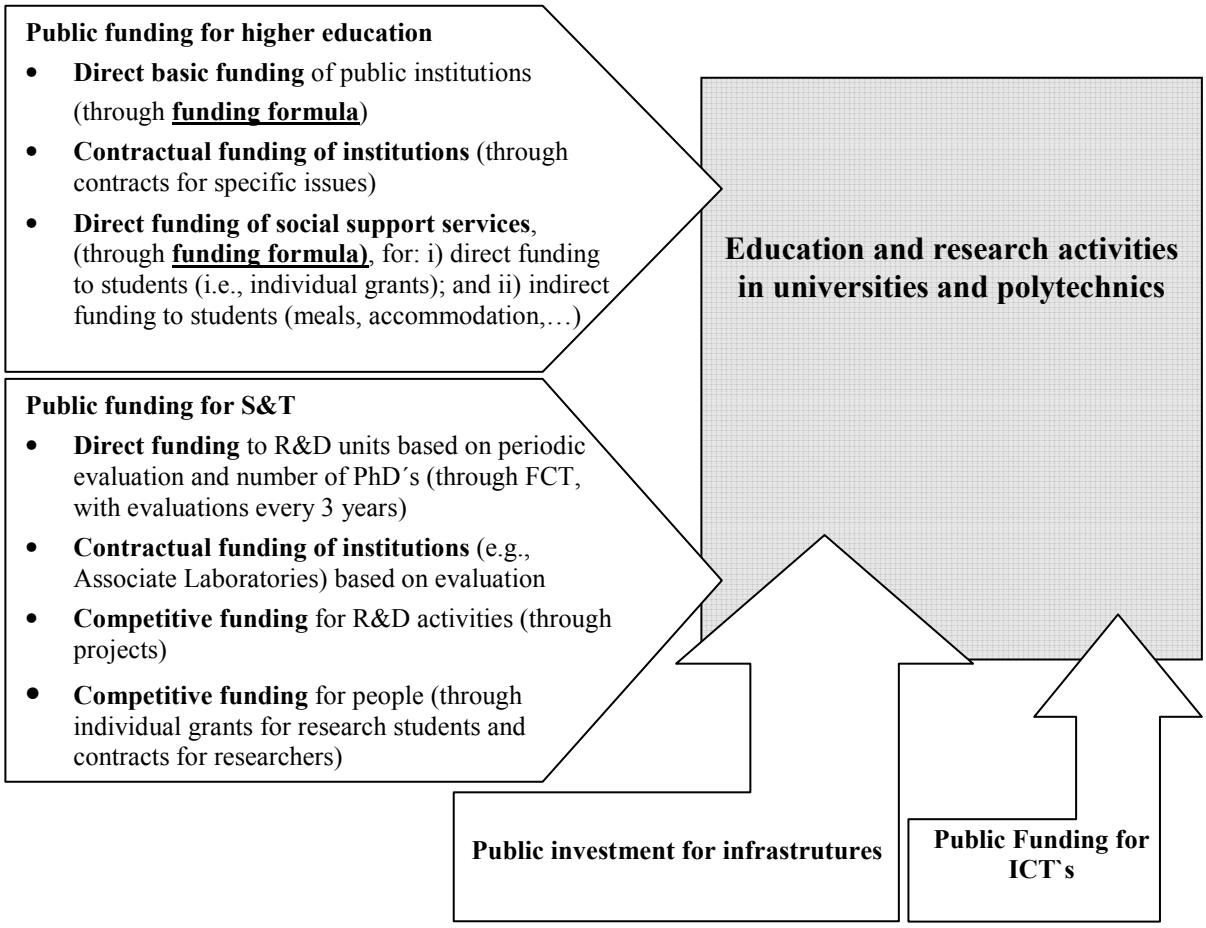


Figure 2.9 – Main public funding mechanisms for education and research in higher education institutions

71. More recently, the allocation rationale changed to become progressively performance-based. For the 2006 budget the Government has adopted a new formula that aims at allocating the available total budget by progressively introducing criteria related to quality and to performance. It should be noted that under the current context of excess capacity, higher education institutions compete for students, so that the number of students represent some level of performance, at least in terms of the attraction capacity for each course/institution. The new formula is based on the overall number of students, but includes the following quality factors:

- Qualification of teaching staff, as measured by the fraction of PhDs in the total number of teachers of each institution
- Graduation rate, as measured based on two indicators:
    - the number of graduates in terms of total enrolments in initial training;
    - the number of master and PhD degrees awarded, in terms of teachers holding a PhD.

72. In addition, the formula includes the following two institutional factors to answer to specific characteristics of each individual institution and training area:
    - Average personal cost for each institution, to account for the specific characteristics of the teaching and non-teaching staff of each institution.
    - Student/teacher ratio for each scientific area.
73. In addition, the formula contains cohesion factors (maximum and minimum limits to the budget variation relative to the previous year) to ensure that no institution will be faced with excessive budget cuts, although it may attenuate the effects of the quality parameters.

Table 2.21 – Criteria used in the Funding Formula developed for 2006

Terms in the new funding formula	Description
Overall number of students	Number of students for all the courses approved for public funding
Cost factor to allow considering specific institutional characteristics, as well as to differentiate areas of study	Staff average costs (indirect measure of qualification) Teacher/student ratios Teacher/non academic staff ratios Funding depends on reference costs calculated using the same criteria for every institution, using a predefined relationship between other current expenses and personnel costs (15/85)
Quality indicators	Level of the academic staff qualification (fraction of the academic staff holding PhDs) Graduation efficiency rate Post-graduation efficiency rates (masters and PhDs awarded)

74. The formula to distribute public basic funding for higher education institutions since 2006 is as follows:

$$OTj = \sum_{i} \left[Iij * Fij * Ej * Qj \right] * D$$

Where

OTj = Public basic funding level for higher education institution j

Iij = Student enrolments estimate in study area i of institution j

Fij = Cost factor for study area i in institution j

Ej = Graduation eficiency for initial training students in institution j

Ej = Scientific eficiency for advanced training students in institution j

Qj = Faculty members qualification level in institution j

D = Theoretical national minimum funding level constant

75. Table 2.22 quantifies the final application of the formula and the level of funding for each institution in 2006, which is obtained after applying the inter-institutional cohesion factor that limits the annual funding level variation to the interval [-2%; + 5%]. It shows that the overall level of basic funding per student (social support to be added) is about 4.022 € for initial graduate programmes, with values varying between 4.403 € for Universities and 3383 € for polytechnics.

76. Figure 2.10 quantifies the evolution of the total basic funding distributed among public universities and polytechnics, as well as the level of the increase in the basic funding per student achieved during recent years.

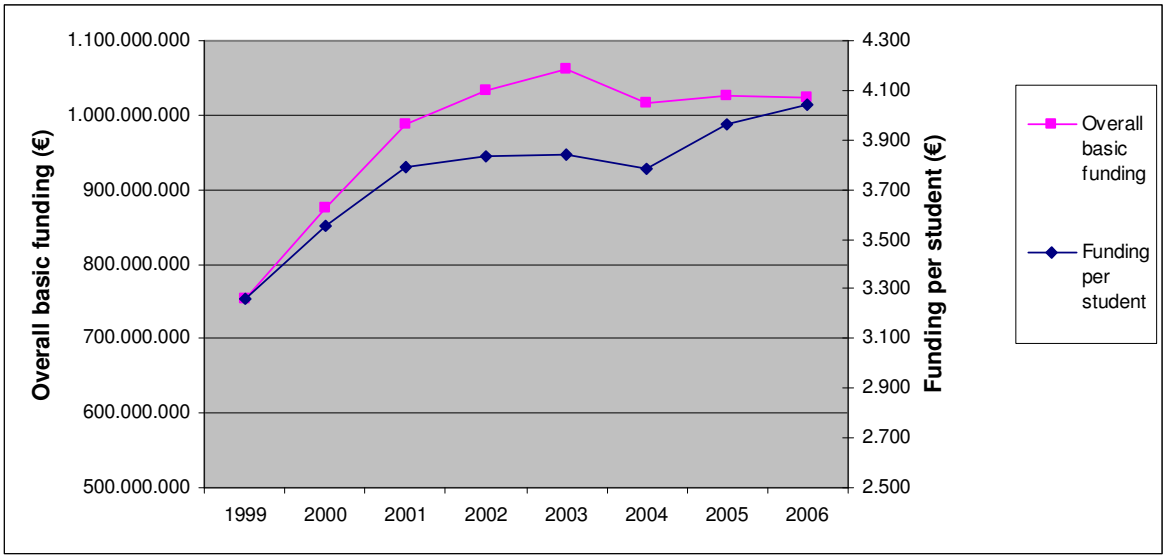


Figure 2.10. Overall basic public funding and basic funding per student distributed through funding formula to public institutions (initial training)

Source: GEFCES and OCES

77. Post-graduate programmes have been funded above the average level for initial training, with funding per student achieving 4883 € and, therefore, about 20% higher than typical values for graduate programmes. In this respect, it should be noted that (in contrast with graduate programmes) public universities have been allowed to ask for additional tuition fees for post-graduate education, without any limitation, as discussed below. This has been made clear through the recently established legal framework that has introduced the Bologna Process in Portugal (i.e., Decree-Law 74/06, from the 24th March 2006).

Table 2.22 – Public basic funding for higher education public institutions as determined through a funding formula for 2006 (excludes social support and buildings)

Institution	Initial Training Programmes			Advanced Programmes (Post-graduate)			Total Funding (€)
	Funding (€)	Students ('Licenciatura' and 'Bacharelato')	Funding per Student (€)	Funding (€)	Students[1] ('Mestrado' and 'Pós-Licenciatura')	Funding per Student (€)	
U.ALGARVE	32.394.085	8.380	3.866	2.111.597	446	4.735	34.505.682
U.AVEIRO	40.676.369	10.288	3.954	3.400.479	703	4.837	44.076.848
U.B.I.	20.346.689	5.096	3.993	455.877	113	4.034	20.802.566
U.COIMBRA	79.029.579	17.389	4.545	5.031.024	948	5.307	84.060.603
U. EVORA	29.104.132	7.033	4.138	2.610.929	620	4.211	31.715.061
U.LISBOA	78.522.377	16.791	4.676	8.608.979	1.774	4.853	87.131.356
U.MINHO	56.614.073	13.796	4.104	4.337.137	896	4.841	60.951.210
U.N.L.	53.661.107	12.338	4.349	5.568.487	1.201	4.637	59.229.594
U.T.L.	87.657.487	18.493	4.740	11.652.698	2.117	5.504	99.310.185
U.PORTO	108.064.395	21.839	4.948	13.227.730	2.356	5.614	121.292.125
U.T.A.D.	28.270.929	6.322	4.472	876.537	171	5.126	29.147.466
I.S.C.T.E.	14.212.147	5.109	2.782	1.407.269	408	3.449	15.619.416
U.AÇORES	13.830.580	2.731	5.064	916.449	176	5.207	14.747.029
U.MADEIRA	9.736.517	2.484	3.920	604.076	139	4.346	10.340.593
TOTAL UNIVERSITIES	**651.963.745**	**148.089**	**4.403**	**60.965.989**	**12.068**	**5.052**	**712.929.734**
IP BEJA	11.872.337	2.965	4.004				11.872.337
IP BRAGANÇA	17.427.958	5.098	3.419				17.427.958
IP C.BRANCO	16.128.549	4.298	3.753	138.471	25	5.539	16.267.020
IP CAV E AVE	2.804.546	1.465	1.914				2.804.546
IP COIMBRA	28.722.800	8.846	3.247				28.722.800
IP GUARDA	11.885.396	3.212	3.700				11.885.396
IP LEIRIA	22.784.204	8.847	2.575				22.784.204
IP LISBOA	46.864.246	13.482	3.476				46.864.246
IP PORTALEGR.	9.262.527	2.962	3.127				9.262.527
IP PORTO	46.267.794	14.907	3.104				46.267.794
IP SANTAREM	12.812.994	3.517	3.643				12.812.994
IP TOMAR	9.320.814	3.101	3.006				9.320.814
IP SETUBAL	18.509.090	5.506	3.362				18.509.090
IP V.CASTELO	10.552.540	2.852	3.700				10.552.540
IP VISEU	18.271.489	5.770	3.167	310.880	60	5.181	18.582.369
ESUP HOT. TUR. ESTORIL	2.482.334	1.072	2.316				2.482.334
ESUP ENF BISS. BARRETO	3.931.022	714	5.506				3.931.022
ESUP ENF DR. ÂNG FONSECA	4.544.372	714	6.365				4.544.372
ESUP ENF ARTUR RAVARA	1.876.764	288	6.517				1.876.764
ESUP ENF Mª Fª RESENDE	2.329.869	290	8.034				2.329.869
ESUP ENF FRANC. GENTIL	1.874.588	238	7.876				1.874.588
ESUP ENF CAL GULB. LISBOA	2.927.951	384	7.625				2.927.951
ESUP ENF CIDADE PORTO	1.633.603	181	9.025				1.633.603
ESUP ENF SÃO JOÃO	2.588.813	522	4.959	158.667	29	5.471	2.747.480
ESUP ENF D. ANA GUEDES	1.832.684	265	6.916				1.832.684
TOTAL POLYTECHNICS	**309.505.021**	**91.496**	**3.383**	**612.281**	**114**	**5.371**	**310.117.302**
TOTAL	**963.559.068**	**239.585**	**4.022**	**59.487.968**	**12.182**	**4.883**	**1.023.047.036**

78. Contractual funding of institutions has been established under the current funding law of higher education through contracts for specific issues. It represents public funding above the basic funding for higher education (as determined through a funding formula) and the contracts established in recent past are quantified in Tables 2.23 and 2.24, respectively for specific "contract-programmes" and for new installations through "development contracts".

Table 2.23. Overall contractual funding with institutions of higher education in recent as established through "Contract-Programmes" funded by State Budget

(Euros)

Public Higher Education System	2004	2005	2006	2007	Total
Universities*	5.076.985	6.383.664	6.442.617	7.448.334	25.351.600
Polytechnics	4062538	3027901	2584499	1196062	10.871.000
Total	**9.139.523**	**9.411.565**	**9.027.116**	**8.644.396**	**36.222.600**

* Includes one contract with the Portuguese Catholic University (Private)

Table 2.24. Overall contractual funding with institutions of higher education as established through "Development Contracts", funded by State Budget and FEDER (only partly executed, as by April 2006)

Higher Education Institutions	Period	Funding (€)	
		PIDDAC+EU	Public Budget
Universidade do Minho	2000-03	20.674.000	
Universidade da Beira Interior	started 2000	20.674.000	
Universidade de Lisboa	2002-06	21.024.000	289.300
Universidade de Nova de Lisboa	2002-06	17.870.000	239.423
Universidade de Coimbra	2002-06	33.638.000	224.459
Universidade do Porto	2002-06	37.842.000	319.230
Universidade Técnica de Lisboa - IST	2005-10	14.000.000	
Instituto Politécnico de Beja	2005-10	12.289.305	
Universidade Politécnico de Castelo Branco	2004-10	16.487.034	

79. Direct funding of social support services as been defined until 2005 through historical records, through the direct funding of public institutions (Public universities and polytechnics) and of students in private institutions. It accounts for: i) direct funding to students (i.e., social support of individual grants); and ii) indirect funding to students (i.e., meals, accommodation, sports, healthcare), as quantifies in Table 2.2.5.

Table 2.25. Direct funding of social support services, 2000-2006 (Unit: €)

Higher Education System	2000	2001	2002	2003	2004	2005	2006
Funding to Public Institutions	94.475.744	97.536.477	102.963.308	102.963.308	117.824.068	132.728.745	127.710.100
Funding to Private Institutions	25.830.055	27.433.884	29.429.076	27.430.059	27.000.000	27.000.000	27.000.000
Total (1+2)	**120.305.799**	**124.970.361**	**132.392.384**	**130.393.367**	**144.824.068**	**159.728.745**	**154.710.100**

NOTE: Does not includes other sources of private income and public investments for installations and equipments.
Source: DGES

80. Since the definition of the annual budget for 2006, the direct funding of social support services has been defined through a funding formula, which is based on two calculation elements:
    - the service level of each support service, measured trough the number and average cost of scholarships, meals and occupied places in student residences registered in the previous year activity;
    - the efficiency of each support service, in terms of direct support grants given to students as a percentage of global service expenditure.
81. The social service budget (Oxi) for each institution, as presented in Table 2.26 was determined as a percentage of the total available budget (OT):

$$O_{xi} = [O_{xi-1}/\Sigma_t\, O_{xi-1}] * OT$$

This percentage was given by the social service previous year budget (weighted by the service eficency) compared to the overall budget in the same year:

$$O_{xi-1} = (O_{1xi-1} + O_{2xi-1} + O_{3xi-1} + O_{4xi-1} + O_{5xi-1}) * Ej$$

where

O_{xi-1} = Funding level for social service in the previous year
O_{1xi-1} = Amount expended in scholarships
O_{2xi-1} = Amount expended in social meals (number and average cost of meals served)
O_{3xi-1} = Amount related to the student residence vacancies ocupation level
O_{4xi-1} = Amount for sports, cultural activities and health services
O_{5xi-1} = Amount expended in functioning costs (service structure costs)
Ej = Service efficiency measured as direct support grants given to students as a percentage of global service expenditure

82. Analysis of Table 2.26 shows that direct funding of social support services accounts for 455 € per student, in overall terms, representing about 9% of the basic funding per student. It should be noted that the survey work developed within the Eurostudent 2005 initiative has clearly confirmed that although polytechnics do consider students with comparatively higher financial needs, their social support system have been funded at lower levels than those of universities. Table 2.26 quantifies these differences and shows that, in average terms, direct funding of social support

services accounts for 485 € per university student, while it accounts only for 401 € per polytechnic student. These discrepancies have justified the new funding methodology and the related formula introduced in 2006, which will help attenuating the funding difference among social support systems in university and polytechnic sub-systems.

Table 2.26 – Public funding of social support services of public higher education institutions in 2006, as determined through funding formula (Unit: €)

Institutions	2005	2006		
	Final Funding (€)	Direct aplication of formula (€)	Final funding after aplication of institutional cohesion factor (€)	Funding per overall number of students (€)
UNIV. AÇORES	2.361.250	1.663.483	2.314.025	837
UNIV. ALGARVE	2.935.936	2.274.402	2.877.217	344
UNIV. AVEIRO	4.707.008	4.468.348	4.612.868	419
UNIV. B. INTERIOR	3.463.497	3.801.414	3.546.346	684
UNIV. COIMBRA	12.313.934	8.298.823	12.067.655	657
UNIV. ÉVORA	3.027.644	3.065.120	3.065.120	395
UNIV. LISBOA	8.400.748	6.209.916	8.232.733	438
UNIV. MADEIRA	1.785.354	1.871.989	1.828.061	696
UNIV. MINHO	8.638.472	10.213.309	8.845.109	613
UNIV. NOVA LISBOA	3.884.844	3.134.582	3.807.147	284
UNIV. PORTO	10.043.897	7.330.043	9.843.019	407
UNIV. T.LISBOA	9.356.004	7.602.403	9.168.884	446
U.T.M.A. DOURO	4.451.314	3.889.828	4.362.288	713
TOTAL UNIVERSITIES	75.369.902	63.823.660	**74.570.472**	**485**
IP BEJA	1.547.402	2.135.174	1.584.417	538
IP BRAGANÇA	2.908.698	4.175.433	2.978.276	592
IP C. BRANCO	2.241.453	3.478.110	2.295.070	529
IP COIMBRA	3.097.601	4.035.034	3.171.697	367
IP GUARDA	1.617.899	2.305.985	1.656.600	517
IP LEIRIA	3.278.990	4.809.247	3.357.425	395
IP LISBOA	2.959.266	3.625.684	3.030.053	222
IP PORTALEGRE	1.737.722	2.187.565	1.779.289	541
IP PORTO	2.607.125	3.221.653	2.669.489	183
IP SANTARÉM	1.904.952	2.288.344	1.950.520	549
IP SETÚBAL	2.493.636	3.570.610	2.553.285	438
IP TOMAR	1.989.620	2.505.998	2.037.213	645
IP V. CASTELO	1.570.164	2.210.209	1.607.723	555
IP VISEU	3.465.670	4.417.395	3.548.571	622
TOTAL POLYTÉCHNICS	**33.420.198**	**44.966.440**	**34.219.628**	**401**
TOTAL	**108.790.100**	**108.790.100**	**108.790.100**	**455**

Source: DGESUP

83. Table 2.27 quantifies the type of expensed supported through the overall budget devoted to social support services and shows that direct student support through scholarships accounts only

for about 53% of the overall budget. Again, the funding methodology adopted in 2006 aims to increase that value by beneficiating those services that maximize the direct support to students.

Table 2.27. Allocation of the state budget for social support services in 2006

Type of Expenses	Funding (€)	% / Total
1. Current Expenses	108.686.100	85,1%
(a) Personnel	*33.800.172*	*26,5%*
(a) Student Grants	*67.788.505*	*53,1%*
(b) Other Expenses	*7.097.423*	*5,6%*
2. Capital Expenses	104.000	0,1%
3. Nursing and Health Technologies Schools	3.280.681	2,6%
4.Common Endowments	15.639.319	12,2%
Total Funding to Public Institutions (1+2+3+4)	**127.710.100**	100,0%

Public funding for science and technology, S&T, in higher education

84. Tables 2.28 and 2.29 provide a general picture of the funding level for science and technology in Portugal when compared internationally. Gross expenditure in R&D has increased steadily since 1995 from 0.57% of GDP to 0.85% of GDP in 2001, but decreased since then to 0.78% of GDP in 2003.

Table 2.28 – Total expenditure in R&D, 1982-2003

Year	Current prices	Constant prices[1]	t.m.c.a.[2]	PPCC[3]	GERD/GDP
	1 000 €	1 000 €	%	(Millions US$)	%
1982	32 627.4	196 745.5	-	185.3	0.30
1984	56 402.1	218 927.1	5.5	222.4	0.34
1986	99 099.2	262 331.1	9.5	280.8	0.38
1988	149 194.4	322 691.9	10.9	367.1	0.41
1990	259 535.5	448 933.2	17.9	550.6	0.51
1992	401 022.5	565 400.6	12.2	734.2	0.61
1995	460 037.1	544 404.2	-1.3	753.5	0.57
1997	576 882.9	638 583.2	8.3	907.6	0.62
1999	814 746.7	842 966.2	14.9	1 255.1	0.75
2001	1 038 431.7	995 909.8	8.7	1 578.4	0.85
2003	1 019 581.0	911 467.1	-4.3	1 527.3	0.78

Notes: 1 GDP Implicit deflecters (2000=1), Main Science and Technology Indicators, OECD, 2005(1) - Database; 2 Average yearly growth rate at constant prices; 3 PPPs at constant prices, OECD (ibid); 4 GDP values published by OECD (*ibid*).

85. Government expenditures accounts for more than 60% of overall expenditure in R&D in Portugal, while it is below 35% for the average European figure. On the other hand, private expenditure in R&D in the European Union accounts for almost 55% of the overall expenditure, whereas it is only 32% in Portugal.

Table 2.29 – Gross domestic expenditure on R&D (GERD) by source of funds (%)

		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Government	EU15			36.8[s]	35.9[s]	35.5[s]	34.1[s]	33.8[s]	33.7[s]	33.7[s]	34.7[s]
	Portugal	59.4[e]	65.3	66.9[e]	68.2	69.1[e]	69.7	64.8[e]	61	60.5[e]	60.1
Industry	EU15			53.4[s]	53.6[s]	54.2[s]	55.5[s]	55.5[s]	55.6[s]	55.3[s]	54.6[s]
	Portugal	20.2[e]	19.5	20.5[e]	21.2	21.3	21.3	27.1	31.5	31.6[e]	31.7
Abroad	EU15			7.7[s]	8.2[s]	8.2[s]	8.2[s]	8.4[s]	8.5[s]	8.7[s]	8.5[s]
	Portugal	15.0[e]	11.9[b]	8.7[e]	6.1[b]	5.7	5.3	5.2	5.1	5[e]	5

s – EUROSRAT estimate; e – Estimated value; b – Break in series; Source: EUROSTAT, 2005

86. Table 2.30 presents the evolution of total expenditure in R&D at constant and current prices and shows that higher education institutions represent the largest share of the expenditure in R&D. Since most non-profit institutions are also associated to universities, analysis shows that higher education represents almost 50% of total expenditure in R&D.

Table 2.30 –Expenditure in R&D for each sector, constant prices[1] (1990-2003)

Sector	1990		1995		1999		2003	
	1 000 €	%	1 000 €	%	1 000 €	%	1 000 €	%
Industry	117 216	26.1	113 875	20.9	191 197	22.7	302 193	33.2
Government*	114 236	25.4	147 111	27.0	235 557	27.9	153 802	16.9
Higher Education	161 757	36.0	201 683	37.0	325 252	38.6	350 252	38.4
Private Non-Profit institutions**	55 723	12.4	81 733	15.0	90 958	10.8	105 219	11.5
Total	448 933	100.0	544 404	100.0	842 966	100.0	911 467	100.0

[1] GDP Implicit deflectors (2000=1), Main Science and Technology Indicators, OECD, 2005(1) – Database
*Excluding higher education. **Many associated to universities. Sources: OCES, Inquérito ao Potencial Científico e Tecnológico Nacional; OECD, Main Science and Technology Indicators, 2005(1) – Database

87. Two main basic public funding categories for S&T have been implemented in Portugal since 1996, namely:

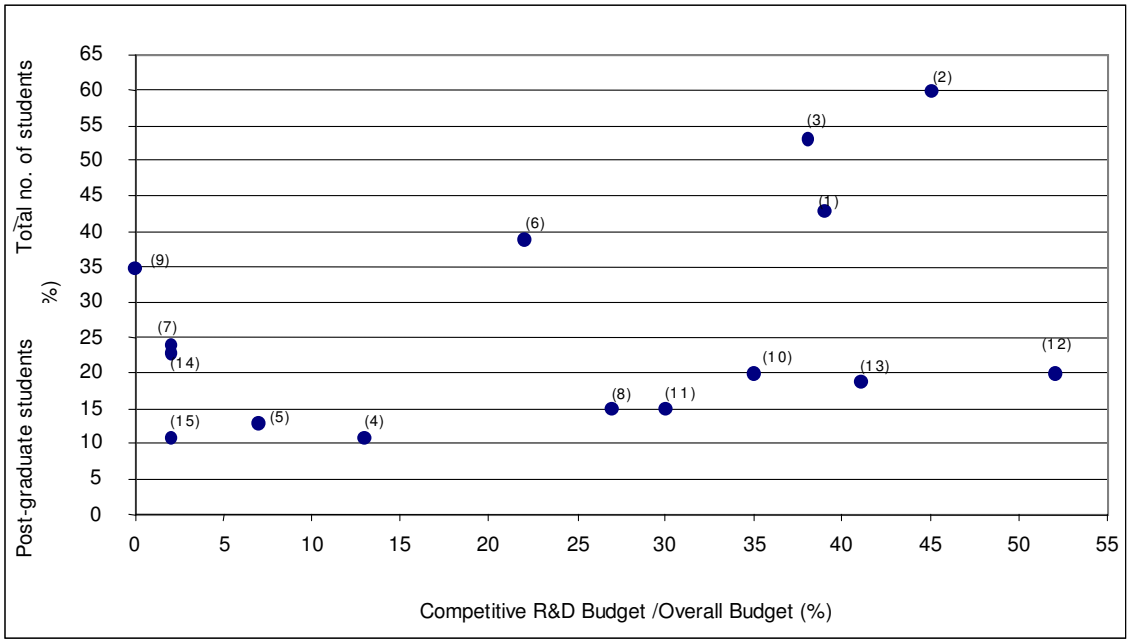
- Core funding, which corresponds to a specific allocation to R&D Centers and S&T institutions (most of them at public universities) by the Portuguese Science and Technology Foundation, FCT, based on periodic evaluations (every 3 years), including two components:
    a. Basic funding in terms of number of researchers and level of evaluation;
    b. Programmatic funding, for specific actions to be defined by evaluators.
- Competitive funding, which comprises other funds, including:
    c. Individual scholarships and advanced training of human resources;
    d. Research and Development Projects;
    e. Prizes;
    f. Other funds, including funding and cooperation models.

88. Following the analysis reported through the international evaluations of S&T implemented since 1996[8], the fundamental question to be analyzed in the context of S&T funding in Portugal is the structuring and form that these two funding types should abide in order to consolidate the autonomy of scientific institutions, and their sustainable development regardless of external alterations to the development of science itself. In particular, while public-based funding (core funding) is only dependent on the scientific evaluation of activities carried out, bearing in mind the size of R&D units, additional funding is attributed on the basis of competitive grounds, to be carried out through public tender calls.
89. The international evaluation reports have also explicitly acknowledge that the tentative adoption of the "research university" model by most public universities depends, above all, on the integration of teaching and research activities. This process is known to have achieved an international scale through the enhancement of post-graduate activities, associated with a gradual process of institutional diversity. However, the number of post-graduate students in proportion to the overall number of students in the most research intensive schools in Portugal is below 20%, whereas this figure is above 40% for most European and American "research universities", achieving a maximum of 60% at the Massachusetts Institute of Technology, as Figure 2.11 shows. In fact, the link between research and education has been explicitly recognised in the different international evaluations carried out by FCT as a priority for scientific development.
90. The results of Figure 2.11 show that the high number of post-graduate students is associated with highly competitive based funding schemes devoted to research activities, showing that these students are important to form essential critical masses for the accomplishment of research activities in a framework of competitive R&D funding.
91. Figure 2.12 compares the fund resources allocated to sample Portuguese, European and American universities, quantifying to a certain extent the under funding level of S&T activities, which has thwarted research activities in Portugal. In comparison with well considered universities

[8] Heitor, M. V. (2000). Evaluation of Research Units, 1999/2000—Final Report. Lisbon: Observatory for Science and Technology, Portuguese Ministry of Science and Technology

worldwide (namely intensive research universities[9] and master colleges/universities[10], according to the Carnegie Classification), the analysis shows that the total budget of a typical Portuguese University (I.e., the Technical University of Lisbon, UTL) is about 20% of the overall budget of the extensive research universities[11] with a smaller budget, such as Georgia Institute of Technology and University of Maryland Baltimore. If we consider only European universities, it can be concluded that the UTL overall budget is three times smaller than that of the University of Karlsruhe (German university with the smallest budget) and half the overall budget of Trinity College, Ireland.

Figure 2.11 – Comparison between Portuguese, European and American universities regarding the competitive funding weight and the relative fraction of post-graduate students



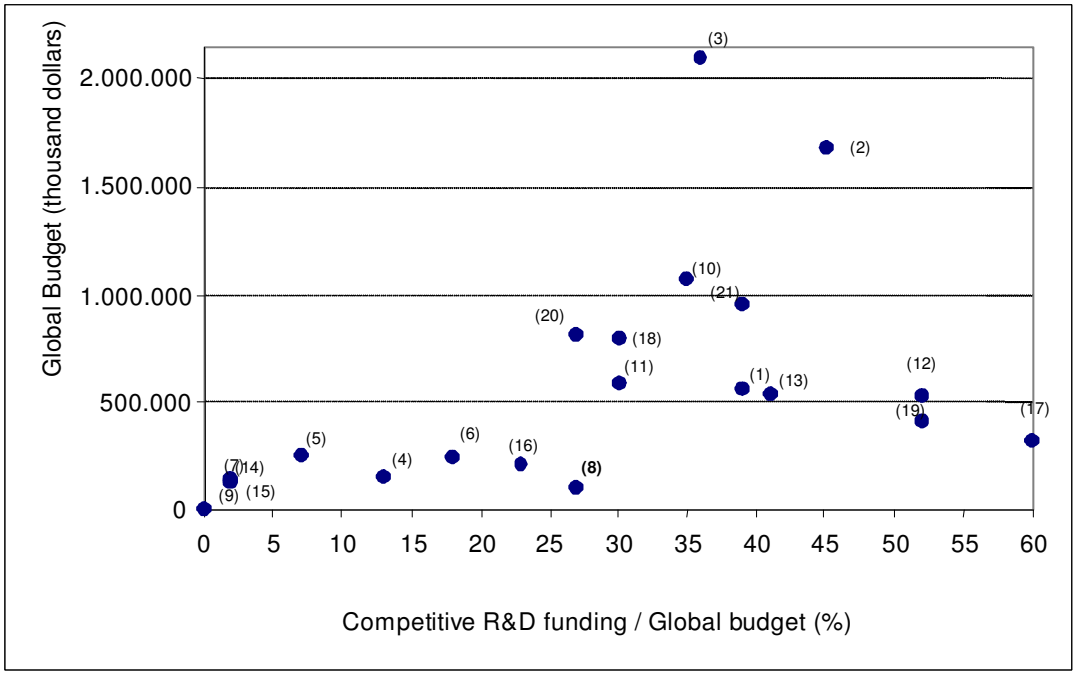
Source: UTL (2005), "Knowledge production and diffusion at the Universidade Tecnica de Lisboa 1995/96-2002/03", UTL.
Note 1: (1) Carnegie Mellon University; (2) MIT; (3) Stanford; (4) Michigan Tech University; (5) Illinois State University; (6) University of Dayton; (7) Central Connecticut State University; **(8) Technical University of Lisbon**; (9) Cumberland University; (10) University of Arizona; (11) Colorado State University; (12) Georgia Institute Technology; (13) University of Maryland Baltimore; (14) Portland State University; (15) Arkansas State University.
Note 2: 2003 data: MIT, Michigan Tech University, Illinois State Univ, Dayton Univ; 2002 data: all other universities; According to Carnegie Classification, in this figure, 11 research universities are presented and 3 master universities (American universities)
Note 3: Information from the Technical University of Lisbon are only related to the Instituto Superior Técnico
Sources: Annual reports, requests for information to universities

9 These institutions offer a wide variety of undergraduate programmes, and give emphasis to post-graduate education, through doctoral programmes. In general, at least ten PhD diplomas are awarded in three or more courses, or a total of 20 PhD awards every year.

10 These institutions offer a wide variety of undergraduate programmes, and give emphasis to post-graduate education, through Master's programmes. In general, at least forty Master's diplomas are awarded every year, in three or more courses.

11 These institutions offer a wide variety of undergraduate programmes, and give emphasis to post-graduate education, through doctoral programmes. In general, at least fifty PhD diplomas are awarded every year in, at least, 15 courses.

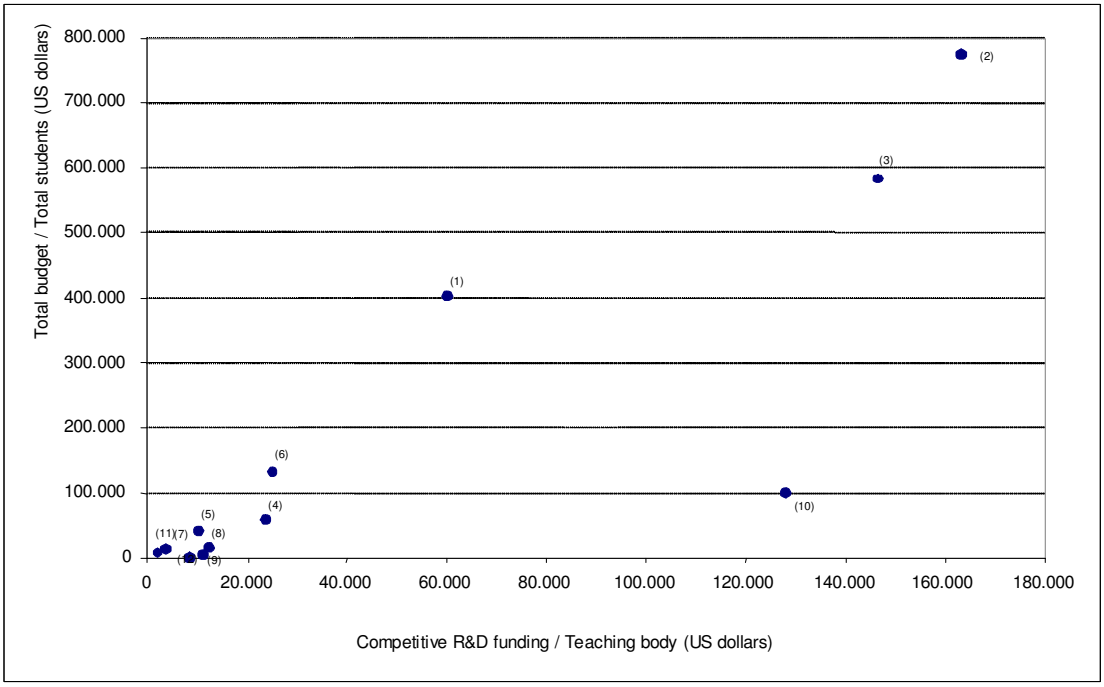
Figure 2.12 – Comparison between the level of funding in Portuguese, European and American universities in terms of volume of the overall budget of universities and the funding weight allocated to R&D on a competitive basis



Source: UTL(2005), "Knowledge production and diffusion at the Universidade Tecnica de Lisboa 1995/96-2002/03", UTL.
Note 1: (1) Carnegie Mellon University; (2) MIT; (3) Stanford; (4) Michigan Tech University; (5) Illinois State University; (6) University of Dayton; (7) Central Connecticut State University; **(8) Technical University of Lisbon**; (9) Cumberland University; (10) University of Arizona; (11) Colorado State University; (12) Georgia Institute of Technology; (13) University of Maryland Baltimore; (14) Portland State University; (15) Arkansas State University; (16) Trinity College; (17) U Karlsruhe; (18) U Erlangen-Nürnberg; (19) TU Berlin; (20) U Frankfurt a.M.; (21) TH Aachen
Note 2: 2003 data: MIT, Michigan Tech University, Illinois State Univ, Dayton Univ; 2002 data: all other characteristics; According to Carnegie Classification, this figure shows 11 research universities and 3 master universities (American universities)
Note 3: In the absence of other information, the UTL data only refer to the Instituto Superior Técnico
Sources: Annual Reports, requests of information from universities

92. The funding differences identified have, naturally, an impact on teaching and research results, and are an element that distinguishes Portuguese universities on an international scale. In terms of teaching, because a larger funding effort allows students to be provided with more resources to support learning, more professors and support staff can be hired, and more infrastructures can be created and maintained in order to improve the quality of taught programmes. As for research, it allows professors, researchers, technicians and administrative staff to be recruited, and makes it possible to acquire and maintain laboratory and support research material, thus providing the institution with a larger capacity to capture and maintain post-graduate students. Thus, Figure 2.13 shows that in comparison with MIT of Boston and Carnegie Mellon of Pittsburgh, the competitive funding per professor in a typical Portuguese university is, respectively, about sixteen and six times smaller. In turn, the funding per student in Portuguese universities is at least ten times smaller than in those universities.

Figure 2.13 – Comparison of the degree of competitive funding per professor and funding per student between Portuguese and American universities

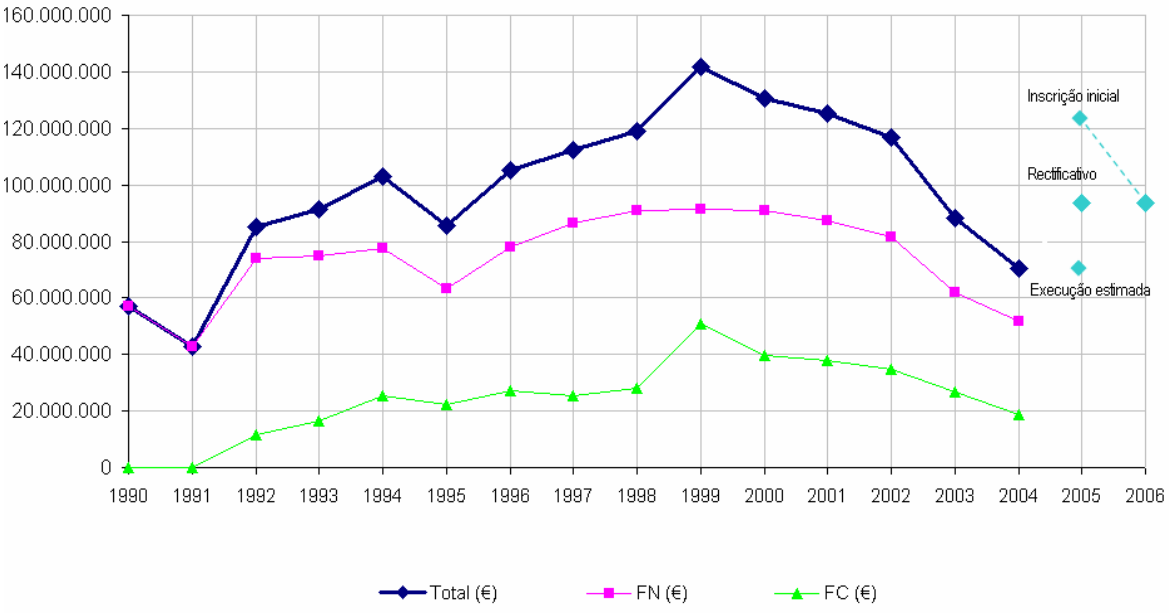


Source: UTL(2005), "Knowledge production and diffusion at the Universidade Tecnica de Lisboa 1995/96-2002/03", UTL.
Note 1: (1) Carnegie Mellon University; (2) MIT; (3) Stanford; (4) Michigan Tech University; (5) Illinois State Note 1: (1) Carnegie Mellon University; (2) MIT; (3) Stanford; (4) Michigan Tech University; (5) Illinois State University; (6) University of Dayton; (7) Central Connecticut State University; **(8) Technical University of Lisbon**; (9) Cumberland University; (10) University of Maryland Baltimore; (11) Portland State University; (12) Arkansas State University.
Note 2: 2003 data: MIT, Michigan Tech University, Illinois State Univ, Dayton Univ; 2002 data: all other universities; According to Carnegie Classification, this figure shows 11 research universities and 3 master universities (American universities)
Note 3: In the absence of other information, the UTL data refers only to the Instituto Superior Técnico

Public funding for infrastructures in higher education (i.e., buildings and equipment)

93. Public support for infrastructures in higher education has considered investments in new buildings and equipment over the last three decades, with major investment made since 1990, as quantified in Figure 2.14. The institutions have negotiated individually with the Government, through DGES, their own development plans, which have resulted in a considerable extension of physical infrastructures throughout the country. Table 2.31 shows that the overall public investment, over 15 years, per current student is about 4.647 €.

Figure 2.14 – Evolution of public investment for buildings and equipments in higher education (€) for 1990 - 2004 (i.e., PIDDAC; includes national funds, FN, and European structural funds, FE)



Source: GEFCES

Table 2.31 – Overall public investment in buildings and equipments in higher education (€) for 1990 - 2004

Sub-system	Contribution from the National State Budget (1990-2004) (1)	European Structural Funds (1990-2004) (2)	Total Funding 1990-2004 (3=1+2)	Total Funding (1990-2004) per current student (Dez. 2004)
Universities	689.632.925	207.699.698	897.332.623	5.162
Polytechnics	236.503.279	104.755.595	341.258.874	3.881
Other schools (Nursing schools)	26.508.140	0	26.508.140	2.525
Total	**952.644.344**	**312.455.293**	**1.265.099.637**	**4.647**

Source: GEFCES

Public funding for the diffusion of information and communication technologies, ICT´s

94. In addition to public funding for teaching and research activities, public support of higher education institutions have also considered the support for the diffusion of information and communication

technologies, including the promotion of "e-learning" and the establishment of "virtual campus", as quantifies in Table 2.32.

95. "Virtual campus" is an initiative aiming the creation and development of Services, Contents, Applications and Mobile Communications Networks (inside and outside University) for students and teachers of higher education, inciting and easing the production, access and share of Knowledge. Various integrated projects have been supported since 2003, including wireless connectivities (WIFI networks) and new contents (teaching and academic services) aiming at:
    - The creation of educational contexts enabling teachers and students to use means and tools of the information society in order to improve the quality and effectiveness of educational system;
    - The creation of didactical contents supported by multidisciplinary educational programs, including collaboration activities between agents of educational system.

Table 2.32. Overall public funding for the establishment of "virtual campus" in Portugal

Higher Education System	1st phase (2003-2006)		2nd phase (2004-2006)		Total	
	Nr. of projects	Funding (€)	Nr. of projects	Funding (€)	Nr. of projects	Funding (€)
Universities	10	9.874.098	4	3.656.181	14	13.530.278
Politechnics	10	5.413.939	7	3.469.174	17	8.883.113
Private Institutions	11	4.424.669	21	5.584.149	32	10.008.818
Total	**31**	**19.712.706**	**32**	**12.709.504**	**63**	**32.422.210**

Source: Management Office, POS_C

Evolution of the main categories of income

96. The evolution of the funds available for the public sub-system indicates different trends according to the source considered. During the expansion phase of the 90´s there was a clear increase in the funds transferred to public universities from the public budget. From 2001 to 2004 the increase in enrolments has slowed down and there was an average annual increase of the overall budget equal to 3.39% (Table 2.39) at current prices. One can also observe that public funds for investment have decreased on average 5.37% over the same period. Indeed, due to the large investments in infrastructures over the last decades and the decreasing number of candidates to higher education, it is possible that the existing physical capacity is under utilised.

Table 2.33 – The annual rate of change of the budget of public higher education institutions

Income – annual variation rate (%)					
	Public budget	Fees	Earned income	Investment	**Total**
2001-02	3.64	11.80	6.55	-0.30	**4.46**
2002-03	0.42	8.46	-0.28	1.17	**0.85**
2003-04	-1.77	44.59	18.26	-16.99	**4.87**
Average	**0.76**	**21.62**	**8.18**	**-5.37**	**3.39**

Source: GEFCES, MCTES, 2005

97. Table 2.33 also shows an increase in the revenues from tuition fees (average of 21.62% over the 2001-04 period), which was due to the increase in the absolute value of fees. Besides tuition fees, institutions have other sources of revenue (earned income), including the transfer of accumulated net balances and EU funds, which had an average increase of 8.18% over the same period.
98. Table 2.34 refers to the annual net balance of public higher education institutions, which presents an annual rate of change equal to 26.13%, despite the apparent economic difficulties claimed by some institutions. Occasionally, these net balances have been frozen by the Ministry of Finance, due to the EU restrictions to the national budget public deficit.

Table 2.34. The annual rate of change of the net balance of public higher education institutions

Net balance - annual variation rate (%)	
2001-2002	50.06
2002-2003	20.63
2003-2004	7.69
Average rate	26.13

Source: GEFCES, 2005

99. Table 2.35 presents the average composition of the income budget of public higher education institutions and quantifies the dominant role of public funding. Despite a slow steady decrease, the combined effect of public funds for current expenses and for investment still represented 64% in 2004 (while 71 % in 2001).

Table 2.35. The average relative weight of different types of income

	Percentage of total income				
	Public budget	Tuition Fees	Earned income	Investment	Total
2001	61.69	6.14	23.15	9.02	100.00
2002	61.20	6.58	23.61	8.61	100.00
2003	60.95	7.07	23.35	8.64	100.00
2004	57.09	9.75	26.32	6.84	100.00
Average	**60,23**	**7.39**	**24.11**	**8.28**	**100.00**

Source: GEFCES, 2005

100. The second major source of funding is earned income (without tuition fees) and it has also expanded throughout the last years. This funding source has acquired a more prominent role in recent years and often contributes with about a quarter of the funds to many institutions, though its importance has achieved considerably higher values in the most intensive research schools, namely in the area of engineering.
101. The third source of funding is provided by student fees, which presented a clear growth pattern in nominal terms in recent years, especially due to the changes in the funding law in 1997 and 2003.

Student fees have clearly increased their role as a funding source in recent years, though they still represent less than 10% of overall income and, therefore, still play a small role for public higher education institutions when compared with other systems in Europe and the USA.

102. Regarding student's fees, Law 37/2003 of 22 August determines that each institution decides upon the level of fees between a minimum and a maximum value, which are indexed to the minimum national salary (i.e., between €450 and €850 for academic year 2003-2004).

103. The results of the exercise for 2005-06 are presented in Tables 2.36 and 2.37, respectively for public universities and polytechnics, with current fees at most public universities at a value very close to the maximum limit of € 902. The Universities of Algarve and Évora have set lower fees. Some schools such as the University of Lisbon and of the New University of Lisbon set lower fees to meet agreements with the students' unions. The Universities of Madeira and Azores follow a non-aligned policy due to what is traditionally seen as the "costs of insularity". In general, fees in Polytechnics are lower than in Universities.

104. Public Universities are free to set the level of fees for postgraduate studies. In general those fees in 2005 averaged € 1,820, Table 2.38, the only exception being fees charged in areas of economics.

Table 2.36. Tuition fees for graduate programmes in public universities for 2006 (forecast)

Institution	Enrolments	Fees	Revenue
Univ. Algarve*	7 918	680	5 384 240
Univ. Aveiro*	10 305	900	9 274 500
UBI	5 072	850	4 311 200
Univ. Coimbra	17 406	901	15 682 806
Univ. Évora	7 147	799	5 710 453
Univ. Lisbon[1]	9 170	900	8 253 000
Fine Arts	1 220	800	976 000
Arts	4 106	530	2 176 180
Medicine	1 588	880	1 397 440
Psychology and Education	950	750	712 500
Univ. Minho	13 536	900	12 182 400
Univ. Nova Lisboa[2]	9 170	900	8 253 000
Social Sciences and Humanities	2 975	620	1 844 500
Technical University of Lisbon	18 442	900	16 597 657
Univ. Porto	21 920	900	19 728 000
UTAD	5 945	880	5 231 600
Univ. Azores	2 590	700	1 813 000
Univ. Madeira	2 487	747	1 857 789
ISCTE	5 124	902	4 621 848

* also includes the polytechnic schools integrated in the university

[1] Schools of Sciences, Law, Dental Medicine and Pharmacy [2] Schools of Medical Sciences, Economics, Science and Technology, Law, Statistics and Information Management. Source: GEFCES, MCTES, 2005.

Table 2.37. Tuition fees for graduate programmes in public plytechnics for 2006 (forecast)

Institution	Enrolments	Fees	Revenue
Beja[1]	2 639	487	1 285 193
School of Health	308	600	184 800
Bragança	5 027	487	2 448 149
Castelo Branco	4 309	487	2 098 483
Cávado e Ave	1 465	600	879 000
Coimbra[1]	2 529	550	1 390 950
Coimbra[2]	3 127	500	1 563 500
Coimbra[3]	2 981	487	1 451 747
Guarda	3 207	550	1 763 850
Leiria	8 508	700	5 955 600
Lisboa[4]	2 392	675	1 614 600
School of Journalism	1 089	900	980 100
School of Dance	121	825	99 825
School of Education	867	680	589 560
S. Accountancy & Administration	2 581	660	1 703 460
School of Engineering	6 581	705	4 639 605
Porto	14 608	800	11 686 400
Santarém	3 550	700	2 485 000
Portalegre[5]	2 768	487	1 348 016
School of Agriculture	255	600	153 000
School of Health	268	650	174 200
Tomar	3 159	680	2 148 120
Setúbal	5 835	850	4 959 750
Viana do Castelo	2 897	750	2 172 750
Viseu	5 649	700	3 954 300
Nursing schools			
Coimbra	1 448	487	705 176
Lisbon	1 177	903	1 062 831
Porto	962	900	865 800

[1] Agriculture and Education [2] Accountancy & Administration and Health

[3] Engineering and Technology and Management [4] Theatre and Cinema, Music and Health

[5] Education and Technology and Management

Source: GEFCES, MCTES, 2005

Table 2.38. Sample survey of tuition fees for master degree programmes in public universities, 2005

University	Field of study	Tuition Fees (Euros)			Students enrolled
		1st Year	2nd Year	Annual average	
Technical University of Lisbon, UTL	Sciences & Engineering	2000	2000	2000	2030
	Economy	5025	0	2513	
ISCTE	Social Sciences & Management	4670	520	2595	621
Univ. Minho		1375	1375	1375	732
Univ. Lisboa	Law	3140	0	1570	1830
	Sciences	1000	1000	1000	
	Humanities	1500	1500	1500	
Univ. Porto	Engineering	1480	1480	1480	2358
	Economy	2960	325	1642	
Univ. Aveiro	Arts, Sciences & Engineering	2250	2250	2250	559
	Economy & Management	1875	1875	1875	
	Maths & Education	1875	1875	1875	
	Social Sciences	1500	1500	1500	
New University of Lisbon, UNL	Economy	15000	-	15000	1263
	Health Sciences	2500	2500	2500	
	Social Sciences	1250	1250	1250	
	Sciences & Engineering	1540	1540	1540	
Univ. Coimbra	Sciences & Engineering	1150	1075	1113	1335
UBI	Sciences & Engineering	1575	1575	1575	206
	Social Sciences	1325	1325	1325	
Univ. Açores		2020	2020	2020	87

Evolution of the main categories of expenditure

105. The basic funding transferred by the government to public higher education institutions is given as a lump sum, according to the formula described above. Although institutions are autonomous to decide upon the internal distribution of funding, the largest share goes to academic and non-academic staff salaries. Some institutions have replicated internally the criteria defined in the national formula, whereas others have made some adjustments. There are also some important differences in terms of the degree of financial autonomy enjoyed by schools/departments in each institution.

106. Table 2.39 presents relative weight of the different categories of expenditure and Table 2.40 presents their annual rate of change of the different categories of expenditure. It can be seen that while personnel expenditures are still increasing, all the other expenditure categories are decreasing, especially the investment expenditures.

Table 2.39. The relative weight of different types of expenditure (public institutions)

Percentage of total expenditure

	Personnel	Others	Current expenses	Investments	Net balance	Total
2001	54.67	28.42	83.09	6.52	10.39	100.00
2002	55.70	23.68	79.38	5.70	14.92	100.00
2003	56.39	21.53	77.91	4.24	17.85	100.00
2004	55.00	23.68	78.67	3.00	18.33	100.00
Average	**55.44**	**24.33**	**79.76**	**4.87**	**15.37**	**100.00**

Source: GEFCES, 2005

Table 2.40. The annual rate of change of the expenditure categories

Expenditure - annual variation rate (%)

	Personnel	Others	Investment	Total
2001-2002	6.41	-12.94	-8,74	4.46
2002-2003	2.10	-8.33	-25,02	0.85
2003-2004	2.29	15.34	-25,78	4.87
Average rate	**3.60**	**-1.98**	**-19,84**	**3.39**

Source: GEFCES, 2005

107. The increase in personnel expenditure is not so much due to a changing ratio between staff and students, but rather to the growing qualification of the teaching staff. Until recently most Portuguese higher education institutions had a high portion of their academic staff in categories below the Professor level (i.e., without a doctorate degree). A large portion of academic staff has completed Master and Doctorate degrees in recent years and this has often meant an automatic promotion in the academic hierarchy with consequences at the financial level. This is confirmed by the fact that the institutions with the highest fraction of salary expenditures are precisely those with the highest qualifications in the academic staff (i.e., the oldest institutions).

5. Institutional autonomy and development, relationships with government and the management of human resources

108. From the perspective of emerging higher education policies worldwide, the need to preserve institutional integrity of the higher education system, in a way to guarantee fostering institutional autonomy, has called for an increased attention of governments, institutions and society at large. In this context, higher education institutions are considered as knowledge infrastructures where research and teaching activities should be guaranteed under diversified actions and policies, especially at a time were knowledge creation is increasingly important and our societies are increasingly dominated by market-based economies. While this may seem like a platitude, the facts presented before in this part of the report show that in many countries, such as Portugal, the social standing of research in universities is still undervalued in comparison with education. Clearly, Portugal has significant quantitative shortcomings, but, at the same time, the country has been making good progress, in a catching-up dynamics that is well known. We refer to institutions in a broad sense and this includes the institutional framework for higher education relationships, namely with the state and with a broad social and economic fabric of actors. In particular, we refer to two main aspects typical of Portugal: (i) a state–centred higher education system, lacking the potential for self reforming and behaving in a reactive way to top-down measures, which are very often driven by short-term political cycles; and (ii) limited participation of social and economic actors and scarce industry-science relationships.
109. Regarding the system of tertiary education, it should be noted that different sub-systems have quite diversified degrees of autonomy, as a result of their own establishment through history. This is briefly described in this part of the report, namely for public universities, public polytechnics and the private sector.

Public universities

110. The public university system includes 14 public universities (including the Open University) and a non-integrated university school, ISCTE. The University of Coimbra, the oldest university, was founded in 1290. The University of Évora was founded in 1559 through the Jesuits, but it was closed down in February 1759 when the Marquis of Pombal expelled the Jesuits from Portugal. Coimbra remained the only Portuguese university until 1911 when the monarchy was overthrown. The new Republican regime established two new universities in 1911, the University of Lisbon and the University of Porto. In 1930 the Technical University was created in Lisbon by integration four already existing schools: Veterinary Medicine, Agronomy, Engineering (I.e., Instituto Superior Tecnico, IST) and the Institute for Economy and Management.
111. Forty years later, in 1973, the University of Aveiro, the University of Minho and the New University of Lisbon were established while a University Institute was created in Évora and two Polytechnic Institutes were created at Vila Real and Covilhã. In 1976 the University of Azores was created, and in 1979 the University of Algarve was established, while the Évora University Institute was transformed into a university. In 1986 the Polytechnic Institutes of Vila Real and Covilhã were transformed respectively into the University of Trás-os-Montes and Alto Douro (UTAD) and the

University of Beira Interior (UBI). In 1988 the University of Madeira was created, as well as the University Aberta – an Open University for long-distance education.

112. The autonomy of public universities is sanctioned by the Constitution and the University Autonomy Act (Law 108/88), which confers public universities a high degree of autonomy, including pedagogical, scientific, financial autonomy. In addition, all buildings have been transferred to the ownership of the institutions. Public universities receive public funds as a line budget hat can be altered by decision of the rector. Earned income (including tuition fees) and net balances are considered assets of the university that the institution can use at its own discretion.
113. Portuguese public universities are usually considered as State's *indirect administration*, as argued by specialists on administrative law (Amaral, D.F., 1999), although legal experts has argued in favour of considering public universities as *autonomous public administration* (e.g., Sousa, 1999).
114. Each University has the right to elaborate its statutes, provided it complies with the applicable legislation. The statutes must define the organic structure of the University, the norms for its internal organisation on the scientific, pedagogic, financial and administrative levels of activity, and the autonomies of its units.
115. Public services are established by Portuguese law, meaning that the number of civil servants is also determined by law, which restricts the number of staff that can be hired on a permanent basis. Increasing staff numbers requires authorization from the Ministry of Finances, which has been difficult to obtain, namely in periods of financial stringency.
116. For public higher education institutions, the academic, administrative and technical staff (full professor, associated professor, administrator, etc.) is also fixed by law. Although public universities have to keep constant the total number of staff, they may change its relative composition, while the total number of staff is reviewed every two years depending on student enrolments.
117. Article 7 of the University Autonomy Act grants public universities full pedagogic autonomy, meaning that:
    - In compliance with their pedagogic autonomy and in harmony with national policies of education, science and culture, universities shall have the right to create, suspend and cancel courses;
    - Universities are autonomous in matters of designing study programmes and subject contents, defining educational methods, selecting methods of evaluating knowledge and trying new pedagogical experiments;
    - Universities shall guarantee the plurality of doctrines and methods upholding the freedom in teaching and learning.
118. In practice, this means that public universities have almost complete freedom to start, suspend or cancel courses and they have used this capacity quite extensively. It is true that DGES must register new degrees, but registration only can be denied if the degrees are illegal (for instance because of duration or number of credits). As described before, the only possibility open to

Government to regulate the public university system is through funding rules or by controlling enrolments when defining the *numeri clausi*.

119. The governing bodies of the universities are strictly defined by law. They are the *University Assembly* (it approves the statutes and elects the Rector), the *Rector* (uninominal executive body), the *University Senate* (policy and legislative body) and the Administrative Council (for the current financial administration). The statutes may create other bodies that share functions from the Senate or the Administrative Council and under this provision some Universities have created Scientific or Academic Councils to coordinate the scientific-pedagogic policies of the University. Advisory Committees may also be foreseen in the statutes, both for the University and its constituent units.
120. The responsibilities of the collegiate bodies are defined by law. Their composition is defined in the statutes, under narrow limits for participation of *ex-officio* members and for the number of elected representatives from the professors, other academic staff, students and non-academic staff, parity between the numbers of elected academic staff and students and balance in the representation of the units regardless of their dimension.
121. The governance of university's units (Faculties, Schools, Institutes or, in some cases, Departments) include the *Assembly of Representatives*, the *Directive Council*, the *Pedagogic Council* and the *Scientific Council* (or a Pedagogical-Scientific Council). The law does not preclude the existence of a *Dean*, but the most frequent situation is having different Presidents for the several bodies (the unit is then represented by the President of the Directive Council), which may lead to conflict due to some overlap of competences.
122. The provisions on the composition of the governing bodies have rose several aspects of concern in recent years, such as:
    - The lack of external orientation and advice, but above all of accountability facing external bodies. The autonomy law does not allow for external participation in the University Assembly, which elects the Rector from within the full professors of the University, in the form of an internal process. External participation in the Administrative Council is also inexistent;
    - The limited role of pedagogical councils and the related passive participation of students, namely in educational/ pedagogical planning and supervision;
    - The large dimension of most of the collegiate bodies (Simão *et al.* 2002): the number of members of the University Assembly in the 14 Public Universities in 2002 varied between 64 and 331, while the number of members of University Senates ranged from 36 to 179.
    - The predominance of the collegiate approach in the university management leads to slow and cumbersome decision-making processes and a diffusion of personal responsibilities. Decision making tends to be corporative, lacking clarity and transparency, which does not contribute to the necessary institutional cohesion.
    - Leadership is not favoured and strategic planning is not a common tool for institutional development.

123. University Senates may have external participation. Up to 15% of its composition may be the external members, when it is foreseen in the statutes and they are nominated by the Rector, or by the Senate following a proposal from the Rector. The data available for 2002 (Simão et al., 2002: 422) shows that only half of the universities had external members in their Senates, ranging from 3% to 12%.
124. Most universities created "Advisory Committees" with participation of external members, but without decision capacity. In general such bodies meet seldom and have little influence in the strategies for institution building.

Public polytechnics

125. The idea of creating a polytechnic sector in Portugal can be traced back to the OECD´s Mediterranean Regional Project, MRP, of 1959. This project aimed at assessing future needs for skilled labour in five Mediterranean countries (Italy, Greece, Spain, Yugoslavia and Portugal) and had a lasting impact in terms of the political and social perception of education, with significant effects on the educational structure of the participating countries. These changes included the expansion of the higher education network by creating new university-level institutions, while a binary system was initiated through the establishment of polytechnic institutes and several colleges of teacher training (Parliament Act 5/73 of 25 July).
126. After 1974 the existing polytechnics were transformed into "University Institutes" under the allegation that they should not remain "second class" institutions. It was in this context that successive governments established contact with the World Bank and, from 1978 to 1984, about nineteen different missions visited Portugal. A final statement was based on two main principles:
    - A basic emphasis on an economic approach to higher education to improve efficiency by attaining objectives at the lowest possible cost, e.g. containing long term university degrees while promoting shorter technical degrees, shorter teacher training degrees, higher student/staff ratios, etc.
    - A perspective of a world division of labour that led defining country specific roles.
127. Although the final report welcomed the expansion of higher education[1], correcting the prior situation of unequal and limited access, the World Bank did not favour further expansion "… the enrolment represents 8% of the 18-22 age group and could be considered adequate. … In view of the rapidly increased university enrolments, which represent an uneconomical drain in the economy…[the Bank recommends a] gradual introduction of quantitative restraints" (World Bank, 1977 Progress report). At the same time, the World Bank urged the Portuguese authorities to restrain enrolment quotas so as to make "better use" and rationalise the supply of higher education and improve the management of the system, namely in terms of accountability, coordination, and efficiency. Future expansions should be planned taking into account manpower needs, and demographic and enrolment trends. As for student/staff ratios, the Bank considered

[1] Enrolments increased dramatically from about 57,000 in 1974-75 to 72,000 in 1975-76 (about 26%), corresponding to a change in participation rate from about 7.7% to 9.7%.

that they were too low: "…The student/teacher ratio of 6:1 was low… The average ratio set by Unesco, as a target for less developed countries is 15:1" (World Bank, 1977 Progress report).

128. Subsequently, the World Bank produced two "Staff Appraisal Reports", which provided insights about the negotiations between the Bank's Mission and the Portuguese government, and further confirmed the Bank's priorities[2]. In the first Report of Assessment (No. 1807-PO, 1978), the Bank insisted on three criteria: balancing the supply of higher education graduates with the economic needs of the country, developing a persistent and consistent policy towards vocational education, and upgrading teacher training programs. The Bank suggested that Portugal needed not only to train high level technicians but also middle level personnel (on an yearly basis: 1400 technicians with short cycle post-secondary education, 500 agricultural technicians and 6000 middle level managers). Subsequently, the government passed Decree-Law 397/77 of 17 September, which established a *numerus clausus* for every study programme and eliminated the threat to the new short vocational education programs – that without reducing the supply of engineering jobs, graduates of the technician training institutes would find employment too scarce.
129. The World Bank was critical of the erratic policies toward the existing technical institutes, and of the excessive enrolment in university engineering programs and the lax approach on managing vacancies quotas, and raised the issue of diseconomies of scale in the system, suggesting that there were too many institutions with small dimension. The government replied to the Bank's demands with Decree-Law 513-T/79[3], which established a network of polytechnic institutes, including Higher Schools of Education. The main objectives of Polytechnic education were: to provide education with an applied and technical emphasis and strong vocational orientation, for training intermediate level technicians for industries, service companies and educational units (first cycle of basic education).
130. Under the Decree-Law 513-T/79, the curricular organisation of Polytechnic higher education was based on initial training programmes of three years providing a 'bacharel' degree. Higher Schools of Education were an exception because they could also confer a 'licenciatura' degree after a four-year programme allowing students to become teachers in the second cycle of basic schooling.
131. Decree-Law 513-T/79 created Polytechnics in several major cities (Beja, Bragança, Castelo Branco, Coimbra, Faro, Lisbon, Porto, Santarém, Setúbal and Viseu), a School of Management and Accountancy in Aveiro, a School of Technology in Tomar and Teacher Training Schools in Guarda, Leiria, Portalegre, Viana do Castelo and Vila Real. The Polytechnic of Faro was later integrated into the Universidade of Algarve. One year later, Decree-Law 303/80 of 16 August created new Polytechnics in Portalegre, Leiria, Guarda and Viana do Castelo, integrating the former Colleges of Teacher Training.

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[2] These priorities were the improvement of technical and management capacity of the higher education system, and the promotion of technical and vocational post-secondary education for those that the system had been unable to retain or to prepare conveniently for the labour market.

[3] This Decree-Law was later ratified by the Parliament with some changes – Law 29/80 of 28 July.

132. Following the World Bank's recommendations, it has been assumed that a vocationally oriented segment was an important strategic objective to promote student enrolment into scientific and technological and economic/business programmes that would provide intermediate level of qualified human resources. Diversification and regionalisation of higher education was another political argument in favour of establishing the polytechnic network. It was assumed that this network should be able to ensure, for instance:
    a) Increased equity of access to higher education.
    b) An answer to increasing demographic pressures resulting from enlarging the duration of compulsory education.
    c) A stronger recruitment among vocational secondary education students.
    d) Regional preference mechanisms by establishing regional quotas in favour of students resident in the area of the institution.
133. By the end of the 1980s the supply of courses exhibited diversified designations, offering a well-defined professional profile corresponding to a narrow spectrum of specialised training. In many cases, these different designations covered an array of disciplinary and technological areas of knowledge that coincided with the initial training programmes of the new universities or of the schools of engineering and management/economics of the more traditional universities. In general, polytechnic Institutes have followed, at least partially, the philosophy of the new universities' curricular organisation, particularly in relation to curricular flexibility and a discourse addressed at closer connections with local communities.
134. Fifteen years later, Decree-Law 304/94 of 19 December created the Polytechnic of Cávado and Ave. The integration of the former schools of the Polytechnic of Santarém located in Tomar resulted in the creation of the Polytechnic of Tomar. In Aveiro the former School of Management and Accountancy was integrated into the University of Aveiro, that has also created other polytechnic schools: the Aveiro Health School, the Águeda School of Management and Technology, as well as an initiative at the post-upper secondary level (the school Aveiro-Norte).
135. The Comprehensive Law of the Educational System (Law 48/86) has helped consolidate the polytechnic network. Besides the declaration of intentions on the technical and cultural educational tasks allocated to this sub-system and the new mission of developing capacities of innovation and criticism, the law reasserts the polytechnics' vocation to train human resources for professional activities through theoretical and applied teaching based on the transmission of scientific knowledge.
136. The implementation of "Specialised Higher Education Courses" (i.e., CESES[4]) in polytechnics by the end of the 1980s was aimed to foster short vocational education, although they were never used to define a continuing education strategy promoting the distinctive profile of polytechnic education. In 1997 the CESES were eliminated and polytechnic degrees became two tier

[4] Entry to the CESES (18 months to 2 years) was open to holders of the 'bacharel' or 'licenciatura' degree. This leads to a diploma, DESE equivalent to a 'licenciatura' for all academic and professional purposes, entitling its holders to attend masters and to be admitted to a doctorate. After obtaining a 'bacharel' degree, students should gain work experience before returning to complete their studies. In practice, most students will chose to complete their programmes without any intermediate work experience.

degrees" (3years + 1 or 2 years), the first cycle conferring the traditional "bacharel" and the second being the degree of 'licenciatura', similar to that at universities.

137. The statutes of each of each polytechnic institute define its organisational structure, but the law defines the governing bodies. These are the *President* (uninominal executive body), the *General Council* (a policy making body) and the *Administrative Council* (for the current financial administration).
138. The participation of external representatives is compulsory for the election of the President and in the body of the General Council; it is not required in the preparation and approval of the statutes. The General Council should include external members, but their number may not exceed the number of Schools in the Polytechnic. The external representation is therefore low, averaging 13.2% for the 16 polytechnics.
139. The legal framework regulating the autonomy of public polytechnics is the *Polytechnic Autonomy Act* (Law 54/90). It establishes that the polytechnic institutes are public collective entities with statutory, administrative, financial and patrimonial autonomy. However, the Schools in the Polytechnics are juridical entities with scientific, pedagogic, administrative and financial autonomy. This is likely to generate conflicts and makes the coordination of the schools a more complex matter.
140. Polytechnics do not own their buildings, they cannot change the relative composition of the scales of their staffs and they do not have full pedagogic autonomy. Public polytechnics are not allowed to create, suspend and cancel study programmes, and they must submit these proposals to the approval of Government, through DGES. In addition, updating staff numbers is a lengthy and painful process, which explains that, contrary to public universities, the personnel hired under special contracts plays a quite significant role, representing over 50% of the total staff.
141. An electoral assembly with 20% of its members being representatives from local authorities and different economic activities elects the President. However, some polytechnics do not comply with this rule and on average the percentage of external members in the electoral assemblies was 15.5% in 2002 (Simão *et al.* 2002: 424-436). The President may be elected from among the qualified academic staff in the Polytechnic or in any other higher education institution, or from highly recognised personalities with a relevant professional experience, although this last possibility has never occurred.
142. Community participation tends to be higher in the Schools of the Polytechnics, although mostly at an advisory level. The Schools' governing bodies are the *Director* or the *Directive Council*, the *Scientific Council* and the *Pedagogic Council* (or the *Pedagogical-Scientific Council*), the *Advisory Council* and the *Administrative Council*. The external participation is very high in the Advisory Council (70,9% on average) and is also present, at a much lower level, in about half of the Scientific Councils (7,6% on average) (Simão *et al.* 2002: 119).

<u>The private sector</u>

143. Since 1979, with the publication of Law 9/79 of March 19 (the Basic Legal Framework for the Private and Cooperative Education), the possibility of creating private higher education institutions

was wide open, which allowed the official recognition of several institutions even before specific regulation had been issued. This only took place later in 1985, giving place to the creation and accreditation of several other institutions. One can accept though that the reasons behind the excessively fast development of the private sector in higher education were both pragmatic and ideological. On the one hand, private higher education could be seen as the possible solution to solve the increasing demand in higher education that could not be met by the public sector, especially in the years of severe economic stringency following the 1974 Revolution. On the other hand, there were agents that, since the approval of the new Constitution and particularly since the above mentioned Legal Framework for the Private and Cooperative Education, clearly argued in favour of the development of a private higher education sector.

144. The institutional development of the private sector has always been ambiguous. With the publication of the first statute for the private and cooperative higher education, in 1979, a legal framework was defined for the creation of private higher education institutions. However, at the same time, a close bureaucratic control has been kept over private institutions that were conferred less pedagogical autonomy than public universities. This has been continuously raised by the association of private institutions, APESP, which complains against scientific and pedagogic autonomy. These aspects were recognised by the World Bank that considered in its 1989 Report on the Portuguese higher education system that Portugal still lacked a policy on private HEI's. This situation led the private sector to flourish mainly in areas of greater demand on the short term and low instruction costs.

145. The development of private institutions was initially rather slow, probably due to the lack of legislation and/or tradition. It should be noted that the Statute for the private and cooperative higher education was published only in 1989, ten years after the setting of an institutional framework. Nevertheless, in January 1979, the Government authorised the first private university by granting the *Universidade Livre* a temporary permit to initiate operations. It was, in fact, learning from this establishment that, later on, new private universities were created. In1994 the *Universidade Internacional* was allowed to start operations and in 1986, after cancelling the licence to *Universidade Livre*, the Minister of Education authorized its replacement by recognising the *Universidade Autónoma Luís de Camões*, in Lisbon, *Universidade Lusíada*, also in Lisbon and *Universidade Portucalense* in Porto. These were the first private universities, even considering that a number of smaller private institutions were already accredited in the end of 1984, namely *Instituto Superior de Psicologia Aplicada*, *Instituto Superior de Gestão* and *Instituto Superior de Matemática Aplicada*, all located in Lisbon.

146. Enrolments in private institutions in 1982–83 (including the Catholic University, which was established in 1971) were only about 11% of total enrolments. The pace of implementation accelerated after the mid-1980s. In 1986, the Government recognised new private universities and polytechnic-type institutions, some resulting from upgrading already existing medium level institutions, which until then were not allowed to confer higher education degrees. The new institutions concentrated most of their supply in areas of low investment/low running costs, such

as languages and administration, management, journalism, training of secretaries and interpreters, and informatics.

147. Much of the initial development of the private sector, particularly from 1986-87 on, was due to the strong increase in demand, which could not be satisfied by the public sector and also to the 1989 decision of the Ministry of Education to lower the requirements for entering higher education. The private share of student enrolments jumped from 11% in 1982–83 to 21.6% in 1989–90, and then to 34.7% in 1996–97. From that year total enrolments started to consistently decrease.

148. The conditions for the creation and operation of private higher education are established in the *Private and Cooperative Higher Education Act* (Decree-Law 16/94). The *founders* may be collective private bodies set up specifically for this objective or foundations whose scope includes such a possibility. The founder must adopt the statutes of the higher education institution and present them for Governmental approval.

149. The founder has the responsibility for the administrative, economic and financial organisation and management, but the institutions must have pedagogic, scientific and cultural autonomy, dully specified in their statutes. Consequently, the law establishes that each private higher education institution must have at least the following governing bodies: a *Rector* (for university institutions) or a *President* (for polytechnic institutions); a *Director* or a *Directive Council*; a *Scientific Council*; a *Pedagogic Council*.

150. The key issue in the governance of private higher education institutions is the interface between the founder and the institution itself. The relationship between the founders and their higher education institutions is very heterogeneous, ranging from cases of ample scientific and pedagogic autonomy that fosters the independence of thought and of teaching, to examples of strong decisive intervention from the founder in the academic bodies of the institution.

151. There is no reference in the Private Higher Education Act to external participation in the academic governing bodies. The existence or presence of external personalities or entities, other than the ones associated in the founder entity, is left to the discretion of the institution.

Emerging aspects for concern: the institutional viewpoint

152. Institutions have raised several other concerns about lacking autonomy and below is a list of some additional restrictions to the full exercise of the autonomy within the limits prescribed by the Autonomy Acts, namely:

- Although the autonomy prerogatives of public higher education institutions are defined in Autonomy Acts passed by the Parliament, it is rather frequent that other laws passed by the government may restrict or change that level of institutional autonomy. For instance, successive Government have decided to freeze or to reduce the number of civil servants, thus preventing institutions from hiring new staff.
- Also, successive Governments have decided to freeze the earned income of institutions, especially in what concerns the accumulated net balances, as a measure to contain the public deficit.

- As the members of the academic staff of both public universities and polytechnics are civil servants, their salaries are fixed at national level, not allowing for the establishment of pecuniary incentives.
- The difficulty in updating the staffs of public polytechnics, which until recently have been through a process of very fast enrolment increase, has created increasingly difficulties to the development of academic careers in polytechnics.
- The Autonomy Acts are too prescriptive about the governance structure of public higher education institutions. The Acts define too strictly not only the governance structure of the universities and polytechnics, but also of their schools, without taking into consideration the institutional diversity of the system.
- The university's patrimonial autonomy, which prevents institutions from a rational management of their assets. Although, at the same time, universities did kept old buildings, after receiving public funds to build new installations.

Human resource management

153. The academic and non-teaching staffs of public higher education institutions are public servants. Each higher education institution hires their own staff and each institution makes the decisions about new contracts and promotions. But, in general, academic staff careers are strongly regulated by law and salaries are national, with related values being ruled by law.
154. Current public university academic staff career has five steps: assistant in training, assistant, assistant professor, associate professor and full professor.
    - Assistants in training are hired for a period of one year following a public tender. The contract can be renewed twice for the same period and they need to complete a master degree to be promoted to assistants. Assistants are hired for a period of six years that can be extended for an additional two-years period and they need to complete a PhD until the end of their contract. They have the right to a three-year period without teaching duties to work for their PhD. Once they have completed a PhD and if they have been teaching for at least five years, they have a right to be immediately hired as assistant professors. If they do not complete a PhD their contract will not be renewed.
    - After five years following their appointment as Assistant Professors, academics need to present to the Scientific Council of their school a detailed report on their activity over that period. The Scientific Council appoints a board of experts (jury) to decide if their activity is worthy of awarding them tenure or if they will be hired for a new experimental period of five years, after which they are hire tenured or fired.
    - Promotion to Associate professor and to Full professor depends on public tenders in competition with candidates from the same or different institutions or from abroad. Decisions are made by a board of experts (jury) proposed by the school and appointed by the rector and needs to include a number of members from outside the institution.
    - It needs to be recognised that the mobility of university professors is rather low and that in a high percentage of cases those promoted belong to the institution itself.

155. The public polytechnic academic career differs from the university academic career in structure and in the number of teaching hours. The structure differs mainly because the major post-graduate requirement for career progression is the master level (i.e., a Ph.D. is not being required). The career has three steps (assistant, aggregate and coordinator).
    - Assistants are hired following a public tender for an initial period of three years than can be renewed once, for an equal period, and they have to complete a masters degree until the end of this period.
    - After this initial period, assistants are automatically hired as aggregate-professors if they hold a masters degree. Otherwise, their contract is discontinued.
    - After a period of three years as aggregate professors, a tenure track may be follwed. Promotion to Coordinator Professor depends on the results of a public tender.
156. There are no set rules for the academic careers of the private sector.
157. There is also a research career in the public sector, which is organised in three steps: assistant researcher, principal researcher and coordinator researcher.
    - Assistant researchers are hired following a public tender and candidates need to hold a PhD.
    - Promotion to the higher ranks depends on competition in a public tender. The number of people hired as researchers in public universities is rather low and the researcher career is not available in polytechnics.

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PART III

THE NETWORK OF TERTIARY EDUCATION

PART III.1

The GEOGRAPHY OF TERTIARY EDUCATION IN PORTUGAL

1. The Portuguese Higher Education system has a considerable degree of institutional diversity. It developed faster than any other European system, creating a diversified and heterogeneous network of institutions and study programmes. This part of the report presents main facts regarding institutional, geographical, and functional aspects, as well as those related with the installed capacity at the level of its integrating sectors (i.e., universities and polytechnics, public and private).

1. Introduction and regional distribution of institutions

2. There are in Portugal more than 150 higher education institutions. The public sector includes 14 public universities and a non-integrated university school, 15 polytechnics and a number of polytechnic schools integrated in universities, 9 non-integrated nursing schools[1], 4 university level military schools and 5 polytechnic military schools. The private sector includes 34 university level institutions and 66 polytechnic schools. The Catholic University has activities in a number of places, including Lisbon, Sintra, Porto, Braga, Viseu, Figueira da Foz and Caldas da Rainha.
3. Table 3.1 presents the regional distribution of higher education institutions showing that there is a strong concentration in the most populated regions, namely in Lisbon and in the North region.

Table 3.1 – Regional distribution of higher education institutions

Region	Public		Private		Catholic univ.	Public Others		Total
	University	Polytechnic	University	Polytechnic		University	Polytechnic	
Algarve	1	1	2	1				5
Alentejo	1	3	5					9
Centre	3	8	7	9	3		2[i]	32
Lisbon	5	4	20	23	2	4[ii]	9[iii]	67
North	3	6	14	25	2		3[i]	53
Azores	1							1
Madeira	1			2				3
Total	15	22	48	60	7	4	14	170

NOTES: i – nursing schools; ii – military institutions; iii – 5 military institutions and 4 nursing schools
Source: OCES, 2006

4. Figures 3.2 and 3.3 present the location of public universities and polytechnics, respectively, and of their *campi* in those cases where they are located in different cities.
5. The localization of current private higher education institutions is presented in Figure 3.4 (university education) and in Figure 3.5 (polytechnic education). It considers more than one hundred institutions, including very small private schools. The average size of the student population is around 1,000 students per institution, but in 2003 there were 29 institutions with less than 200 students and 35 institutions where student enrolment varied between 200 and 500 students.

[1] The nursing schools in Lisbon, Porto and Coimbra are in a merger process that will trsnform the 9 autonomous institutions into only three, one in each town.

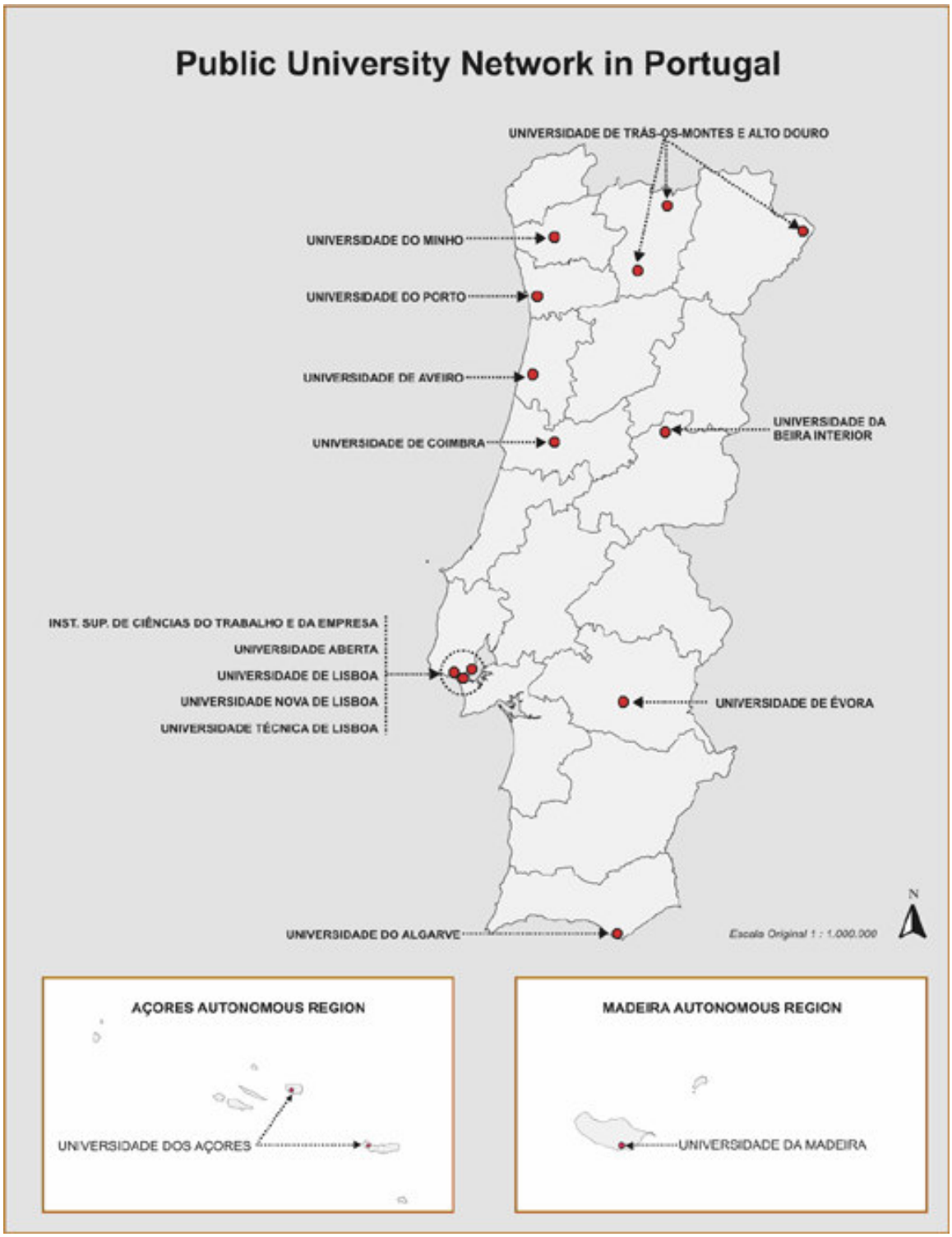


Figure 3.2 – Location of public universities
Source: DGES, 2006

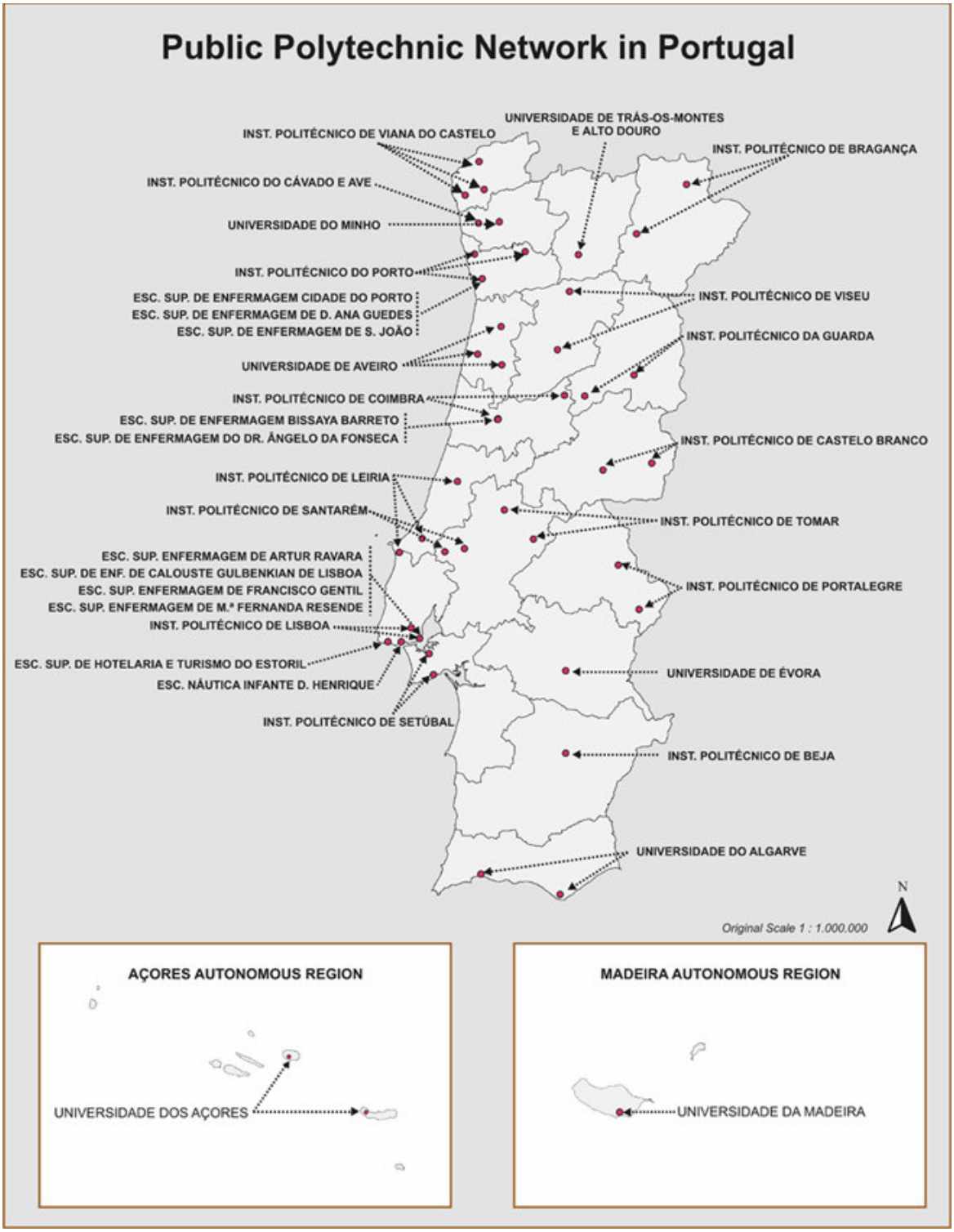


Figure 3.3 – Localisation of public polytechnics
Source: DGES, 2006

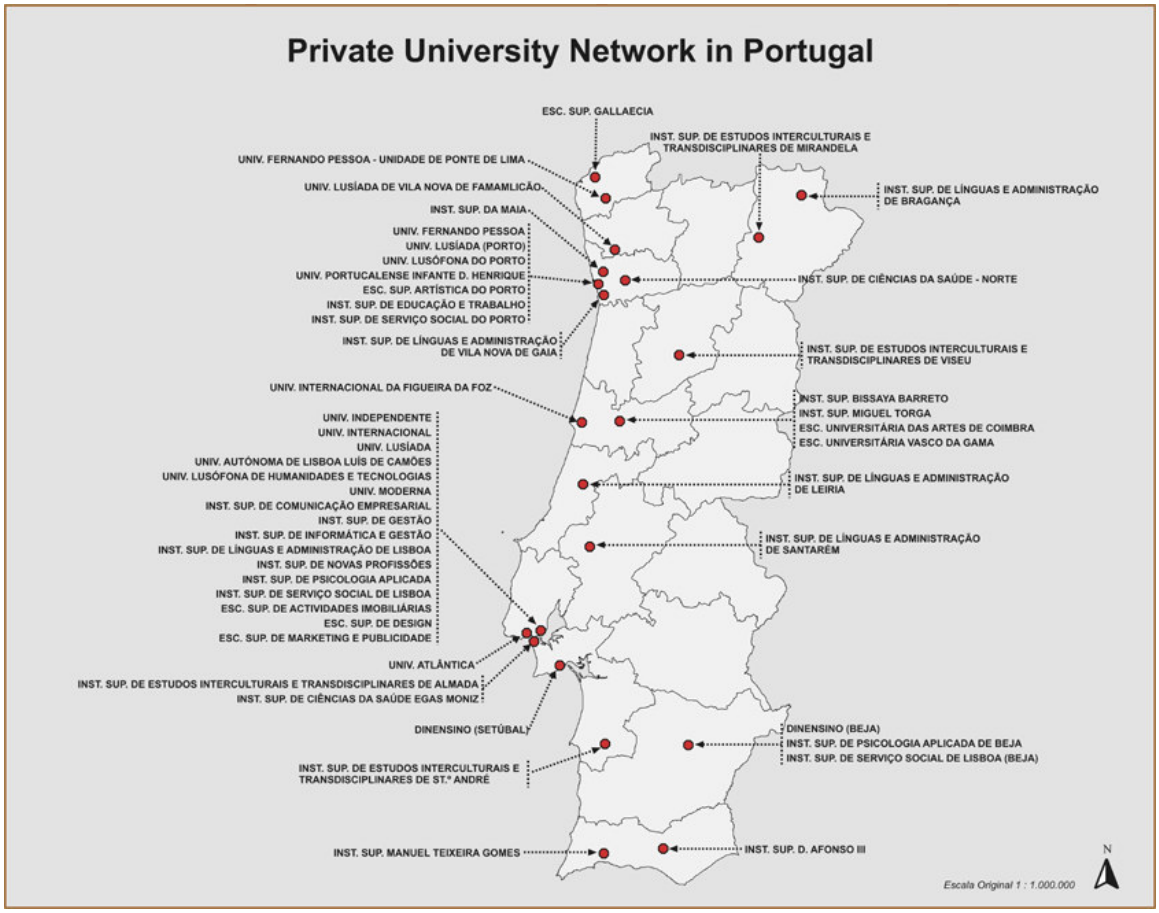


Figure 3.4 – Private university higher education
Source: DGES, 2006

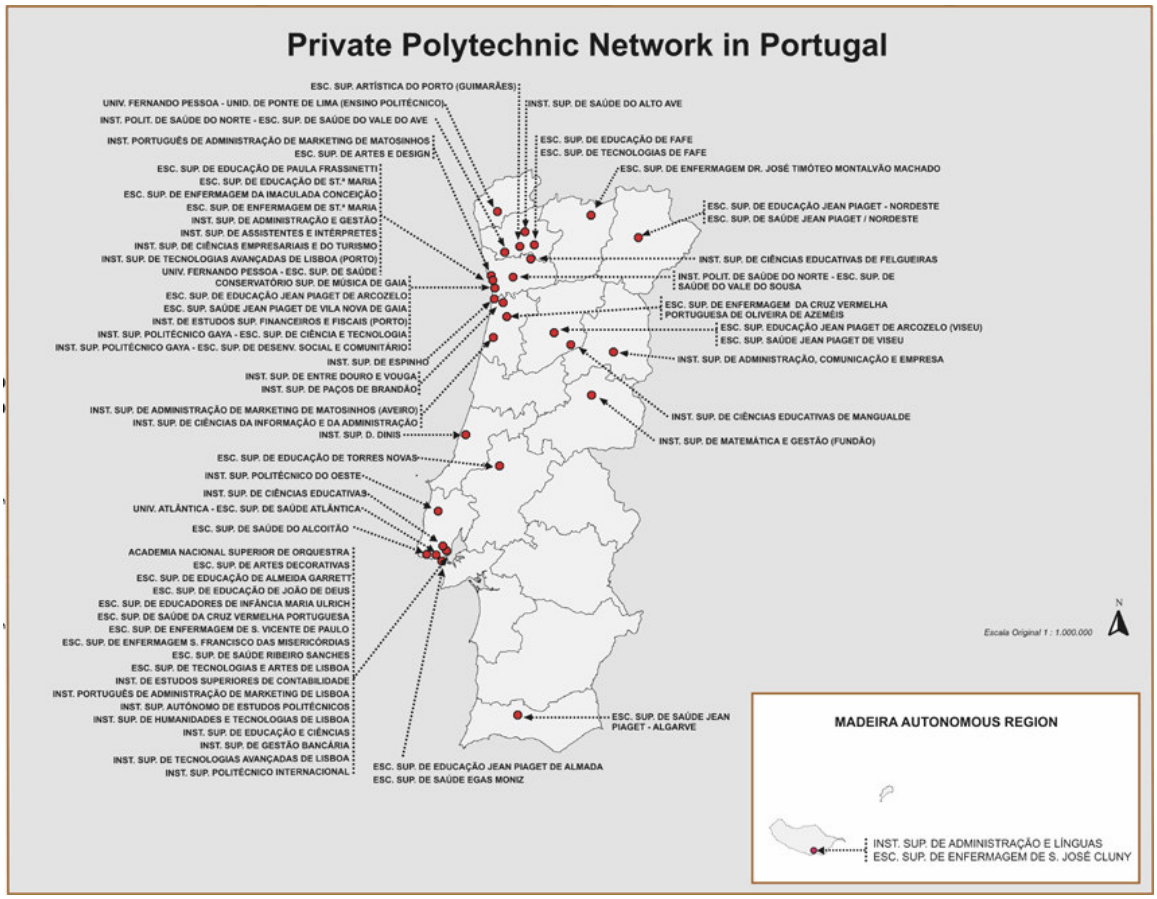


Figure 3.5 – Private polytechnic higher education
Source: DGES, 2006

2. Regional distribution of vacancies, enrolments and graduates

6. Figure 3.6 presents the overall distribution of vacancies as well as the distribution of the public and private sectors for the different regions (NUT II). The country average is 8/1,000 inhabitants, with the Region of Lisbon is above the average (12/1,000), while the North and Centre are below average and quite smaller values for the islands of Madeira and Azores. When only the public sector is considered, the Centre is the most favoured region (6/1,000), closely followed by Lisbon (5/1,000), both above the national average (5/1,000). Alentejo and Algarve are slightly below the national average, while the North is well below the national average.
7. The private sector has a more unbalanced regional distribution, with Lisbon and North above the national average. The Lisbon indicator is well above the national average, almost double the national value, while the North region is only slightly above the national average, and all the other regions below the national average. The more favourable situation of Lisbon is mainly due to the contribution of the private sector that concentrates a large proportion of vacancies there. It is also interesting to notice the almost negligible presence of the private sector in the region of the Alentejo and the island of Madeira, and its absence in the Azores archipelago.

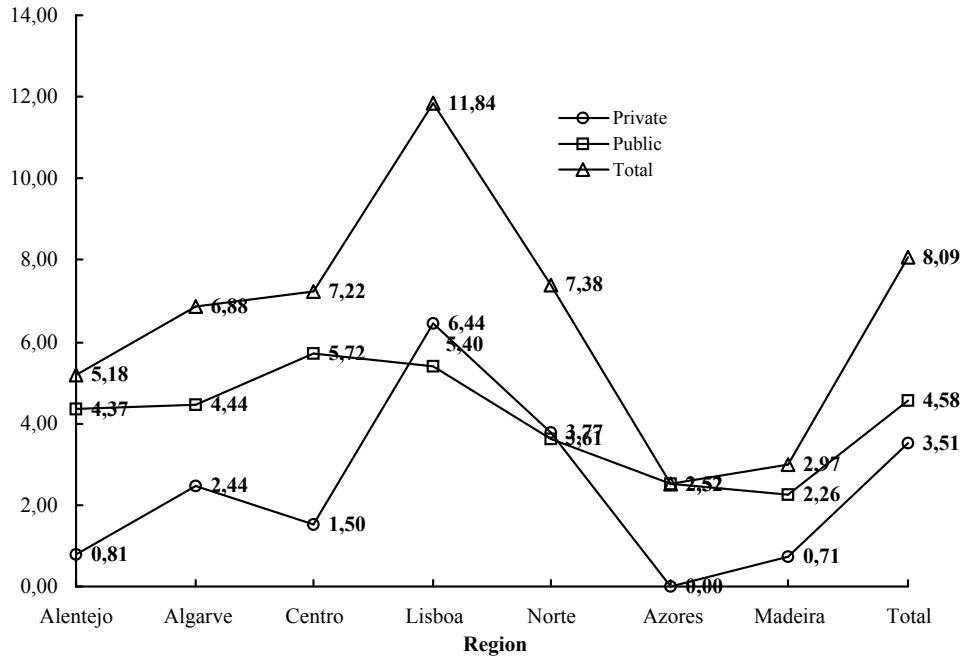


Figure 3.6 – The Regional distribution of total vacancies (2005-06)
Source: OCES, 2005

8. Figure 3.7 presents the regional distribution of vacancies by sub-sector, differentiating university education from polytechnic institutions. One can see a regional concentration of universities that favours the Lisbon Region, almost double the national average. Polytechnics are more evenly

distributed in the mainland than universities, with only the Centre Region slightly above the national average.

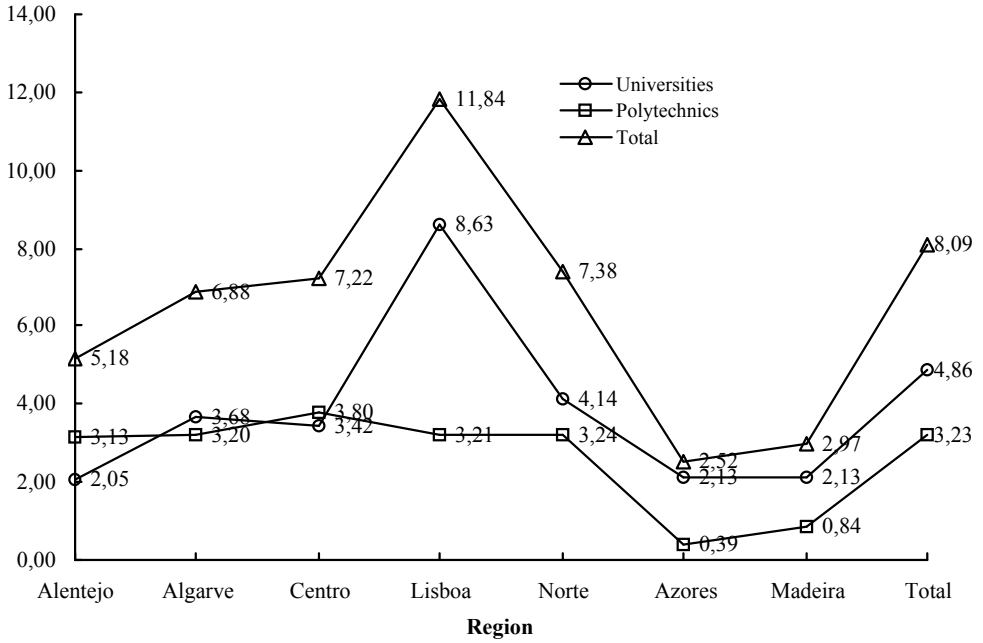


Figure 3.7 – The Regional distribution of vacancies – university/polytechnic education (2005-06) Source: OCES, 2005

9. Further analysis, at the level of the district (Figure 3.8), shows that most higher education institutions are concentrated around the two main cities of Lisbon (33%) and Porto (20%), the third being Coimbra (8%).
10. If one considers only the public sector, Lisbon corresponds to 25%, Porto to 14% and Coimbra to 11%, meaning that the two districts where the two main towns are located correspond to 40% of the total public vacancies. Considering only the private sector, Lisbon accounts for 42%, Porto for 28% and Coimbra for a barely 4%: the two districts where the two main towns are located correspond to 70% of the total private vacancies.
11. The regional distribution of enrolments (Table 3.2) and graduations (Table 3.3) on the basis of the scientific areas indicates that some important areas represent a rather small percentage of total enrolments. This is the case of Computer Sciences (below 3.5% in all regions and only 0.2% in Madeira), Physical Sciences (below 2.6% in all the mainland regions and only 0.3% in Azores), Mathematics and Statistics (below 1.5% in all regions except Madeira where it represents 4%) and Life Sciences with a maximum of 7.7% in the Azores followed by Madeira with 5.7%, Alentejo with 4.6%, all the other regions below 3.5%. One can also observe that Management is the most popular area representing 15% of all enrolments, followed by Engineering with 13%, Health with 12% and Social Sciences with 10%.

12. Comparing the different regions (Table 3.2) one observes a heterogeneous landscape. Some areas such as Management or Health present a quite uniform percentage of enrolments across the country; other areas such as Teacher Training (20.0% in Azores and 6.0% in Algarve) or Engineering (16.4% in the Centre and 1.2% in Azores) present a very wide variation. Some data is quite surprising, such as the low value of Social and Behavioural Sciences in the Centre (only 6.1%) while others can be explained by the regional characteristics such as the high values for Agriculture in Alentejo (8.6%), for Building Industries in Algarve (10.9%) and for Personal Services in Madeira (9.4%).
13. Analyses of the number of graduates (Table 3.3) reveal a different picture. Teacher Training with only 7.4% of the total enrolments represents 14.9% of all graduates, and Health with 12.1% of total enrolments represents 14.4% of the graduates. On the other hand, Engineering with 13% of all enrolments, contributes with only 7.5% of all graduates.

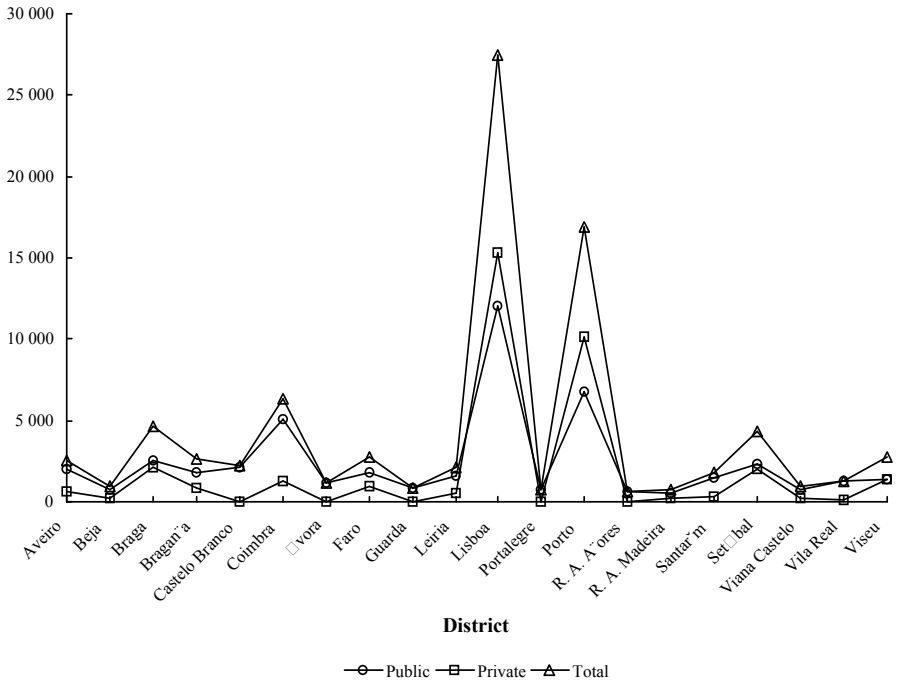


Figure 3.8 – The distribution at district level (public, private and total) (2005-06)
Source: OCES, 2005

Table 3.2 – Total enrolments in higher education per scientific area, 2004/05

Areas	Sub-areas	Algarve		Alentejo		Lisbon		Centre		North		Azores		Madeira	
Education	Teacher training	636	6,0%	2 293	11,4%	8 927	6,1%	5 977	7,3%	9 136	7,8%	671	20,0%	415	13,0%
	Education Sciences	193	1,8%	181	0,9%	1 291	0,9%	871	1,1%	2 150	1,8%	46	1,4%	141	4,4%
Arts and	Arts	202	1,9%	783	3,9%	6 198	4,3%	4 306	5,3%	4 312	3,7%	0	0,0%	176	5,5%
Humanities	Humanities	488	4,6%	637	3,2%	7 676	5,3%	2 831	3,5%	4 772	4,1%	194	5,8%	83	2,6%
Social Sciences	Social & Behavioural Scienc.	1 037	9,8%	1 263	6,3%	18 520	12,7%	4 964	6,1%	10 431	8,9%	447	13,3%	383	12,0%
Commerce	Communic. and Journalism	244	2,3%	320	1,6%	4 036	2,8%	2 039	2,5%	1 649	1,4%	44	1,3%	0	0,0%
and Law	Management	1 756	16,5%	3 284	16,4%	21 448	14,8%	13 365	16,4%	16 592	14,2%	535	15,9%	484	15,1%
	Law	0	0,0%	142	0,7%	8 093	5,6%	3 551	4,4%	4 844	4,1%	0	0,0%	0	0,0%
Sciences,	Life Sciences	485	4,6%	661	3,3%	2 427	1,7%	1 762	2,2%	2 072	1,8%	259	7,7%	183	5,7%
Mathematics	Physical Sciences	254	2,4%	490	2,4%	3 163	2,2%	2 047	2,5%	2 157	1,8%	9	0,3%	113	3,5%
and Informatics	Mathematics and Statistics	122	1,1%	60	0,3%	1 852	1,3%	818	1,0%	1 318	1,1%	21	0,6%	127	4,0%
	Informatics	214	2,0%	641	3,2%	3 680	2,5%	891	1,1%	3 106	2,7%	45	1,3%	5	0,2%
Engineering,	Engineering	1 055	9,9%	1 268	6,3%	18 845	13,0%	13 342	16,4%	14 490	12,4%	40	1,2%	416	13,0%
Manufacturing	Manufacturing Industries	189	1,8%	697	3,5%	764	0,5%	1 335	1,6%	1 450	1,2%	34	1,0%	0	0,0%
& Building Ind.	Architecture and Building	1 153	10,9%	1 097	5,5%	10 873	7,5%	6 417	7,9%	9 507	8,1%	72	2,1%	35	1,1%
Agriculture	Agriculture, Silvic. & Fisheries	150	1,4%	1 716	8,6%	899	0,6%	1 378	1,7%	1 365	1,2%	128	3,8%	0	0,0%
	Veterinary Sciences	0	0,0%	335	1,7%	766	0,5%	304	0,4%	714	0,6%	21	0,6%	0	0,0%
Health and	Health	995	9,4%	1 523	7,6%	14 943	10,3%	9 275	11,4%	18 580	15,9%	526	15,7%	379	11,8%
Social Protection	Social Services	154	1,5%	1 052	5,2%	3 141	2,2%	1 688	2,1%	2 799	2,4%	146	4,3%	0	0,0%
Services	Personal Services	1 041	9,8%	1 247	6,2%	3 701	2,5%	2 566	3,1%	4 046	3,5%	0	0,0%	262	8,2%
	Transport Services	0	0,0%	0	0,0%	306	0,2%	0	0,0%	18	0,0%	0	0,0%	0	0,0%
	Environment Protection	247	2,3%	336	1,7%	2 022	1,4%	1 676	2,1%	1 233	1,1%	120	3,6%	0	0,0%
	Security Services	0	0,0%	34	0,2%	1 698	1,2%	80	0,1%	209	0,2%	0	0,0%	0	0,0%
	TOTAL	10 615	100,0%	20 060	100,0%	145 269	100,0%	81 483	100,0%	116 950	100,0%	3 358	100,0%	3 202	100,0%

Source: OCES, 2005

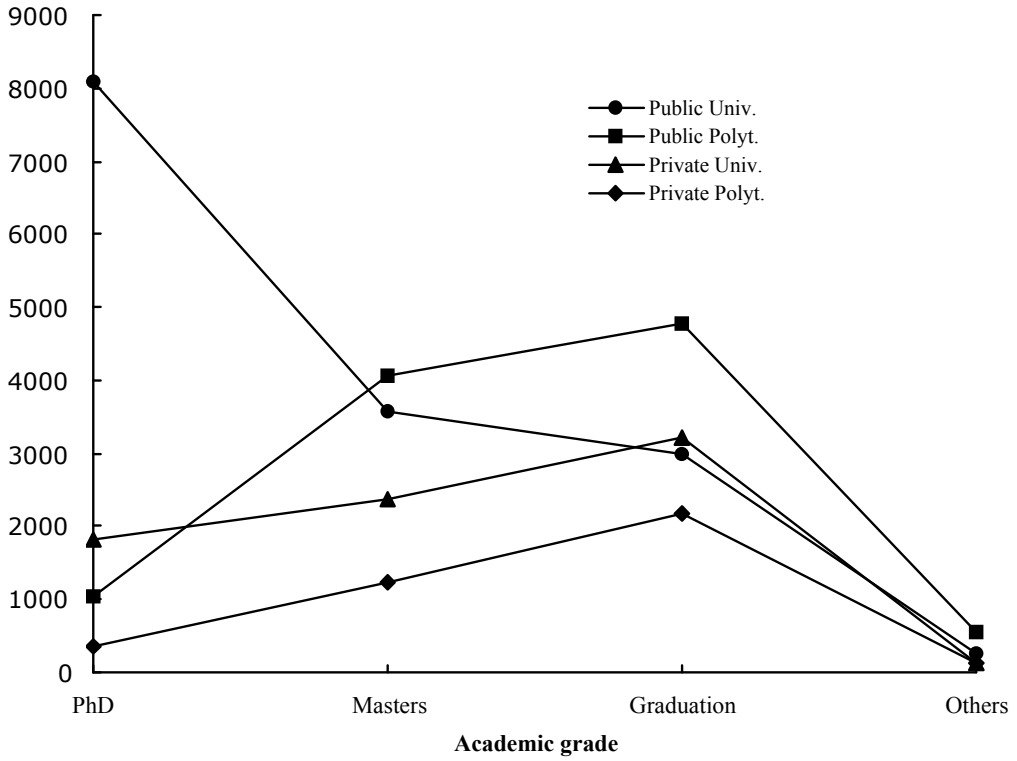
Table 3.3 – Total number of graduates in higher education per scientific area, 2003/04

		Algarve		Alentejo		Lisbon		Centre		North		Azores		Madeira	
Education	Teacher training	277	13,6%	797	21,7%	3051	12,2%	2073	14,5%	3633	16,1%	168	27,6%	219	34,5%
	Education Sciences	18	0,9%	82	2,2%	485	1,9%	287	2,0%	1065	4,7%	5	0,8%	6	0,9%
Arts and	Arts	54	2,7%	124	3,4%	1195	4,8%	784	5,5%	933	4,1%	0	0,0%	36	5,7%
Humanities	Humanities	155	7,6%	45	1,2%	1155	4,6%	628	4,4%	812	3,6%	64	10,5%	52	8,2%
Social Sciences	Social & Behavioural Sci.	119	5,8%	146	4,0%	2468	9,9%	586	4,1%	1529	6,8%	31	5,1%	0	0,0%
Commerce	Communic. & Journalism	73	3,6%	63	1,7%	713	2,9%	486	3,4%	200	0,9%	0	0,0%	0	0,0%
and Law	Management	342	16,8%	556	15,1%	4389	17,6%	2128	14,9%	3259	14,5%	33	5,4%	63	9,9%
	Law	0	0,0%	27	0,7%	1379	5,5%	388	2,7%	686	3,0%	0	0,0%	0	0,0%
Sciences,	Life Sciences	82	4,0%	73	2,0%	272	1,1%	284	2,0%	321	1,4%	44	7,2%	24	3,8%
Mathematics	Physical Sciences	58	2,9%	45	1,2%	409	1,6%	348	2,4%	401	1,8%	3	0,5%	29	4,6%
& Informatics	Mathematics & Statistics	37	1,8%	21	0,6%	305	1,2%	191	1,3%	267	1,2%	9	1,5%	28	4,4%
	Informatics	29	1,4%	45	1,2%	553	2,2%	128	0,9%	436	1,9%	0	0,0%	0	0,0%
Engineering,	Engineering	131	6,4%	88	2,4%	1666	6,7%	1472	10,3%	1783	7,9%	0	0,0%	8	1,3%
Manufacturing and	Manufacturing Industries	70	3,4%	170	4,6%	140	0,6%	221	1,6%	316	1,4%	4	0,7%	0	0,0%
Building Industries	Architecture and Building	83	4,1%	93	2,5%	1437	5,8%	771	5,4%	1105	4,9%	0	0,0%	0	0,0%
Agriculture	Agricult,, Silv. Fisheries	32	1,6%	298	8,1%	179	0,7%	240	1,7%	325	1,4%	26	4,3%	0	0,0%
	Veterinary Sciences	0	0,0%	21	0,6%	92	0,4%	0	0,0%	118	0,5%	0	0,0%	0	0,0%
Health and	Health	115	5,7%	519	14,1%	3149	12,6%	2183	15,3%	3626	16,1%	178	29,3%	110	17,3%
Social Protection	Social Services	68	3,3%	239	6,5%	579	2,3%	246	1,7%	607	2,7%	24	3,9%	0	0,0%
Services	Personal Services	231	11,4%	157	4,3%	712	2,9%	507	3,6%	788	3,5%	0	0,0%	60	9,4%
	Transport Services	0	0,0%	0	0,0%	73	0,3%	0	0,0%	6	0,0%	0	0,0%	0	0,0%
	Environment Protection	61	3,0%	67	1,8%	290	1,2%	265	1,9%	236	1,0%	19	3,1%	0	0,0%
	Security Services	0	0,0%	0	0,0%	260	1,0%	39	0,3%	56	0,2%	0	0,0%	0	0,0%
	TOTAL	2 035	100,0%	3 676	100,0%	24 951	100,0%	14 255	100,0%	22 508	100,0%	608	100,0%	635	100,0%

Source: OCES, 2005

3. Regional distribution of the academic staff

14. Table 3.4 and Figure 3.9 present information on the regional distribution of the academic staff and its qualification.
15. The academic staff is largely concentrated in the regions of Lisbon, North and Centre, where most of the population lives and where the main public universities are located. Only 31% of the academic staff hold a PhD and only 31% hold masters degree as their maximum academic qualification.



16. At the system level, analyses of the distribution of the academic staff indicate that the public universities account for 72% of all the PhD holders and for 32% of those holding at least a masters degree. These percentages are respectively 9% and 36% for public polytechnics, 16% and 21% for private university institutions and only 3% and 11% for private polytechnics.
17. Analyses of the qualification of the academic staff within each sector indicate public universities have 55% of the academic staff holding a PhD and 24% holding a masters degree. These percentages are respectively 10% and 39% for public polytechnics, 27% and 32% for private university level institutions and only 14% and 31% for private polytechnics.

Table 3.4 The regional distribution of the academic staff

Region	Type of institution	PhD	Masters	Graduation	Other	Total
Algarve	Public Univ.	226	87	28	2	343
	Public Polyt	42	201	264	21	528
	Private Univ.	46	58	77	1	182
	Private Poly	10	13	44	1	68
	Total	324	359	413	25	1121
Alentejo	Public Univ.	342	231	95	3	671
	Public Polyt	71	407	362	17	857
	Private Univ.	43	69	109	2	223
	Private Poly	0	18	17	0	35
	Total	456	725	583	22	1786
Centre	Public Univ.	1583	728	634	55	3000
	Public Polyt	332	1451	1518	126	3427
	Private Univ.	173	250	310	10	743
	Private Poly	31	124	201	9	365
	Total	2119	2553	2663	200	7535
Lisbon	Public Univ.	3449	1313	1309	102	6173
	Public Polyt	263	872	1277	227	2639
	Private Univ.	901	1183	1762	80	3926
	Private Poly	168	476	895	90	1629
	Total	4781	3844	5243	499	14367
North	Public Univ.	2260	1052	795	71	4178
	Public Polyt	323	1109	1239	147	2818
	Private Univ.	660	825	956	46	2487
	Private Poly	135	567	944	24	1670
	Total	3378	3553	3934	288	11153
Azores	Public Univ.	168	112	54	8	342
	Public Polyt	6	21	81	2	110
	Private Univ.	2	0	0	2	4
	Private Poly	0	0	0	0	0
	Total	176	133	135	12	456
Madeira	Public Univ.	76	66	65	7	214
	Public Polyt	4	13	45	0	124
	Private Univ.	0	0	0	0	0
	Private Poly	2	25	80	1	108
	Total	82	104	190	8	446
TOTAL		11316	11271	13161	1054	36802

Source: OCES, 2006

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- Correia, F., Amaral, A. and Magalhães, A. (2002), "Public and private higher education in Portugal: unintended effects of deregulation", *European Journal of Education*, 37.4: 457-472.

PART III.2

A FUNCTIONAL ANALYSIS

1. In order to better understand the Portuguese higher education system and its network of institutions and study programmes, a functional analysis of the system including the contribution of each sector - public and private, universities and polytechnics – is undertaken. The analysis includes the adequacy of the educational provision in terms of the needs of the Portuguese society, including strengthening the research capacity and the levels of internationalisation, as well as the access of new publics and the provision of lifelong education and industry-science relationships.

1. Post-secondary education

2. Post-secondary education has been recently reinforced with a new legal framework expanding "Technological Specialisation Programmes" (i.e., "CETs - Cursos de Especialização Tecnológica"), which aim at conferring students a diploma of technological specialisation and a level IV professional qualification. These programmes are offered mainly to students that have completed upper secondary education or that have qualifications equivalent to a level III professional qualification, and are run under the supervision of one of four ministries beyond Higher Education, namely: Education, Economy, Work and Social Solidarity, and Agriculture.
3. It should be noted that Portugal remains one of the European countries with the lowest supply of lifelong education and retraining opportunities, Table 3.5. Access routes to higher education are, in general, very traditional and most of the institutions do not have institutionalized practices of enrolling students from other than traditional access routes. Also, the lack of experience and knowledge in the recognition of informal training activities makes transfer between institutions and credit recognition very uncertain for students.

Table 3.5 – Population aged 25 to 64 participating in education and training (%)

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
EU15	**-**	**-**	**5.7[e]**	**5.7[e]**	**-**	**8.2[e]**	**8.4[e]**	**8.3[e]**	**8.5**	**9.9[b]**	**11.1**	**11.9**
Belgium	2.7	2.8	2.9	3.0	4.4	6.9[b]	6.8	7.3	6.5	8.5	9.5[b]	10.0
Denmark	15.1	16.8	18.0	18.9	19.8	19.8	20.8	17.8	18.4	25.7b	27.6	27.6
Germany	-	-	5.7	5.4	5.3	5.5	5.2	5.2	5.8	6.0	7.4	-
Greece	1.0	0.9	0.9	0.9	1.0	1.3	1.1	1.4	1.2	2.7b	2.0	1.8
Spain	3.9	4.3	4.4	4.4	4.2	5.0	5.0	4.8	4.9	5.8	5.1	12.1[b]
France	2.9	2.9	2.7	2.9	2.7	2.6	2.8	2.7	2.7	7.4[b]	7.8	7.6
Ireland	3.9	4.3	4.8	5.2	-	-	-	-	7.6	9.6[b]	7.2	8.0
Italy	3.4	3.8	4.1	4.6	4.8	5.5	5.5	5.1	4.6	4.7	6.8[b]	6.2
Luxemburg	3.3	2.9	2.9	2.8	5.1[b]	5.3	4.8	5.3	7.7	6.3[b]	9.4	9.4[p]
Netherlands	13.6	13.1	12.5	12.6	12.9	13.6	15.6	16.3	16.4	17.4[b]	17.3	16.9
Austria	-	7.7	7.9	7.8	-	9.1	8.3	8.2	7.5	12.5[b]	12.0	13.9
Portugal	**3.5**	**3.3**	**3.4**	**3.5**	**3.1[b]**	**3.4**	**3.4**	**3.4**	**2.9**	**3.7**	**4.8[b]**	**4.6**
Finland	-	-	16.3	15.8	16.1	17.6	19.6[b]	19.3	18.9	25.3 [b]	24.6	24.8
Sweden	-	-	26.5	25.0	-	25.8	21.6	17.5[b]	18.4	34.8[b]	33.3	34.7
UK	11.5	-	-	-	-	19.2	21.0	21.7	22.3	21.2	29.1	29.1[p]

NOTES: - not available; e – estimated value; b – break in series; p – provisional value
Source : EUROSTAT, 2005

4. Forms of post-secondary education and lifelong learning have been formally introduced with the 1986 *Comprehensive Law of the Education System*. It defines professional training as an important objective in the overall structure of the educational system, and established a framework of training activities designed to promote the participation of working people, for the purposes of both professional enhancement and professional conversion (article 19, § 2). As far as non-formal educational activities were concerned (article 23, § 3), the law emphasised the development of technological aptitudes and technical knowledge, which would foster adult adaptation to contemporary life. The educational system was therefore awarded both responsibilities and competencies for continuing education, and the connection between education and professional activity was explicitly assumed, as was the need to prepare students for transition to the labour market.
5. So far, continuing education has not yet been organised on a widespread scale, and little has been developed in the way of structures or mechanisms to fulfil this objective (Table 3.6). In particular, analysis has shown that higher education institutions, including public polytechnics and universities, have not yet focused their attention to post-secondary education. It is possible that the difficulties created by the declining number of traditional students will force institutions to assume an increasing role in the 'less traditional' educational market, including continuing education.

Table 3.6 – Number of people participating in education and training activities

Year	Number of people			Years of formal schooling					
	Total	Men	Women	< 4 years	4 years	6 years	9 years	12 years	>12
2000	**43 260**	22 877	20 383						
2001	**35 765**	19 094	16 671						
2002	**37 652**	20 633	17 019						
2003	**50 802**	27 077	22 276						
2004	**55 520**	30 275	25 245	206	4 498	10 248	16 836	12 352	11 380
August 2005	**34 917**	19 403	15 514	46	2 962	6 780	10 975	7 398	6 756

Source: Ministry of Work and Social Solidarity, 2005

6. Most of the activities oriented towards continuing education and lifelong learning were to a large extent the results of expectations or demands from the European Union. In this respect too, Portugal's entry to the European Community in 1986 can be seen as a turning point in the country's participation in lifelong learning, mainly as a result of activities developed with support from the European Social Fund (ESF). This has become the main source of finance for training systems, and indeed the main inspiration behind the organisation of national training policies. In addition to European resources, national programmes, private companies and the students themselves have also financed continuing education, but up to now, all of these latter resources have played a less visible role.
7. Table 3.7 shows that "Technological Specialisation Courses", CETs, offered through higher education institutions have involved only 1302 students in 2005. These CETs were offered

through 13 public institutions and 8 private institutions of higher education and represent only 24% of the total number of programmes. Table 3.8 presents the overall supply of programmes through the different types of schools existing under different ministries.

Table 3.7 – Number of students enrolled in "Technological Specialisation Programmes", CET´s, publicly funded through MCTES in 2005

Type of courses	
Computer Applications to Management	79
Automation, Robotics and Industrial Control	14
Building Work Management	50
Irrigated Cultures	25
Project and Design of Mechanical Constructions/ moulds	59
Development of Multimedia Products	149
Design of footwear and morocco	10
Furniture Design	20
Documentation and Information	15
Electronics and Telecommunications	20
Automatic Manufacture – Design an Manufacture of metal-mechanic products	27
Quality Management	25
Management of Tourist Activity	46
Network Management	36
Installation and Maintenance of Computer Networks and Systems	162
Industrial Maintenance	20
Work Organisation and Planning	59
Mechanic Production	20
Food Quality	63
Environment Quality	55
Industrial Chemistry	14
Social service and Community Development	54
Tourism Management Techniques	20
Hotel Management Techniques	36
Food Technology	23
Mechatronics Technology	36
Information Systems Technologies and Programming	123
Telecommunications and networks	42
Total	1302

Source: MCTES, 2006

Table 3.8 - Technology specialization courses, CET´s, in 2005/2006

a) Number of available courses per area

Area	Secondary and Technical Schools (Ministry of Education)	Universities and Polytechnics (Ministry of ST & Higher Education)	Technological Schools (Ministry of Economy)	Training Schools (Ministry of Work)	Total
Management	3	2	5	0	10
Informatics	21	16	3	7	47
Electronics and Automation	8	3	9	4	24
Construction	16	2	0	0	18
Accounting	25	2	0	0	27
Design	1	0	0	0	1
Marketing and Publicity	2	1	0	0	3
Turism	9	3	0	0	12
Textil Industry	1	0	3	0	4
Environment Protection	0	1	0	0	1
Metalurgy and Metalomechanics	2	5	4	2	13
Transforming Industries	0	0	0	0	0
Food Industries	2	1	0	0	3
Chemical Engineering	0	0	1	0	1
Finance, Banking and Insurance	0	0	0	1	1
Personnal Services	0	2	0	0	2
Materials	0	0	0	0	0
Agriculture	0	0	0	0	0
Archive Sciences	1	2	0	0	3
Total	**91**	**40**	**25**	**14**	**170**
Percentage	**54%**	**24%**	**15%**	**8%**	**100%**

b) Number of available technology specialization courses per area and region

Area	North Region	Center Region	Lisbon Region	Algarve	Alentejo	Total
Management	4	4	2	0	0	10
Informatics	15	14	17	1	0	47
Electronics and Automation	6	9	8	0	1	24
Construction	7	3	4	2	2	18
Accounting	17	4	1	3	2	27
Design	1	0	0	0	0	1
Marketing and Publicity	3	0	0	0	0	3
Turism	7	4	0	0	1	12
Textil Industry	3	1	0	0	0	4
Environment Protection	0	1	0	0	0	1
Metalurgy and Metalomechanics	4	6	3	0	0	13
Transforming Industries	0	0	0	0	0	0
Food Industries	0	1	2	0	0	3
Chemical Engineering	0	1	0	0	0	1
Finance, Banking and Insurance	0	0	1	0	0	1
Personnal Services	0	2	0	0	0	2
Materials	0	0	0	0	0	0
Agriculture	0	0	0	0	0	0
Archive Sciences	0	2	0	1	0	3
Total	**67**	**52**	**38**	**7**	**6**	**170**
Percentage	**39%**	**31%**	**22%**	**4%**	**4%**	**100%**

2. Graduate studies

8. Graduate education is the main activity of the Portuguese higher education institutions and Table 3.9 presents the number of enrolled students in each sector. Public universities represent 44% of the total number of students, followed by public polytechnics, with 30%, and the private sector, with 27%.
9. Table 3.10 presents the number of degrees awarded, with public universities contributing with 31% of the total, public polytechnics with 35% and the private sector with 34%. The results complement those presented in Part I of this report for student survival rates, and call our attention for the increasing importance of guaranteeing student success. There are numerous social, economic and psychological reasons for not completing higher education. Some reasons point to the influence of rhetorical and passive methods of teaching, others to excessive long study programmes, although the inadequacy of student choices have also been indicated as a possible justification. The challenge posed by unsuccessful rates of finishing higher education may be helped with the transition of a system based on the transmission of knowledge to a system based on the development of competencies, as discussed within the Bologna process.

Table 3.9 – Number of students enrolled in graduate programmes

Type of institution	Enrolments in 31st December													
	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Public														
University	107644	114807	121459	126221	133055	140892	144220	148973	153522	160120	163634	162441	160093	156114
Armed forces	1042	1015	994	890	835	850	907	917	996	1082	1138	1163	1252	1352
Total P.Univ.	108686	115822	122453	127111	133890	141742	145127	149890	154518	161202	164772	163604	161345	157466
Polyt- General	33822	40431	45479	49877	54091	60026	67349	74740	83815	92998	98461	101779	100289	97018
Polyt- Health	2398	2894	3043	3450	4664	4574	4582	4612	5791	8081	9190	9892	10353	10500
Armed forces	323	339	222	300	294	305	305	279	256	198	318	341	368	356
Total P. Polyt.	36543	43664	48744	53627	59049	64905	72236	79631	89862	101277	107969	112012	111010	107874
Total Public	**145229**	**159486**	**171197**	**180738**	**192939**	**206647**	**217363**	**229521**	**244380**	**262479**	**272741**	**275616**	**272355**	**265340**
Private														
University	29540	33684	36473	41191	43304	48123	45680	49512	47982	43429	40891	38299	35456	31337
Polytechnics	31285	39228	48426	53220	61444	62380	64243	57313	59711	59501	60186	60915	59797	56161
Catholic univ.	7461	8138	8294	9050	9190	10021	9839	10055	9833	9964	9536	9762	9741	9370
Total Private	68286	81050	93193	103461	113938	120524	119762	116880	117526	112894	110613	108976	104994	96868
TOTAL	**213515**	**240536**	**264390**	**284199**	**306877**	**327171**	**337125**	**346401**	**361906**	**375373**	**383354**	**384592**	**377349**	**362208**

Source: OCES, 2006

Table 3.10 – Number of students concluding first degree courses

Type of institution	Number of graduates										
	1993/4	**1994/5**	**1995/6**	**1996/7**	**1997/8**	**1998/9**	**1999/0**	**2000/01**	**2001/02**	**2002/03**	**2003/04**
Public											
University	12318	12715	13680	14478	14913	15161	15401	15599	17223	18606	18953
Armed forces[a]	177	143	130	126	147	102	149	162	140	181	178
Total Public Univ.	12495	12858	13810	14604	15060	15263	15550	15761	17363	18787	19131
Polyt- General	5933	6226	7323	7593	8647	10512	11567	14771	16364	17879	18156
Polyt- Health	868	1370	1303	1848	1298	1659	2518	4248	3753	3951	3906
Armed forces[a]	138	93	90	68	92	83	103	66	130	106	81
Total P. Polyt.	6939	7689	8716	9509	10037	12254	14188	19085	20247	21936	22143
Total Public	**19434**	**20547**	**22526**	**24113**	**25097**	**27517**	**29738**	**34846**	**37610**	**40723**	**41274**
Private institutions	10676	12339	13117	14537	16648	19332	20028	20613	20052	20067	19622
Catholic univ.	1074	1004	1267	1453	1644	1580	1512	1570	1496	1587	1770
Total Private	11750	13343	14384	15990	18292	20912	21540	22183	21548	21654	21392
TOTAL	**31184**	**33890**	**36910**	**40103**	**43389**	**48429**	**51278**	**57029**	**59158**	**62377**	**62666**

Source: OCES, 2006.

10. It should be noted that the funding formula adopted in 2006 has introduced for the first time a performance indicator aimed to foster the implementation of measures to promote success in higher education. It uses a graduation efficiency (i.e., TEP_j, Graduation efficiency for each graduate programme, j; Tables 3.11 and 3.12), defined as follows:

$$TEPj = \frac{3 * D_{t-2} + \mathrm{IPV_{t\text{-}1}} - A_{t-2}}{4 * \frac{I_{t-1}}{n}}$$

where: D_{t-2} = Number of graduates, year t-2
I_{t-1} = Total enrolment, year t-1
$\mathrm{IPV_{t\text{-}1}}$ = Number of new students in the first year, year t-1
A_{t-2} = Number of drop-outs, year t-2
N = Nominal duration of the programme (years)

11. The efficiency of each institution is obtained as an average of the efficiencies of each programme weighted by the number of students enrolled in the programme.
12. The funding formula adopted in 2006 has also introduced for the first time a scientific efficiency rate for post-graduate programmes, Table 3.11, which aims at measuring the relation between the number of awarded degrees (masters and Ph.D.s) and the number of teachers with a PhD degree, as follows:

$$TEC_j = \frac{Number\ of\ awarded\ Masters_{t-2} + 3xPh.D.s\ awarded_{t-2}}{Number\ of\ Ph.D.\ holding\ academic\ staff,\ FTE_{t-2}}$$

13. The indicator's initial value for university j is calculated as the ratio between the numbers of post-graduate degrees awarded by the institution in year t-2, the number of Ph.D.s being weighted by 3.
14. Analysis of Tables 3.11 and 3.12 show comparable graduation efficiencies in universities and polytechnics, although public polytechnics show drop-out and failure rates higher than those typical of other European contexts (with measured survival rate indexes of 54% in 2003, and 59% in 2004), namely in the area of technologies.

Table 3.11 – Graduation efficiency and Post-Graduation efficiency rates for Public Universities, 2004

Institution	Initial training ("licenciatura")	Advanced training (masters and PhD)	Overall
UTAD	0.66	0.62	0.66
Univ. Minho	0.64	0.86	0.66
Univ. Porto	0.62	0.81	0.64
ISCTE	0.55	1.33	0.61
UBI	0.58	0.53	0.58
Technical Univ. LIsbon	0.58	0.63	0.58
Univ. Lisbon	0.56	0.78	0.58
Univ. Azores	0.59	0.30	0.57
Univ. Madeira	0.55	0.61	0.56
Univ. Coimbra	0.53	0.61	0.53
Univ. Aveiro	0.52	0.67	0.53
New Univ. LIsbon	0.50	0.77	0.52
Univ. Algarve	0.51	0.57	0.51
Univ. Évora	0.42	0.49	0.42

Source: OCES, 2005

Table 3.12 – Graduation efficiency of Public Polytechnics, 2005

Institution	(only initial training: "bacharelato" & "licenciatura")
IP Viana do Castelo	0,65
IP Portalegre	0,59
IP Castelo Branco	0,58
IP Santarém	0,57
IP Guarda	0,53
IP Cávado e Ave	0,51
IP Viseu	0,51
IP Tomar	0,47
IP Porto	0,46
IP Beja	0,46
IP Bragança	0,45
IP Coimbra	0,43
IP Lisboa	0,41
IP Setúbal	0,40
IP Leiria	0,37

Source: OCES, 2005

15. Examining enrolments by disciplinary area, Table 3.13 shows that public universities offer a diversified range of study programmes and courses without any specific concentration of student enrolments. The area with more students represents less than 23% of the total number of students and there are five areas with enrolments above 10% of the total, namely: Social Sciences, Commerce and Law, with 25%, followed by Engineering and Technologies, with 23% and Sciences, Mathematics and Computer Sciences with 15%.
16. Public Polytechnics concentrated their enrolments in Engineering (32%), Management and Business Administration (31%), Education/Teacher training (14%), Health and Social Protection (9%) and Agriculture (5%), which corresponds to the initial recommendations made by the World Bank (e.g., Teixeira, Amaral and Rosa, 2003).
17. Private universities concentrate their study programmes in the area of Social Sciences, Commerce and Law, which represent 66% of the total number of students, while all other areas represent less than 10% of enrolment. Private polytechnics concentrate their programmes in the areas of Education/Teacher training (36%) and Management and Business Administration (36%). Education in Health and Social Protection is delivered essentially at nursing schools, representing 9.8% of the total number of students.

Table 3.13 – Enrolments in Public and Private Institutions by disciplinary area, 1997/98

Scientific area	Private sector				Public sector			
	Polytechnic		University		Polytechnic		University	
	Number	%	Number	%	Number	%	Number	%
Education	9 614	35.7	280	0.3	10 276	14.1	16 615	10.8
Arts and Humanities	1 766	6.6	7 599	8.1	2 868	3.9	19 006	12.3
Social Sc., Commerce, Law	9 570	35.6	61 523	65.5	22 321	30.7	38 031	24.7
Sciences, Maths, Informatics	1 089	4.0	5 925	6.3	1 349	1.9	23 188	15.1
Engineering, Manufacturing and Building Industries	1 162	4.3	9 324	9.9	23 518	32.4	35 166	22.8
Agriculture	0	0.0	59	0.1	3 379	4.6	6 441	4.2
Health and Social Protection	2 651	9.8	5 864	6.2	6 560	9.0	8 925	5.8
Services	1 065	4.0	3 340	3.6	2 420	3.3	6 579	4.3
Total	**26 917**	**100.0**	**93 914**	**100.0**	**72 691**	**100.0**	**153 951**	**100.0**

Source: OCES, 2005

The effects of declining enrolments

18. From the mid 1990s the context of Portuguese higher education has shifted as a result of declining birth rates and increasing policy concerns with quality. For example, Table 3.14 presents the evolution of enrolments since 1997/98, showing that the enrolments of private universities decreased 29% since 1997/98. The private polytechnics showed declining enrolments after 2002/03. The declining trend in the public sector began only in 2003/04.

Table 3.14 – Enrolments in higher education

		97/98	98/99	99/00	00/01	01/02	02/03	03/04	04/05
Public	Universities	153 951	158 850	164 722	171 735	176 303	178 000	176 827	173 897
	Polytechnics	72 691	80 007	90 286	101 795	108 486	112 532	111 482	108 376
	Total Public	226 642	238 857	255 008	273 530	284 789	290 532	288 309	282 273
Private	Universities	93 914	89 361	88 190	82 979	79 908	77 109	73 708	67 157
	Polytechnics	26 917	28 572	30 547	31 194	31 904	33 190	33 046	31 507
	Total Private	120 831	117 933	118 737	114 173	111 812	110 299	106 754	98 664
	Total	**347 473**	**356 790**	**373 745**	**387 703**	**396 601**	**400 831**	**395 063**	**380 937**

Source: OCES, 2005

19. Table 3.15 lists those private institutions that have closed down in recent years. The low levels of enrolments question the survival of institutions and /or their capacity to meet accreditation standards. But in general institutions claim that it is difficult to guarantee the availability of resources to hire good quality academic staff, maintain a good library and provide the appropriate institutional environment in the context of continuing student decrease. In particular, institutions have shown the capacity to express “isomorphic” characteristics, in that new programmes attracting students are followed by a duplicating phenomenon giving rise to similar programmes created elsewhere without adequate attention

to the framing conditions. This has happened in certain degree programmes such as "management", "environment", and more recently "health".

Table 3.15- Private institutions that have ceased activity in 2005

Institution	Enrolments in 31st December														
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Autónoma[k]	234	423	543	717	796	826	812	672	538	371	232	104	60	24	
Internacional[g]	181	191	233	199	152	93	62	30							
COCITE[a]		41	63	15											
COCITE[b]		62	114	117	78	65	52	36							
I.Erasmus[c]	361	703	1055	1276	1747	2186									
I.Erasmus[d]				163	343	375	366	257							
IESF[e]	70	117	238	285	266	201	127	73	87	83					
ISCIE[e]	630	997	1280	1669	1812	2066									
ISG[a]				177	133	99	79	58							
ISHT[f]	54	99	147	142	119	162	151	137	62	51	18				
ISHT[a]				11	11	11	19	34	30	16					
ISTH[l]				33	41	59	110	108	105	78	68	61	50	42	
ISMG[e]	344	730	1213	3001	4415	5723	7394	7588							
ISMG[f]				145	169	178	184	148	106	88	38	16	10		
ISMG[l]				109	180	211	246	413	379	397	335	284	258	247	
ISPI[g]	58	53	33												
ISPP[h]	88	138	209	120	106	42									
ISPP[i]	172	304	462	529	608	619	523	393	248	115	70	29	20		
ISPP[j]	52	102	131	123											
ISTE[e]														22	
ISTr[e]				24	46	62	56	58	54	42	42	16	11		
ISTrCom[e]			40	73	104	139	161	165	145	134	127	104	37	22	

a – Torres Vedras; b – Setúbal; c – Porto; d – Ponte de Lima; e – Lisboa; f – Castelo Branco; g – Chaves; h – Lamego; i – Penafiel; j – Santo Tirso; k – Caldas da Rainha; l – Portimão Source: OCES, 2005.

20. Decreasing enrolment is not confined to the private sector and Figure 3.10 presents the number of institutions with less than 100 students in the first year.

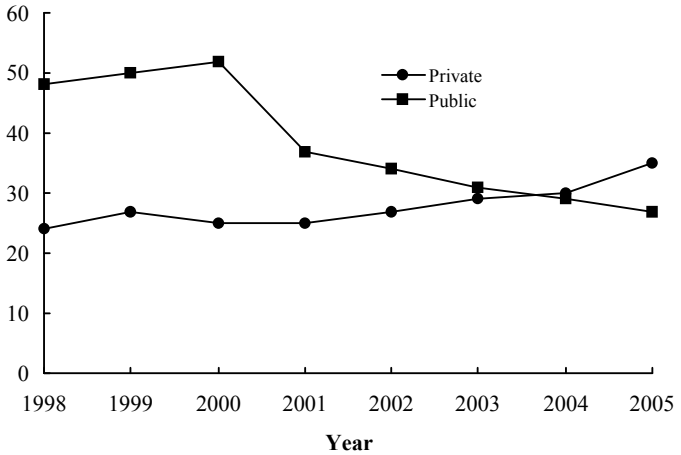


Figure 3.10 – Number of institutions enrolling less than 100 students in the first year
Source: OCES, 2005

21. Table 3.16 presents the decline in the number of new students entering private universities. The total decrease is about 25% in the first year of enrolment, although this is unevenly distributed: the area of Social Sciences, Commerce and Law present a 35% decrease, all the other areas show a 11% decrease. First year total enrolments in Law declined from 1705 in 1997/98 to 674 in 2004/05, which corresponds to a 61% decline.

Table 3.16 – First year enrolments in the private university sector

	1997/98	1998/99	1999/00	200/01	2001/02	2002/03	2003/04	2004/05
Total private university	16 823	17 141	16 575	16 942	16 333	16 137	14 528	12 545
Social sci., commerce, law	10 107	9 501	8 729	9 099	8 477	8 682	7 721	6 538
Others	6 716	7 640	7 846	7 843	7 856	7 455	6 807	6 007

Source: OCES, 2005

22. Regarding private polytechnics, the number of first year students has changed from a total of 8,875 in 1997/98 to a maximum of 10,669 in 2001/02, and then decreased to 8,453 in 2004/05. This shows a decline of only 5% relative to 1997/98 (see Table 3.17), although with larger values in two major traditional areas, namely: Education (from 37% to 24%) and in Social Sciences, Commerce and Law (from 32% to 14%), while a large increase from 14% to 52% occurs in the area of Health and Social Protection.

Table 3.17 – Evolution of first year enrolments in the private polytechnic sector (%)

	1997/98	1998/99	1999/00	2000/01	2001/02	2002/03	2003/04	2004/05
Education	36.9	38.3	53.3	48.5	44.4	39.3	33.0	24.4
Arts and Humanities	7.7	6.0	4.1	4.7	3.5	3.8	3.5	4.3
Social Sc., Commerce, Law	31.6	27.3	17.7	14.0	13.2	12.5	12.9	14.0
Sciences, Maths., Informatics	3.8	3.7	2.9	2.9	2.4	2.3	1.9	1.9
Engineering, Manufacturing and Building Industries	3.2	4.1	2.2	2.5	2.3	1.7	1.9	1.8
Agriculture	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
Health and Social Protection	13.7	17.6	18.0	25.7	32.6	38.1	44.4	52.1
Services	3.2	2.9	1.7	1.7	1.6	2.3	2.4	1.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: OCES, 2005

23. The decrease in enrolment of public sector is more recent. Nevertheless, the health sector in the public polytechnics has increased first year enrolments from 2543 in 1997/98 to 5680 in 2004/05. Similarly, architecture in the public universities increased in first year enrolments from 1864 in 1997/98, to 2458 in 2004/05.
24. Following the data presented in Part II of this report, analyses of enrolments in all programmes across the whole system shows programmes with very few students. For

example, in 2005 there were 286 programmes in public universities with less than 100 students (and of these 161 have less than 50 students and 70 have less than 25 students), and there were 227 programmes in public polytechnics with less than 100 students (and of these 125 have less than 50 students and 39 have less than 25 students). In addition, some public institutions open *campi* in several towns around its main campus, as listed in Table 3.18. These initiatives are often taken in answer to the demands of local authorities and in most cases result in establishing small schools.

Table 3.18 – Number of students in new *campi* established by public institutions outside their main centre of activity

Institution	Area and localization of school	1st year, 1st time 03-04	1st year, 1st time 04-05	1st year, 1st time 05-06
Universities				
Algarve	Gestão, Hotelaria e Turismo de Faro (Portimão)	129	124	90
Aveiro	Tecnologia e Gestão (Águeda)	217	234	190
Aveiro	Design, Gestão e Tecnologias da Produção Aveiro-Norte	0	0	30
UTAD	UTAD (Miranda do Douro)	87	54	51
UTAD	UTAD (Chaves)	145	113	108
Polytechnics				
Bragança	Tecnologia e Gestão (Mirandela)	183	251	221
Castelo Branco	Gestão (Idanha-a-Nova)	139	193	208
Coimbra	Tecnologia e Gestão (Oliveira do Hospital)	100	123	107
Guarda	Turismo e Telecomunicações (Seia)	94	94	80
Leiria	Artes e Design (Caldas da Rainha)	276	266	311
Leiria	Educação (Caldas da Rainha)	0	0	0
Leiria	Tecnologia (Peniche)	207	169	233
Portalegre	Agrária (Elvas)	63	82	59
Porto	Estudos Industriais e de Gestão (Vila do Conde)	247	249	267
Porto	Tecnologia e Gestão (Felgueiras)	105	158	171
Santarém	Desporto (Rio Maior)	105	147	145
Setúbal	Tecnologia (Barreiro)	84	90	46
Viana do Castelo	Agrária (Ponte de Lima)	82	45	31
Viana do Castelo	Ciências Empresariais (Valença)	26	45	38
Viseu	Educação (Lamego)	127	106	117
Viseu	Tecnologia (Lamego)	106	137	145
Tomar	Tecnologia (Abrantes)	91	80	99
TOTAL		**2613**	**2760**	**2747**

Source: OCES, 2006

3. Post-graduate programmes

25. Post-graduate programmes are still a minor activity at the university level, representing less than 12.000 students in 2005, Table 3.19. At present, the traditional Masters offered by university level institutions corresponds to about 8% of total enrolments in public universities (Table 3.20).It should be noted that the new Decree-Law regulating the implementation of the Bologna process gives polytechnics the possibility of offering the new Bologna second cycle of studies.
26. Students enrolled in master's programmes in public universities represented in 2004 about 85% of the total number of post-graduation students, with the Catholic University representing 50% of the non public sector.

Table 3.19 – Enrolments in public universities (master degrees, "Mestrado")

	Enrolments in 31st December														
	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Public	3 015	3 906	4 485	4 550	5 088	5 231	5 607	6 173	6 590	7 448	7 315	7 380	9 226	9 388	9752
Private	222	406	612	737	837	908	1059	1275	1251	1277	1377	1165	1298	1718	1670
Total	**3 237**	**4 312**	**5 097**	**5 287**	**5 925**	**6 139**	**6 666**	**7 448**	**7 841**	**8 725**	**8 692**	**8 545**	**10 524**	**11 106**	**11 422**

Source: OCES, 2006

Table 3.20. Percentage of advanced training students enrolled in portuguese public higher education institutions in 2005-2006

	Initial training students ('Licenciatura' and 'Bacharelato')	**Advanced training students ('Mestrado' and specialization programmes)**	**Percentage of advanced training students in total students**
U. ALGARVE	8.380	338	4%
U. AVEIRO	10.288	731	7%
U.B.I.	5.096	140	3%
U.COIMBRA	17.389	1.484	8%
U. ÉVORA	7.033	533	7%
U.LISBOA	16.791	1.587	9%
U.MINHO	13.796	921	6%
U.N.L.	12.338	1.252	9%
U.T.L.	18.493	2.202	11%
U.PORTO	21.839	2.607	11%
UTAD	6.322	283	4%
ISCTE	5.109	750	13%
U.AÇORES	2.731	90	3%
U.MADEIRA	2.484	48	2%
SUB-TOTAL Universities	**148.089**	**12.966**	**8%**
Other: Polytechnics	**91.496**	**486**	**1%**
TOTAL	**239.585**	**13.452**	**5%**

27. Table 3.21 presents the number of Masters awarded by Portuguese institutions, confirming the concentration of degrees in public universities in the same proportion as that for total enrolments.

Table 3.21 – Students completing Masters

	2001/02	2002/03	2003/04
Public	1987	2543	2673
Private	435	461	489
Total	**2422**	**3004**	**3162**

Source: OCES, 2006

28. Table 3.22 lists the number of doctoral degrees awarded during the last three decades, and their relative increase over recent years is a measure of the level of resources being dedicated to research and graduate training. Public universities have awarded 71% of all degrees, 28% being awarded by foreign universities and the remaining 2% by Portuguese private institutions. From the total number of 12,849 Ph.D. degrees awarded since 1970, there are 11,316 Ph.D. holders in the academic staff of higher education institutions.

Table 3.22 – Number of PhDs awarded by Portuguese and foreign universities

	1970-9	1980-9	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	**Total**
Portugal	293	1 247	250	223	245	378	319	432	459	467	480	575	693	699	799	836	926	**9 321**
Abroad	477	818	87	96	106	115	133	137	149	120	236	196	161	206	175	174	142	**3 528**
Total	**770**	**2 065**	**337**	**319**	**351**	**493**	**452**	**569**	**608**	**587**	**716**	**771**	**854**	**905**	**974**	**1 010**	**1 068**	**12 849**

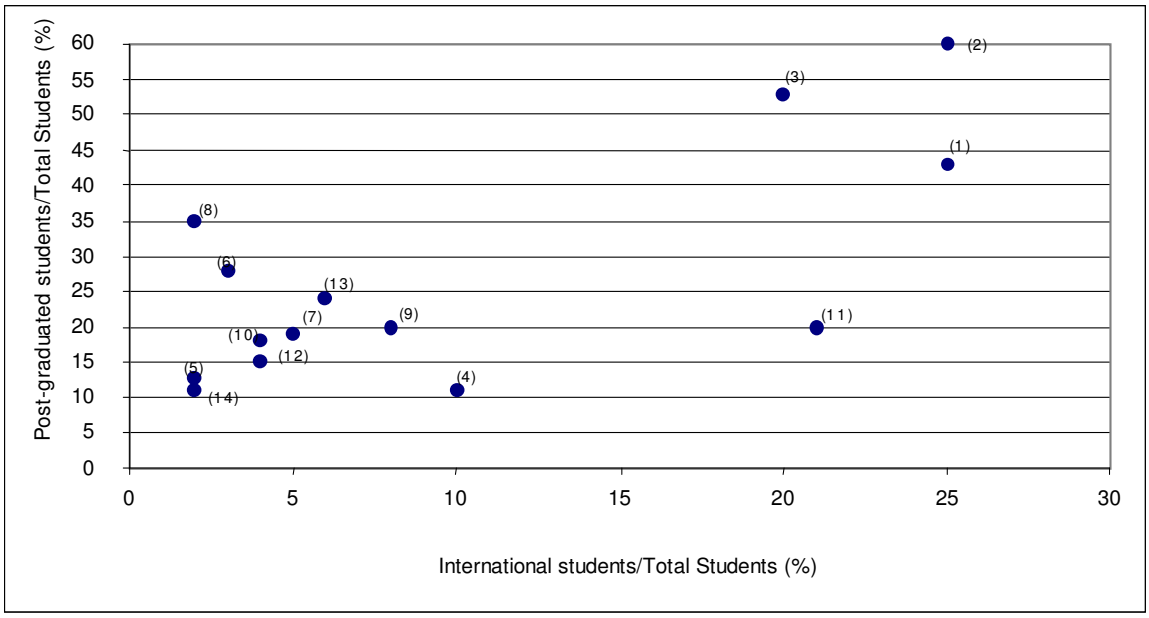
Source: OCES, 2005.

29. Figure 3.11 compares the student structure of the Portuguese Universities with the largest percentage of post-graduate students (i.e., UTL and UP, as in Table 3.20) with those master universities and some research universities considered by Carnegie Foundation. Analysis must be done with caution because it reflects the relative duration of the various programmes, but it is interesting to note that leading research intensive universities surpass 20% of international students and 40% of post-graduate students, totalling 60% in the particular case of the *Massachusetts Institute of Technology*, MIT. Indeed, the hosting of foreign professors and students, mainly at the post-graduate level, is linked to a high diversity of the American higher education system, which is today an important condition to guarantee university excellence. In fact, the extensive research universities are responsible for nearly 70% of all foreign students in the USA, the great majority being post-graduate students.
30. Regarding the current European context of tertiary education, Portugal graduates 3/5 of the PhD´s graduated each year in Spain for each 1000 graduates from higher education. This corresponds to about 1/5 of those PhD´s annually graduated in the Netherlands, or 1/7 of

those graduated in Germany, for each 1000 graduates from higher education (see Table 1.9 for details).

31. In terms of active population, Portugal graduated in 2001 about 3.0 new PhD´s in science and engineering for each 10.000 inhabitants aged 25-34, while this figure for the average EU15 was about 5.5.

Figure 3.11 – Comparison between the student structure of sample Portuguese Universities and that of American universities



Source: UTL(2005), "Knowledge production and diffusion at UTL, 1995/95-2002/03", UTL.
Note 1: (1) Carnegie Mellon University; (2) MIT; (3) Stanford; (4) Michigan Tech University; (5) Illinois State University; (6) University of Dayton; **(7) Technical University of Lisbon** (as based on figures only from engineering students at Instituto Superior Técnico); (8) Cumberland University; (9) University of Arizona; (10) Colorado State University; (11) Georgia Institute Technology; (12) University of Maryland Baltimore; (13) Portland State University; (14) Arkansas State University
Note 2: Data for 2003: MIT, Michigan Tech University, Illinois State Univ, Dayton Univ; Data for 2002: all other universities; According to Carnegie Classification, this figure show 11 research universities and 3 master universities (American universities)
Sources: Annual reports, requests to universities for information

4. Academic Research

32. Academic research represented in 2003 about 50% of total expenditure in R&D (including expenditure by higher education and related non-profit institutions), accounting for 510 M€. Total expenditure (public and private) in R&D was 0.78% of the GDP, while it had reached 0.85% in 2001, when the European average was 1.98% for the EU15 (Figure 3.12). Overall, higher education and related non-profit institutions represented in 2003 about 74% of Portuguese researchers (FTE), with a total value of 24.726 researchers (i.e., head counts), representing 13.008 FTE researchers. In December 2004, higher education institutions included 11.316 teaching staff members holding a PhD degree.

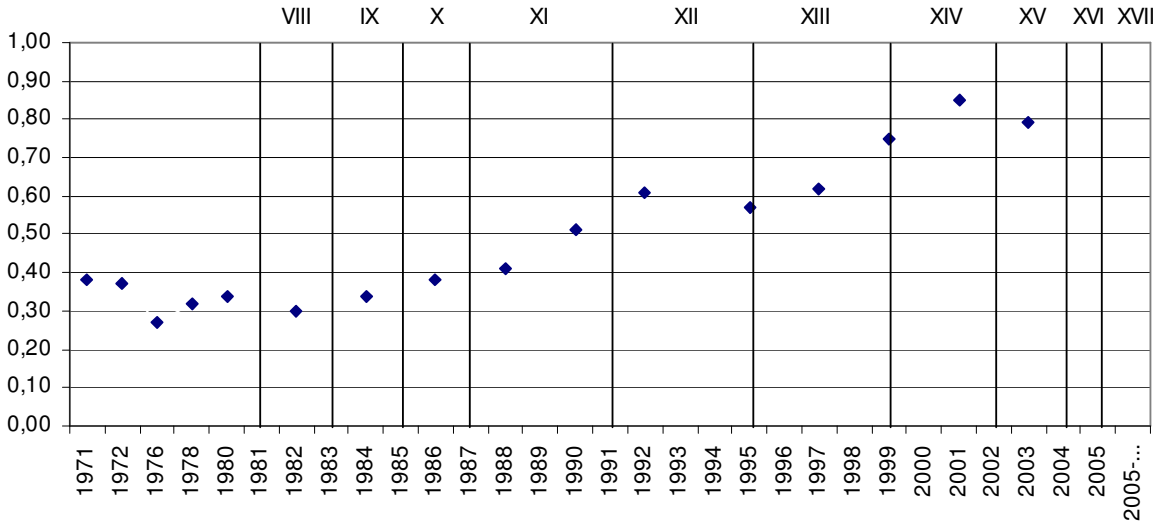


Figure 3.12 – Gross expenditure in R&D (GERD, %) as a fraction of GDP, with identification of the various Governments
Source: EUROSTAT

33. In the context of this discussion, it is also important to note again that in 2001 Portugal was, for the first time in history, part of the group of the countries of excellence that contributed to the share of top 1% of the world's highly cited publications[12]. Between 1997 and 2001, Portuguese researchers contributed with 0.25% of the overall figure. Spain is responsible for 2.08%, whereas Ireland and Greece account for 0.36% and 0.3%, respectively.

12 See the analysis of King, D.A., *The scientific Impact of Nations – What difference countries for their research spending*, Nature, vol. 430, 15 July 2004

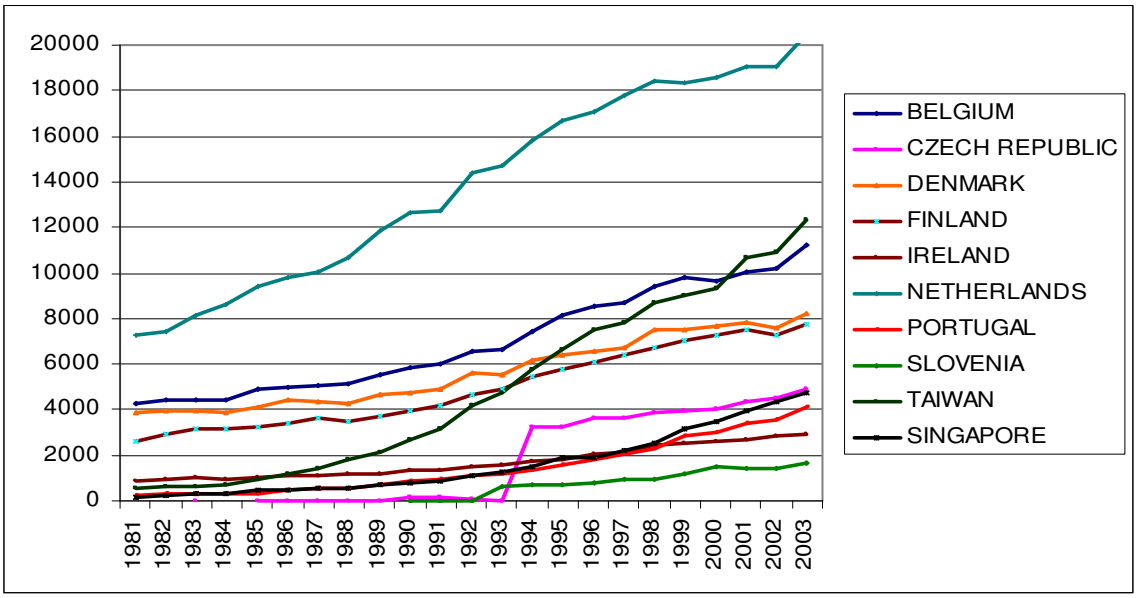


Figure 3.13 – Number of scientific publications in ISI Journals over time for a sample of small nations
Source, ISI; OCES

34. The development of Portuguese science and, in particular, academic research has been achieved in a comparatively high international context and Figure 3.14 shows that 52% of the scientific publications registered at ISI in 2003 have been made in international co-authorship.

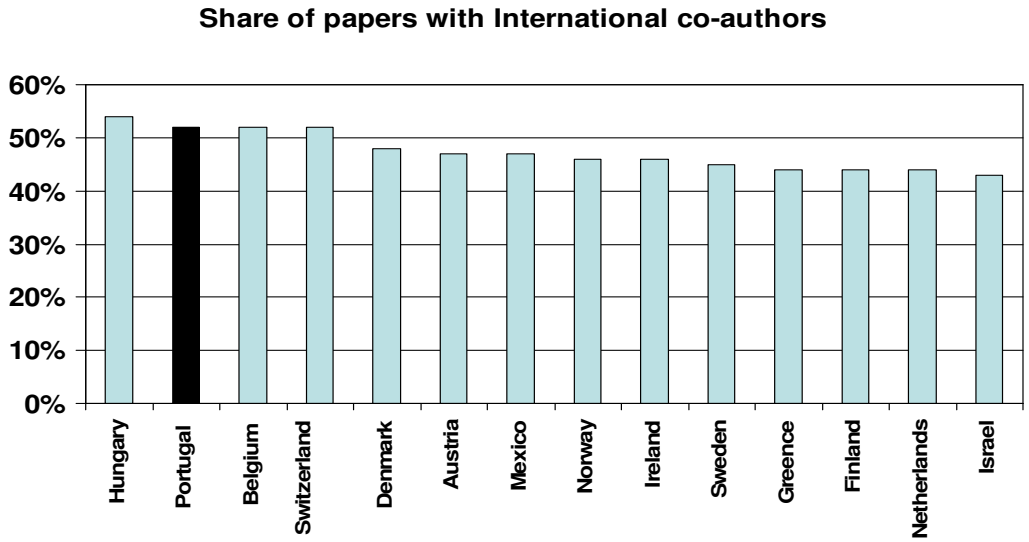


Figure 3.14 – Fraction of scientific publications in ISI Journals made in international authorship
Source, ISI; OCES

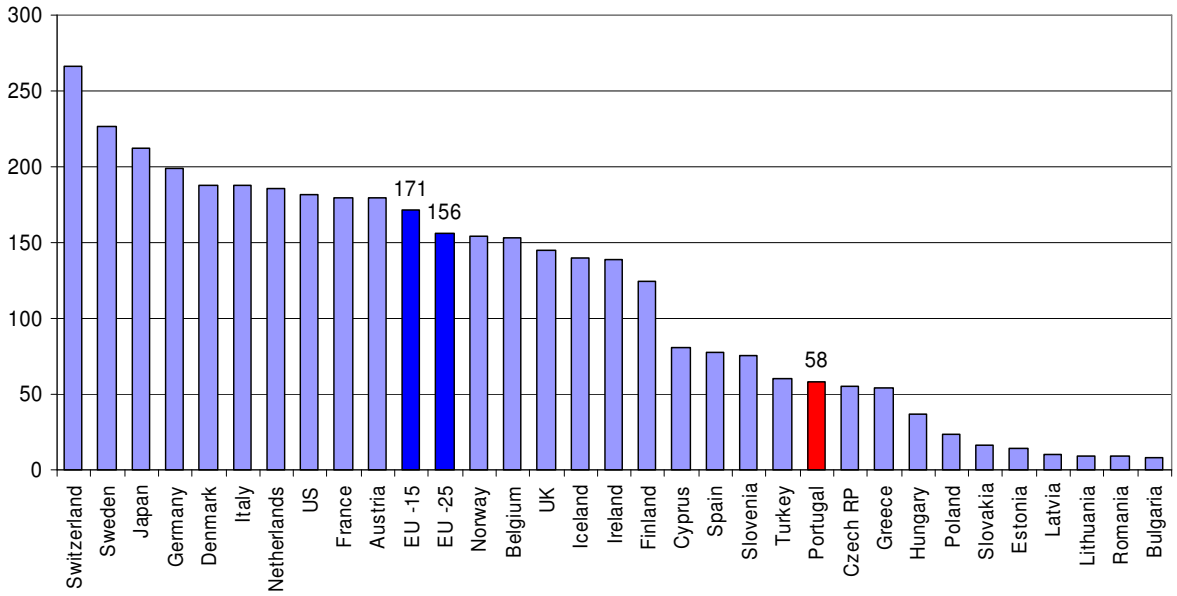


Figure 3.15 – Expenditure in R&D per researcher (1000 € / FTE), 2001

Sources: Eurostat; http://europa.eu.int/comm/eurostat/; Notes: data for 2001 or last year available (Áustria, Reino Unido: 1998; Bélgica, Dinamarca, Grécia, EUA: 1999; França, Irlanda, Itália, Holanda, UE-15, UE-25, Turquia, Suiça: 2000); "FTE" refers to "full time equivalent"

35. The rapid increase in the number of researchers in Portugal has been recent. It is linked to the implementation of the CIÊNCIA programme in the beginning of the nineties and later on to the programme of advanced training scholarships sponsored by the Science and Technology Foundation that allowed the number of PhD holders and researchers to increase sharply in all scientific domains[13] (as described in PART I of this report). It is worth mentioning that the average funding per researcher in Portugal is still one third of the European average in the beginning of the twenty first century, even considering Europe as a 25-nation bloc. However, researchers in higher education in a Europe of 25 have practically half of the funding of their colleagues in the United States, as Table 1.11 shows. Additionally, in 2002 the Portuguese overall R&D funding per inhabitant was barely 39% of the respective EU-25 average (and only around 74% in comparison with Spain). Furthermore, Portugal's GDP per capita was at that time just about 75% of the EU-15 average, which demonstrates the real deficit in R&D funding in Portugal.
36. With regard to the funding structure of R&D activities, in 2001 the State sector funded around 56% of total R&D activities in the EU, while it represented 61% in Portugal. It is also known that these figures differ from the R&D funding structure in more economically and technologically developed countries (i.e., countries where private R&D funding is larger, as is the case of the United States of America: 66%, Sweden: 72%, Finland: 71%). However, it is

13 See, FCT (2002) *Cinco Anos de Actividades – Relatório 1997-2001*, Lisboa, FCT

also known that the R&D systems of these countries are particularly diversified, being public financial support the main funding source of the academic R&D activities.

37. The funding structure is consistent with the low employment percentage in knowledge-intensive service sectors (Table 3.23). Also, the number of PhDs working in industry is very low (Table 3.24). Nevertheless, in the second half of the 1990's, the number of companies active in R&D doubled in Portugal. These companies compete internationally with qualified human resources, R&D and innovation, marketing, design, training and quality, co-operating with S&T institutions.

Table 3.23 – Employment in knowledge-intensive service sectors (share of total employment, %) for EU15, Portugal and some selected countries

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
EU_{15}		6.33[s]	6.29[s]	6.24[s]	6.32	6.29	6.28	6.17	6.07	5.89[s]	5.7[s]
Greece	2.13	2.12	2.08	2.01	2.21[b]	2.000	1.97	1.99	1.91	1.75	2.05
Spain	4.79	4.67	4.61	4.84	4.92	4.85	4.78	4.92	4.87	4.55	4.34
Ireland	4.45	4.30	4.35	4.40	3.94[b]	4.05	3.53	3.71	3.69	3.38	3.77
Finland		5.17	5.28	5.11	5.27	5.18	5.25	5.25	5,38	5.09	4.85
Portugal					3.14	3.17	3.14	3.05	2.91	2.87	3.08

NOTES: s – EUROSTAT estimate; f – Break in series; Source: EUROSTAT (2005)

38. The deficit of Portuguese private R&D can be better understood through recent analysis of private R&D in Europe (e.g., DTI, 2004). This study identified the critical role of multinational corporations in Europe, as well as the importance of research and development activities for their success. Nevertheless, it is worth mentioning that whereas a medium-sized multinational in the north of Europe invests more than 6% of its turnover in R&D, one of the largest Portuguese companies (for instance, in the car component sector), with a turnover 10 times lower, invests around 3%. This results in a ratio of 1 to 20 in terms of resources – but only 1 to 2 in terms of turnover - allocated to research and development activities. As multinationals have not moved to Portugal[7], at least in a way that might have increased the private sector R&D, and within the current context of foreign direct investment in southern Europe and particularly in Portugal, it is urgent to rethink the relationship of the university with the private sector to ensure a process of European convergence in terms of the S&T national level.

Table 3.24 – Number of researchers with a PhD working in industry*

Year	Number of PhDs
1995	41
1997	94
1999	104
2001	113
2003	189

* includes those with equivalence to a PhD
Source: OCES, 2005

7 There are exceptions such as the recent development of the Centre for Innovation of Siemens Portugal, in Carnaxide.

Strengthening S&T

39. Science and technology got a major boost in the mid 1990s with the implementation of specific policies focused on the promotion of human resources and scientific institutions. The Ministry of the Science and Technology was created in 1995, resulting in profound institutional changes. Three new organisations were created: the Foundation for Science and Technology (FCT) with evaluation and financing responsibilities, the Institute for International Cooperation in S&T (ICCTI) for promoting international cooperation in science and technology, and the Observatory of Sciences and Technologies (OCT), with observation, inquiry and data analysis responsibilities. In addition, the development of the Portuguese scientific and technological system was stimulated within the framework of a deep reform in the evaluation of R&D institutions, to guarantee the independence and effectiveness of the evaluations, the publication of the respective methodologies and results, as well as the exercise of the right to recourse. This exercise included all academic research units, and the implementation of new programs to foster advanced training, namely at the Ph.D. level, and to promote the mobility of human resources.
40. Major reforms implemented in the second half of the 90's to increase R&D potential by investing in advanced training of human resources and in competitive funding of R&D activities, as well as in strengthening R&D institutions and their internationalization, included the following measures (OECD, 2002):

- R&D programs integrate scholarship grants for initial (graduate) and advanced (PhD and Post-doc) training and the launching of scientific careers. This has been based on funding of research projects across all scientific domains on a competitive basis by international quality standards. Similar measures are contemplated for advanced human resource training and research targeted to ICT.
- Project funding is dependent on team and project quality assessment by independent evaluation panels including a majority of international experts. Application for funding is opened yearly by the FCT for all areas of knowledge. Beneficiaries are research teams in public or private institutions with R&D activities, and business enterprises in consortia with R&D institutions or engaging in integrated R&D programs. Since the aim is to develop the general science base, there is no thematic prioritization in the general funding programme. Project selection is based on project and team quality assessment.
- Dedicated thematic programmes are also dedicated to public interest issues (e.g. forest fires, marine science, ethnic minorities, protection of natural environments, drug addiction) and for participation in international R&D institutions to which Portugal is a member (EMBL, ESO, ESRF, ESA, CERN, ESO). Evaluation parameters and procedures are similar to those of the general programme. In the context of Information Society, new R&D programs were set up, targeted at ICT and their use in social and economic context, and computational processing in Portuguese language.

41. Academic research is organized in "Research Units", most of them are associated to public universities (Table 3.25). To strengthen the institutional development of sample units,

"Associated Laboratories" have been created and promoted since 2000 and incentives were provided for the continuous implementation of independent scientific evaluations. This process involved the reorganization of part of the R&D system and has strengthened the level of responsibility and accountability to society.

Table 3.25 – Research centers accredited by FCT, 2004

Type of institution	Centres
Public universities	384
Public Polytechnics	8
Catholic University	14
Private universities	7
Other private institutions	20
Total	433

Source: FCT

42. The network of associated laboratories created since 2000 consisted in specific contracts with networks of existing R&D units with strategic orientations and missions considered of public utility. The status of "associated laboratory" was conferred by the Ministry of Science and Technology for a period of up to ten years, through a contract that specifies the amount of public funding of the laboratory and the missions that it is committed. These laboratories had an initial funding for five years and their status of associate lasts for up to ten years. They are evaluated after five years and at the end of the contract period, which can be renewed after positive evaluation.
43. Fifteen associated laboratories were established in 2000 and 2001, integrating 31 R&D institutions. There are today 21 associate laboratories involving 38 R&D institutions in Physics, Chemistry, Earth and Space Sciences, Marine Sciences, Geological Sciences, Health Sciences, Materials Sciences and Engineering, Chemical and Biotechnological Engineering, Electrical and Computational Engineering and Social Sciences. These laboratories include 41 research units, have 2,200 researchers, 1,452 of them holding a Ph.D. and had funds totaling € 268 Million for the first 10 years (as in http://www.fct.mct.pt/pt/apoios/laboratoriosassociados/quaissao/).
44. An important infrastructure in the networking of R&D institutions has been the creation of an information network (i.e., RCTS), linking universities and research centers, libraries and elementary and secondary schools by broadband. All linked institutions were provided sub-domains, e-mail accounts and space for web pages. One of its developments is the creation of a Network Science and Technology Library connecting all adherent institutions to common library resources online and to international databases. The first step towards the creation of this Science and Technology Library has already been taken through an agreement with the Institute for Scientific Information, making ISIs' databases available online to all Portuguese research institutions.

45. The *Innovation Agency* (AdI, http://www.fct.mces.pt/pt/empresas/inovacao/), as created in 1993, was co-coordinated with S&T policy, implementing support for consortia of business and R&D institutions and the promotion of R&D results for economic use.
46. New policies to foster the public understanding of science and technology were also particularly introduced during the second half of the 90's. The "Ciência Viva" has been particularly ambitious to promote dissemination activities and support cooperative networks of basic and secondary schools with research centres. The importance of promoting science education and/or creating science culture has been widely identified and discussed (Gago, 1990). There are two main arguments to consider: first, S&T should be considered as an open system, with different and diversified ways of participation, mainly derived from the fact that scientific activity is increasingly part of people's live, so that the training of scientists should not be confined to a specific group of people, but rather developed broadly and as part of today's education; and second, the goal of fostering the public understanding of science, where schools and other institutional settings (e.g, science museums) have a determinant role in stimulating curiosity and the interest for scientific knowledge.

Assessing of R&D Institutions

47. The implementation of a new model for funding and assessment of R&D units was launched in 1996, covering all 270 units existent at the time. International expert panels rated candidate units in a five degrees scale ranking from 'poor' to 'excellent', and made recommendations for strategic orientation, future investment and activity plans. Quality assessment takes into account research performance by international standards, including publications in international journals and patenting activity, where appropriate. Subsequent evaluations take into account the compliance to the recommendations and the good use of the previous funding, besides R&D performance and publications (OECD, 2002). Following the assessment exercise, funding for units classified as Poor was discontinued. The remaining 257 units were funded under the multi-year funding Program for R&D Units of FCT, receiving base funding per post-doc, with the level of funding being partially based on the assessment. Following consideration of appeals submitted by certain units, distribution of the classifications Excellent, Very Good, Good and Fair among the units receiving funding was 17%, 31%, 32% and 19% respectively.
48. The second assessment of 1999/00 included the units assessed in 1996 and funded under the multi-year funding Program of FCT, covering a total of 263 units and 4068 Ph.D.'s, and including new units that had become autonomous or were the result of mergers of units assessed in 1996. Around 160 foreign scientists, organized in 21 separate panels, took part in the 1999 assessment, which included the analysis of reports and activity plans, as well as visits by the assessment panels to the research units.
49. The third assessment of 2002/04 involved the Units financed through the multi-year funding Program of FCT, including those resulting from the partition or merger of Units evaluated in 1998 or 1999. It focused on the worth of the activities carried out in the period 1999/01, as

well as on the activity plans for 2003/05. It also assessed the applications submitted to the 2001/02 call for proposals for new Research Units. One hundred and eighty international and Portuguese experts, belonging almost entirely to foreign institutions, made up the Panels responsible for the evaluation.

50. The results of the assessment are given in detail elsewhere (FCT, 2005), but a number of general observations clearly expressed during the evaluation are of particular interest. Table 3.26 presents the main indicators of the Portuguese Research Units in 1996, 1999 and 2003. The steady increase of the number of PhDs and Units from one evaluation cycle to the other is clearly evident in the Table, reflecting the impact of a stable financing model on the R&D system that became progressively more mature. The number of PhDs increased at an average rate of 19%/year in the period 1996 - 2003. The average size of the Units increased too, but the growth seems to be stabilizing from 1999 to 2003.

Table 3.26 – Situation of the Portuguese Research Units in 1996, 1999 and 2003

Indicators	1996	1999*	2003
Number of PhDs	3 575	5 823	8 324
Number of units	270	354	473
Average number PhD/unit	13.2	16.4	17.6

Consolidated in December 2000.
Source: FCT, Evaluation of Research Units 2002-2004, overall report

51. Research Units have a significantly smaller dimension in the Arts, Social and Human Sciences areas than in the remaining part of the Portuguese R&D system, Figure 3.16. The numbers, however, also show that those areas are growing at a faster rate, increasing their share of the overall system in terms of the number of Units and PhDs, respectively from 27% to 39% and 21% to 30%, from 1996 to 2003. In spite of these increases, the average dimension is still small, probably below a critical threshold value.
52. Figure 3.16 shows the evolution of the number of Full Time Equivalent (FTE) PhDs in the Research Units, per scientific area, from 1996 to 2003. Considering the 2003 data inclusive of the Associated Laboratories, it can be observed that the number of PhDs increases steadily, for almost all areas, from one evaluation to the other. Between 1999 and 2003, this general increase is particularly noteworthy for areas such as Philosophy, Art and Architecture, Economics and Management, Health Sciences, History, Sociology, Anthropology, Demography and Geography, Literature and Electrical and Computer Engineering, which grew 88.7%, 88.0%, 79.6%, 62.3%, 61.6%, 57.9%, 54.7% and 54.6%, respectively. Figure 3.16 also reflects the heterogeneous distribution of the number of PhDs integrated in the 15 Associated Laboratories (AL) existing in December 2003 across the different scientific areas.

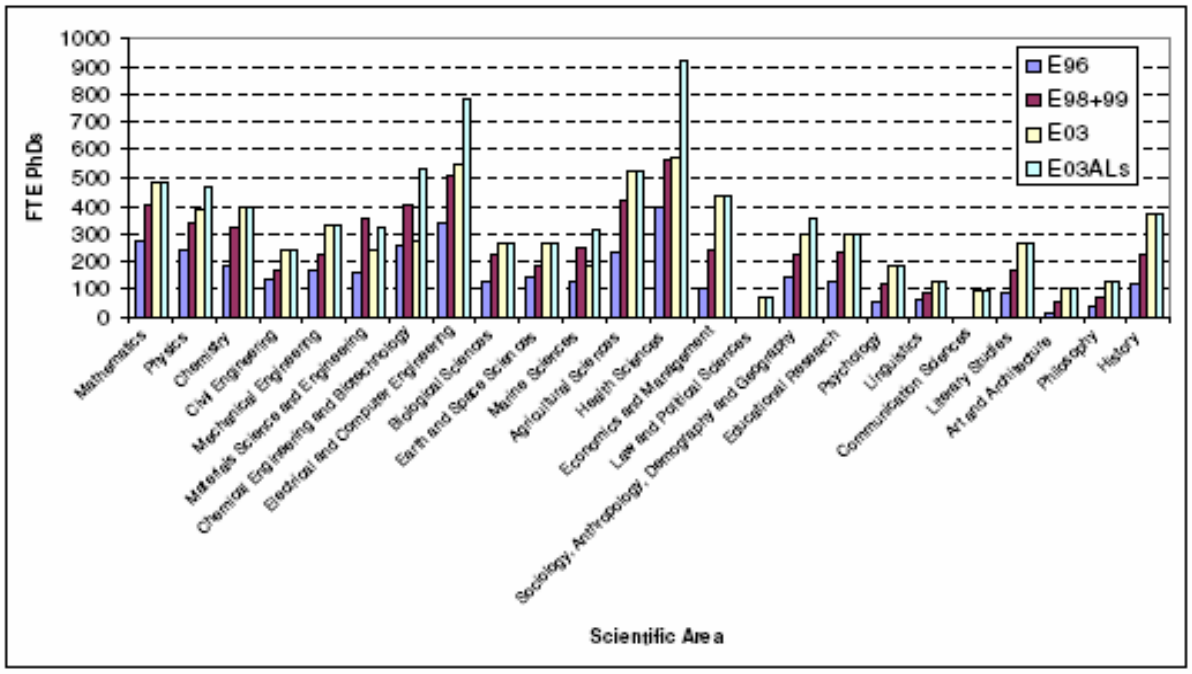


Figure 3.16 – Evolution of the number of FTE PhDs in research units per scientific area, 1996 to 2003

Source: FCT, Evaluation of Research Units 2002-2004, overall report

53. The analysis can be taken a step further by considering the data in Figure 3.17, which represents the evolution of the number of Research Units from 1996 to 2003. Again, the growth in the number of Units in the Arts, Social and Human Sciences areas from 1996 to 2003 is evident, being particularly important in Art and Architecture, History and Economy and Management (300%; 200%; 182%). The distribution of the number of Units integrated in Associated Laboratories is also not homogeneous, although the differences are smaller than in that case of the PhDs.

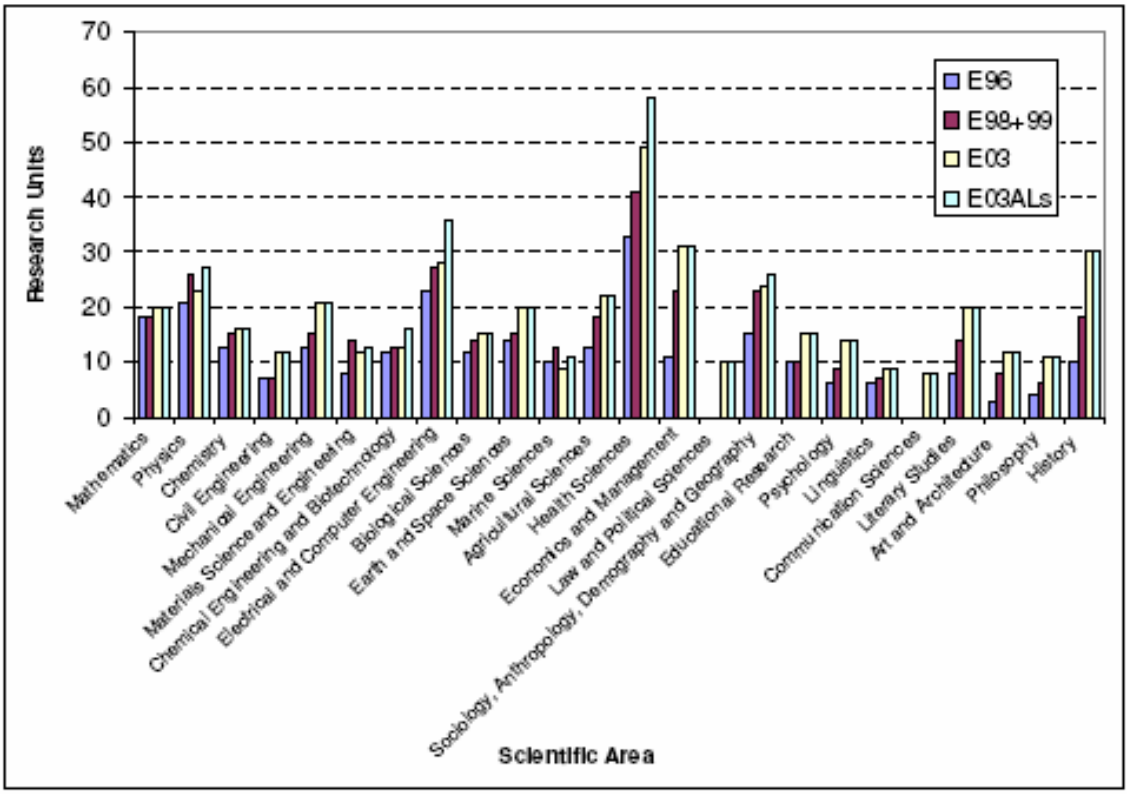


Figure 3.17 – Evolution of the number of research units per scientific area, 1996 to2003
Source: FCT, Evaluation of Research Units 2002-2004, overall report

54. Figure 3.18 crosses data of Figures 3.16 and 3.17 and quantifies the average dimension of the Research Units in the different areas. The results show a steady increase in the PhDs/Research Unit ratio from 1996 to 2003, with higher average ratios in the following areas (by decreasing order): Chemical Engineering and Biotechnology (34), Marine Sciences (29), Chemistry (25) and Materials Science and Engineering (25). Conversely, the areas with lower average ratios are Art and Architecture (8), Law and Political Sciences (8), Philosophy (12) and Communication Sciences (12), all Arts, Social and Human Sciences areas. It should be noted that two of these areas were evaluated and financed in 2003 for the first time.

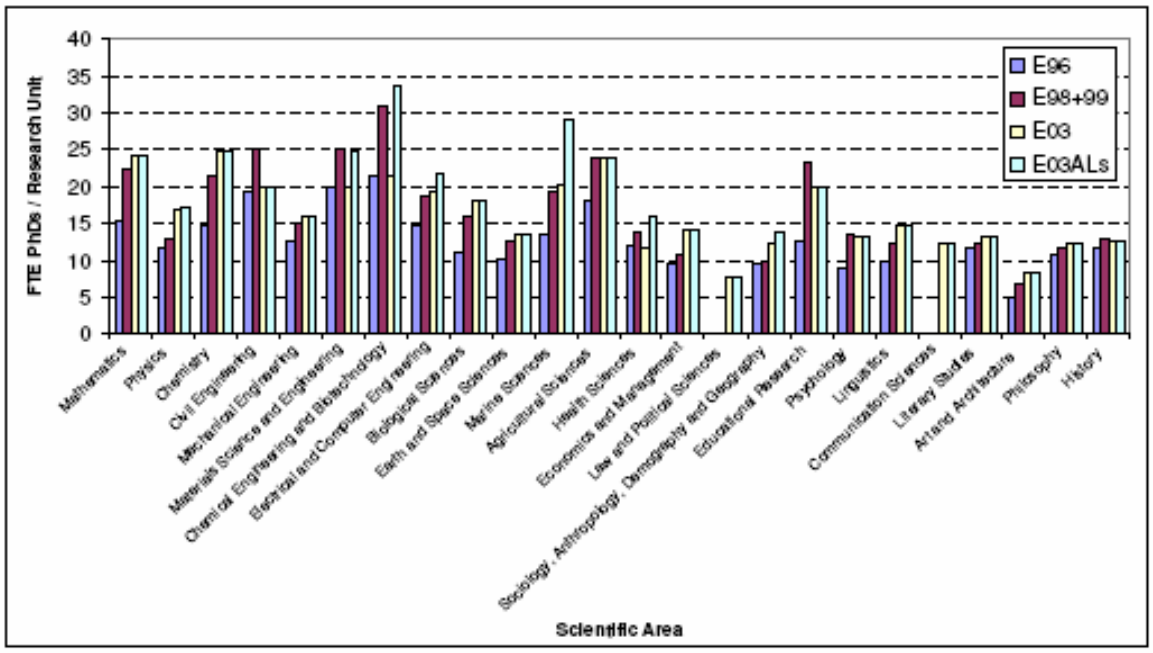


Figure 3.18 – Evolution of the ratio PhD/unit per scientific area, 1996 to 2003
Source: FCT, Evaluation of Research Units 2002-2004, overall report

55. These policies have resulted in a continuous increase in the number of doctorates, especially when considering European and international figures, a fact that was systematically referred to by the generality of the evaluation panels as a decisive factor to guarantee the critical mass essential for scientific development (Heitor, 2000). The number of scholarships for advanced training awarded by the Foundation for Science and Technology, Figure 3.19, has given an important contribution for progress registered in research activities.

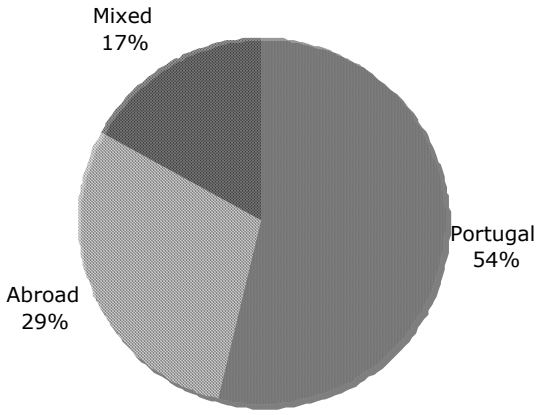


Figure 3.19 – Scholarships for advanced training (Masters, PhD and post-doctoral)

56. The growth of academic research during the last decade can also be assessed in terms of the number of research collaborations at European level and Figure 3.20 quantifies the relative strength of Portuguese participation in the 6th Framework Programme by scientific field.

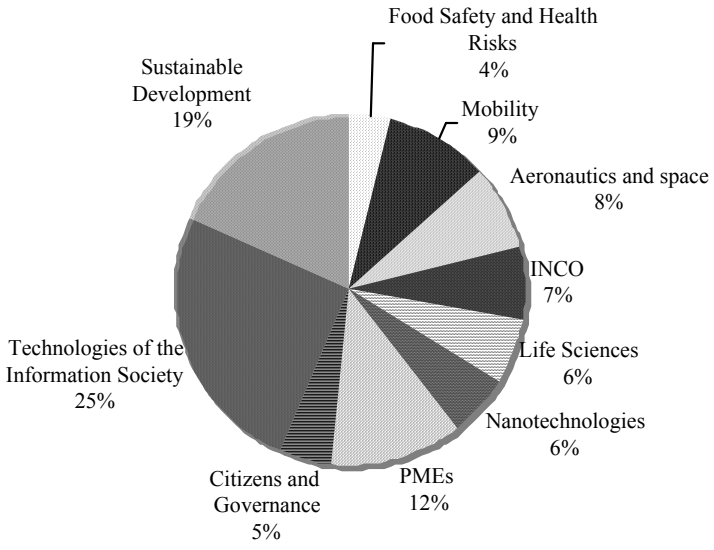


Figure 3.20 – Number of projects for the Portuguese participation if the 6th Framework Programme, by scientific area

Fostering industry-science relationships

57. Existing programmes seeking to develop university-industry links include:

- Doctors and Masters in Companies and Technology Centres, aiming at encouraging firms to recruit human resources holding a doctoral or a master degree, in order to strengthen company's R&D, technological innovation and competitiveness.
- IDEIA - Applied R&D in Companies, aimed at supporting cooperative R&D projects involving companies and S&T organisations, in order to develop new products, process or services. The programme gives special emphasis on product innovation.
- Centres of Excellence – Competence building making use of ICT – is a programme aimed at supporting networking of companies, research centres, Universities, Polytechnic Institutes, Public bodies and business associations. The main goals are the following:
  - Encouraging the linkages between companies, research centres, high education and universities to develop networks
  - Promote the development of new and better services and new technologies
  - Orientate sector and regional S&T development toward key areas
  - Contribute to improve education curricula

- NEST - New Technology Based Companies, to provide financial support to the creation, launching and development of technology-based firms that have a close relationship with domestic S&T organisations and/or are expected to reach a high level of technological capacity.
- The NEOTEC Initiative is concerned with the provision of seed capital for the creation of new technology-based firms, by supporting them in the different stages, from the identification of market potential to the commercialisation. Its aims include encouraging the carrying out of research activities and the exploitation of its results and stimulating entrepreneurship and an innovation culture

58. Figure 3.21 presents the results (accumulated values) of the programme "Doctors and Masters in Companies and Technology Centres" which is contributing to increase the number of people with a postgraduate degree in industry.

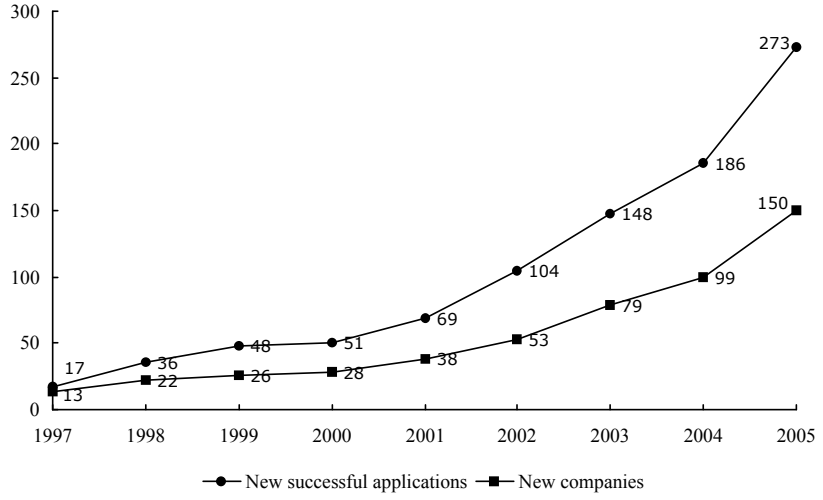


Figure 3.21 – Number of successful applications and of new companies in the programme "Doctors and masters in Companies and Technological Centres".
Source: Adi, 2006

59. The diffusing character of R&D consortia may be analysed based on the projects approved by the Innovation Agency, AdI, in the period 2001/2002, which has involved 119 research projects undertaken by consortia of science and technology (S&T) companies and academic R&D units. Although most of the support was concentrated on projects led by companies from the high and medium-high technological intensity sectors (69%), there was a significant participation of projects in sectors with greater weight in the Portuguese economic fabric that are generally classified as being of low technological intensity (44,3% of the number of participations), as in Table 3.27. The impact of these projects in the modernisation of the economic fabric is even more important given the high diffusing potential of the consortia. As was the case with the projects supported in 1996-2000, the great majority concern product innovation (77%), in order to facilitate adding value to national production. Furthermore, as most of the product innovation projects are for items of equipment and software, which represent production means for other economic sectors, they will contribute towards

technological modernisation of those sectors, spreading the results of innovation. This is readily apparent on the matrix shown in Table 3.28 which juxtaposes the main technological areas of the projects and the main application sectors of the technologies being developed. Chemical technology is spread through the textile, clothing and footwear sectors, as well as to the wood and cork and environmental sectors. Material technologies are strongly co-related with the construction, mechanical, and plastics sectors, as well as to the electronics sector. Mechanical technologies is playing a spreading role in the transport materials, textile, and electronics sectors. Finally, the information and communication technologies (ICT), with their horizontal characteristics, is spreading their innovative effects throughout virtually all sectors, including those such as maritime activities, public works, metal-mechanical working, transport and company services. Taking the textile/clothing and footwear sectors as examples, we can note that these sectors are benefiting from the diffusion of technological innovation developed by technology companies working in such diverse areas as mechanics, ICT, materials, chemicals and biotechnology.

Table 3.27. Distribution of R&D consortia approved by the Innovation Agency, AdI, in the period 2001/2002 by technological intensity levels

Technological Intensity Levels	Number of Participations	Eligible Investment	Total Public Support
Low	44,3%	30,6%	29,1%
Medium-low	6,3%	2,5%	1,9%
Medium-high	12,5%	9,5%	9,6%
High	37,0%	57,4%	59,4%
Total	*100,0%*	*100,0%*	*100,0%*

Source: AdI, November 2002

Table 3.28. Distribution of R&D consortia approved by the Innovation Agency, AdI, in the period 2001/2002 by application area

Source: AdI, November 2002

	Technological Areas							(%)
	Application Sectors	Agro-food	Biotech.	Chemical	Mats +Civil En	Mechanics	ITC	Total
1	Sea	0,8					3,4	4,2
2	Agro-food	8,4	2,5	0,8				11,8
3	Environment			0,8			1,7	2,5
4	Health		7,6	1,7	0,8		2,5	12,6
5	Chemicals			2,5				2,5
6	Plastics			0,8	1,7	0,8	1,7	5,0
7	Wood +Cork			1,7			0,8	2,5
8	Construction				3,4		2,5	5,9
9	Textiles / Clothing Footwear		0,8	2,5	0,8	2,5	0,8	7,6
10	Metal working				0,8	0,8		1,7
11	Mechanical				2,5	1,7	2,5	6,7
12	Transport Equipment				0,8	4,2		5,0
13	Electronics+Instruments.				1,7	1,7	1,7	5,0
14	Software						7,6	7,6
15	Telecom						10,1	10,1
16	Transport						4,2	4,2
17	Other Services						5,0	5,0
	Total	9,2	10,9	10,9	12,6	11,8	44,5	100,0

60. It should be noted that 30% of the R&D consortia funded through AdI (by number) are undertaken in collaboration with S&T companies and institutions from other countries, including Europe, but also from America and Asia. The international projects account for more than 44% of the eligible investment expenditure and when we set this against the number of projects we see that these projects are larger than the average. Furthermore, about 22% of the projects are led by multinational companies, or companies with significant foreign-owned share capital. This significant presence of companies with foreign capital is a good indication of the trend that has been seen for the up-grading of foreign investment in our country. Adding the two percentages (and subtracting the effect of the intersection of the two types of internationalisation) we find an internationalisation rate of 45% (measured by the number of projects) and 56% (by the relative importance of the investment sums involved).

Table 3.29. Distribution of R&D consortia approved by the Innovation Agency, AdI, in the period 2001/2002 in terms of the level of internationalisation

Distribution of Nº of Projects			
	Source of Capital*		
Project Context	National	Foreign	Total
National	55,5%	14,3%	69,7%
International	22,7%	7,6%	30,3%
Total	78,2%	21,8%	100,0%

Distribution of eligible expenditure			
	Source of Capital*		
Project Context	National	Foreign	Total
National	44,2%	11,4%	55,7%
International	34,2%	10,1%	44,3%
Total	78,5%	21,5%	100,0%

* Classification of proposing company

61. Against the background of the initiatives described above, the process of technology transfer in Portugal has consistently been considered from a short-term perspective and has been based on specific contracts, mainly of a consultancy nature. Today, it is clear that science and technology cannot be promoted independently of an innovation policy and that in turn innovation determines and is determined by the market. However, it is also clear that research and innovation are structurally distinct activities, each with its own incentives, which are complementary but not interchangeable. While it is necessary to be aware of the reality in Portugal and its lag in science, technology and innovation compared to the European average, the important changes in progress should not be forgotten, particularly in terms of the endogenization of a "culture of monitoring and accountability", as well as the international recognition of the enormous potential for expanding research activities and technological development. Against this background, any consideration of the considerable opportunities available to Portugal, must reflect on the need for a "culture of change" and of rigour, thus fostering quality in the light of increasing numbers of Portuguese PhDs, which continue to rise at rates far higher than the European average.
62. In many evaluation reports produced over the last years by FCT, it is mentioned that various coordinators of research units have often mentioned the difficulty in implementing intellectual property protection mechanisms as a way to promote scientific impact and ensuring

institutional integrity of the R&D units and the university. The main obstacle identified is a deficit in administration competences and technology commercialization, but it is above all related to the problem in defining market strategies and connections with large companies that help launch new technology-based companies.Regarding the first critical aspect to be considered, the analysis of the data provided by one of the Portuguese engineering schools, IST[14], shows that between 1995 and 2003, 4.1 patents per year were submitted through this service, of which 2.37 were international patents and 1.75 national patents. These figures contrast with the average of 7.5 patents submitted in 2002, by 98 English universities[15], where the links between the universities and the productive sector are more intense. But the weak submission of patents is also due to the low competences of technology commercialization and, above all, to the diffusion of innovation that today demands expert structures. For instance, a case usually referred to in the literature consists in the evolution of the Technology Licensing Office of MIT that today employs about 30 experts, most of whom have technical training, with special focus on engineering areas, and professional experience in industry. Thus, the commercialization of patent portfolios, together with market strategies can be promoted. It is evident that organizational practices and institutional incentives play a relevant role in the effective technology transfer processes, so that institutional policies should focus on the following:

- The competences and the capacities of technology transfer offices;
- The incentive systems that are inconsistent with a more dynamic and pro-active attitude;
- The encouragement of faculty, researchers and postgraduate students in terms of their entrepreneurial potential capability and the development of new technology-based business projects.

Promoting academic research

63. In the context of the present analysis, a particular note should be mentioned in terms of the process of building a science community under international reference terms, as initiated during the second half of the nineties, in that the consecutive international evaluations of S&T institutions carried out since 1996 have imposed a dynamic of change within the university community and, above all, a considerable enthusiasm resulting, undoubtedly, from the fast increase in the presence of young doctorates and of Ph.D. students, as well as a higher expression of international connections.
64. In fact, the continuous increase in the number of doctorates, especially when considering European and international figures, was systematically referred to by the generality of the evaluation panels as a decisive factor to guarantee the critical mass essential for scientific development. However, in 2003, the number of researchers in terms of the active population represented still about 1/2 of the European average (2.9 and 4.9, respectively for every

14 See, for details, UTL (2005), "Knowledge production and diffusion at UTL 1995(96-2002/03".
15 AURIL, NUBS (2003) *UK University Commercialisation Survey: Financial Year 2002*

thousand inhabitants) and analysis led review teams to clearly indicate the need for structural actions, including:

- Reinforce infra-structural aspects, including the support to libraries and the widespread electronic access to documentation centres, and fast and efficient access to the Internet.
- Intensify the technical and administrative support, that continued to be particularly below the European average when analyzed in terms of the personnel per researcher (respectively, 3.9 and 9.5 for every thousand inhabitants), but also because of its reduced quality in most cases.
- Complement the current lines of public R&D funding with thematic programs of multi-disciplinary nature, to be naturally associated with national priorities, namely with reference to the enormous public investments of coming years (e.g., information society, telecommunications, transports, as well as public risks). It is important to note the structuring nature that these types of programs can have, namely to promote the connection of the scientific community to the civil society.
- Facilitate the scientific activity within knowledge integrated communities and networks that stimulate the institutional relationship, not only between academic centres, but also between these centres and other actors, namely State Laboratories, secondary schools and companies. The valorisation of those scientific-based networks, in addition to decreasing the effects related with the reduced dimension of the units, should certainly promote the creation and diffusion of new knowledge, motivating the scientific development in a context of continuous change and growing internationalization of the scientific base.
- Privilege the national and international mobility of researchers, primarily valuing the European area and in a context of effective need to promote the internationalization of the research community.
- Implement coherent protective measures of intellectual property as a way to promote scientific impact, in addition to preserve its institutional integrity, in a context of growing importance of innovation as a critical factor of economic development.
- Develop own competences at the level of the technology management, in addition to the reinforcement of strategies that promote links with companies and the release of new technological-based companies.

65. It should be noted that the evaluation reports produced over the last years are clear when discussing the implementation of the measures above, and in general of the Portuguese scientific and technological development, in that it is strongly conditioned by structural deficiencies in the organization and constitution of the majority of the units, and particularly in terms of their relationship with universities, including:
    - A deficient articulation between education and research, requiring an improved partition of the workloads of teachers and students, namely regarding the distribution of the academic schedules, but above all, the valorization of post-graduate education and of the research activities in the structure and organization of the universities.
    - Relative ageing of research and university personnel, demanding the adoption of rejuvenation policies and the integration of young researchers, in a way that allows the vaporization of their careers, the materialization of the fair aspirations of promotions of the younger teachers/researchers, the integration of new doctors, and the promotion of a dynamics of international collaboration with centres of excellence world-wide.
    - Insufficient support structures, in a way that requests support enlargement, and the adoption of development strategies and flexible approaches for university operation.

66. As pointed out by the Evaluation Panel in the area of Mathematics in 2000, “it is not the education mission that is being challenged or questioned, but the lack of flexibility in

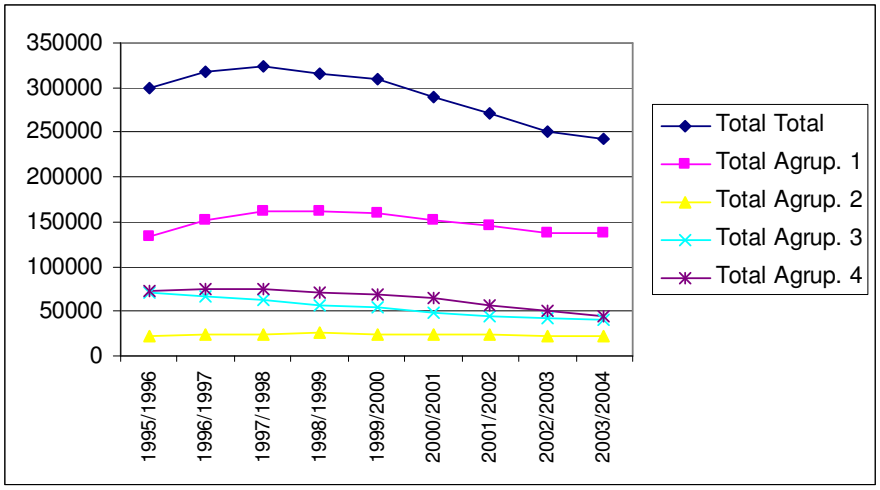
recruitment and in the management of teaching duties of each faculty member". Generally, many of these comments confirm the observations made in the several reports drawn up in the context of evaluations conducted in 1996, 2000 and 2003. In fact, the need to promote the link between university R&D units and society and with companies in particular, has been mentioned. Although these aspects are particularly applicable to the areas of Exact Sciences, Engineering/Technology Sciences, Natural Sciences and Health Sciences, it has been systematically mentioned the need to promote scientific-based cooperation and national and international mobility, within the European area, as one of the processes to get over past difficulties imposed by the way of relationships with the hosting institutions.

67. It is also imperative to refer that many of the evaluation panels that visited Portugal over the last years concluded that the direct funding by industry, reduced as it is, has not had a significant impact on the quality of the research and has been, almost exclusively, used for short term purposes and at the level of technological development. Actually, analysis shows that the current situation is primarily due to the absence, in the past, of integrating science and technology policies, and it requires the priority promotion of collaboration forms between research centers and the entrepreneurial reality.
68. The recent European report on the "Benchmarking the promotion of R&D culture and Public Understanding of Science" (Miller et al., 2002)[16] clearly acknowledges the leading role of "Ciencia Viva" programme implemented in Portugal since 1996, but also recognizes the still difficult climate for promoting science culture in Portugal. Although the country is commonly characterized for low science literacy levels, if we turn the values of Figure 3.22 into relative measures of student enrolment, it is interesting to note the increasing trend allocated to science and technology courses, as illustrated in Figure 3.23. This has been called as the "Ciência Viva Effect" and reflects the openness of the Portuguese society to measures associated with science culture. In fact, the continued implementation of actions fostering "science for all" is a practice to follow, where the role of the Ministry of Science, Technology and Higher Education appears particularly suitable to facilitate the joint enrolment of researchers and basic and secondary schools in specific projects driving society at large. It is clear that this requires new knowledge about social behaviors, as well as new methodological developments, namely at an European wide level, and the work of "Ciência Viva" programme provides important guidelines to help moving towards a "Portugal of knowledge" in a fast moving landscape.

16 Miller, S., Caro, P., Koulaidis, V., Semir, V., Staveloz, W. and Vargas, R. (2002). *Report from the Expert Group Benchmarking the promotion of RTD culture and Public Understanding of Science*. Available at http://www.jinnove.com/upload/ documentaire/PP-fe-106.pdf

Figure 3.22 – Students enrolled in secondary education (10th to 12th grades) in Portugal for 1996-2004, per type of studies

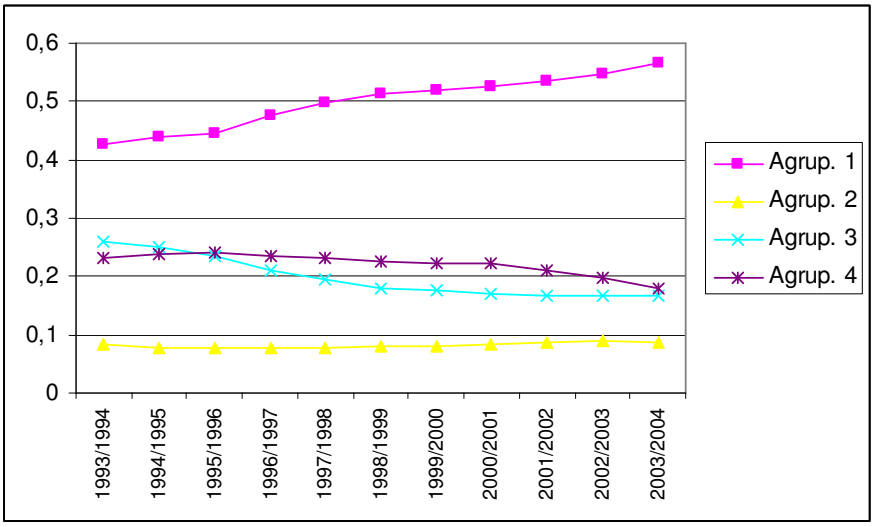
Source: Conceição and Heitor (2005); Primary data from DAPP, Min. Education



agrup 1	Sciences
agrup 2	Arts
agrup 3	Socio-economics
agrup 4	Humanities

Figure 3.23 – Percentage of students enrolled in secondary education (10th to 12th grades) in Portugal for 1994-2004, as function of the type of studies

Source: Conceição and Heitor (2005); Primary data from DAPP, Min. Education



Note: key as in Figure 3.22

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PART III.3

A CAPACITY ANALYSIS

1. The Portuguese higher education system has gone through a process of fast expansion, namely until 2002. Large investments were made in the qualification and expansion of the number of academic and non-academic staff and in new facilities. In this context, this chapter analyses the capacity installed and its relative adequacy to the labour market and to the present rates of total enrolment.

1. The academic and teaching staff

2. Table 3.30 quantifies the student/teacher ratio experienced in 2004/05 in public university and polytechnics, with average values about 14 (as calculated on the basis of FTE teachers). This compares with other European figures, as discussed in Part I of this report, although for considerably different qualification levels. However, it should be noted that the overall student/academic staff ratio in terms of head counts is 10.4 for the whole system, with ratios equal to 11.6 for public universities, 10.4 for public polytechnics and 8.8 for the private sector. For any measure, the results suggest that attention should be paid to other factors that can reduce the efficiency of the system, such as the level of qualification of the academic staff, the excessive number of courses and institutions with a very low number of students, as well as in some cases an excessive number of weekly direct contact hours. It is clear that the situation changes when examining the qualification of the academic staff because the percentage of staff with a PhD is still low by international standards.
3. Table 3.31 shows that the number of the academic staff in public universities holding a PhD has been steadily increasing over the last decade, although it still represents only about 55% of the overall number of university teachers.
4. It should be noted that the growth of PhD´s has been done very much based on "in-house" training programmes and, for example, Figure 3.24 shows the high inbreeding rate of Assistant Professors at the two largest Portuguese engineering schools, namely at the Instituto Superior Técnico of the Technical University of Lisbon and at the Faculty of Engineering of the University of Porto. Inbreeding does not allow structural changes, nor does it often allow new approaches to scientific research and education problems. It has in fact been internationally recognised[17] as an obstacle to the diffusion of new forms of organisation and knowledge. Besides, the inbreeding problem is not exclusively a Portuguese problem, since Spain also shows a very high inbreeding rate, around 95%. On the other hand, countries like the United Kingdom have an inbreeding rate of only 17%, as a high mobility of faculty has been developed throughout decades[18]. Despite the facts described above it is worthwhile mentioning that PhD researchers mobility mainly occurs under the scope of R&D units, often at post-doctoral researchers' level. This fact strengthens the critical role of R&D units because it helps the institutionalisation of mobility in the scientific community. Indeed, it was the growing number of young PhD holders in research units that led

17 European Commission, (1995) *White Paper on Education and Learning – Towards the Learning Society* (COM(95)590)

18 Navarro, A. and Rivero, A.(2001), *High rate of Inbreeding in Spanish Universities*, Nature 14 1

the international evaluation panels in the course of evaluation processes of R&D units to consider that there are dynamics of change. Nevertheless, these dynamics have had little impact on the overall university structure.

Table 3.30 – Ratio of students to teaching staff in higher education Portuguese institutions in 2004/05, calculations based on full-time equivalents

	Students (total)	Teaching Staff (FTE)	Students per teacher
U.ALGARVE	9116	619	15
U.AVEIRO	11702	838	14
U.B.I.	5273	406	13
U.COIMBRA	19872	1317	15
U. EVORA	8384	573	15
U.LISBOA	20411	1517	13
U.MINHO	15707	1084	14
U.N.L.	14840	999	15
U.T.L.	21802	1616	13
U.PORTO	26387	1841	14
U.T.A.D.	6603	547	12
I.S.C.T.E.	5739	373	15
U.AÇORES	3342	260	13
U.MADEIRA	2735	185	15
TOTAL UNIVERSITIES	**171913**	**12175**	**14**
IP BEJA	3227	219	15
IP BRAGANÇA	5348	439	12
IP C.BRANCO	4652	328	14
IP CAVADO E AVE	1447	162	9
IP COIMBRA	9218	555	17
IP GUARDA	3543	241	15
IP LEIRIA	9187	506	18
IP LISBOA	13992	1030	14
IP PORTALEGRE	3342	200	17
IP PORTO	15395	1030	15
IP SANTAREM	3842	256	15
IP TOMAR	3348	240	14
IP SETUBAL	6029	450	13
IP V.CASTELO	3352	257	13
IP VISEU	6266	399	16
ESUP HOT. TUR. ESTORIL	1063	47	23
ESC. SUP. ENF. NAO INT.	4490	381	12
TOTAL POLYTECHNICS	**97741**	**6740**	**15**
TOTAL	**269654**	**18915**	**14**

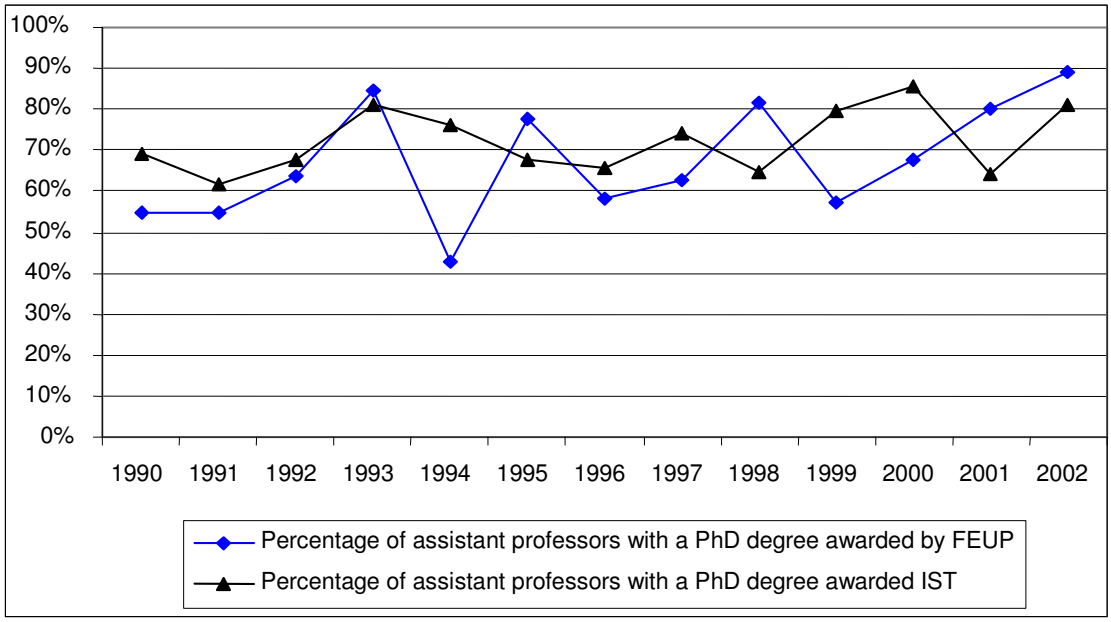
Note: Universidade Aberta, the portuguese distance education institution has been excluded from the analysis given its specificity in terms of ratio of students to teaching

Table 3.31 – Academic staff holding a PhD (FTE); public universities

Institution	1993	1996	1999	2001	2002	2003	2004
Azores	34	63	83	101	132	133	142
Algarve	31	76	120	169	187	199	217
Aveiro	137	219	306	358	376	385	394
UBI	23	45	72	95	124	143	166
Coimbra	435	549	678	724	770	783	836
Évora	65	118	176	222	256	277	315
Lisbon	611	803	863	924	942	962	982
Technical	676	895	1006	1069	1118	1141	1177
New U. Lisbon	325	441	567	618	630	676	674
Minho	161	261	370	462	492	549	608
Porto	631	862	999	1125	1149	1183	1214
UTAD	52	82	145	196	201	221	245
Madeira	2	25	32	48	49	58	73
Aberta	8	22	36	62	69	77	79
ISCTE	41	84	103	126	141	160	173
Total	**3232**	**4545**	**5556**	**6299**	**6636**	**6947**	**7295**

Source: OCES, 2005

Figure 3.24 – Evolution of the inbreeding rate in two engineering schools (Instituto Superior Técnico, UTL, and Faculty of Engineering, University of Porto), for 1990 - 2003



Note: the inbreeding rate is calculated on the basis of PhD holders, who remain in the same institutions as assistant professors.
Source: UTL (2005), "Knowledge production and diffusion at UTL 1995(96-2002/03".

5. Table 3.32 quantifies the number of PhD holders employed in R&D units evaluated with the best classifications. The analysis is further quantified in Figure 3.25 with the relative numbers of eligible researchers holding a PhD in R&D units classified as Excellent and Very Good by Portuguese university. The results show a large disparity across different universities, as explicitly

acknowledge by various review committees in the various evaluations carried out though FCT. It should be said that many evaluation panels[19] that visited academic research units under the scope of international evaluations organized through FCT have mentioned the need to promote the mobility of researchers and professors through limitation of inbreeding processes. This leads to reflect on the need to rethink the structure of doctoral programmes and post-graduate programmes in Portugal. Indeed, the need to expand the recruitment base and facilitate placements in post-graduate and post-doctoral programmes abroad, and promote an effective internationalisation of the scientific community was systematically pointed out by evaluation committees.

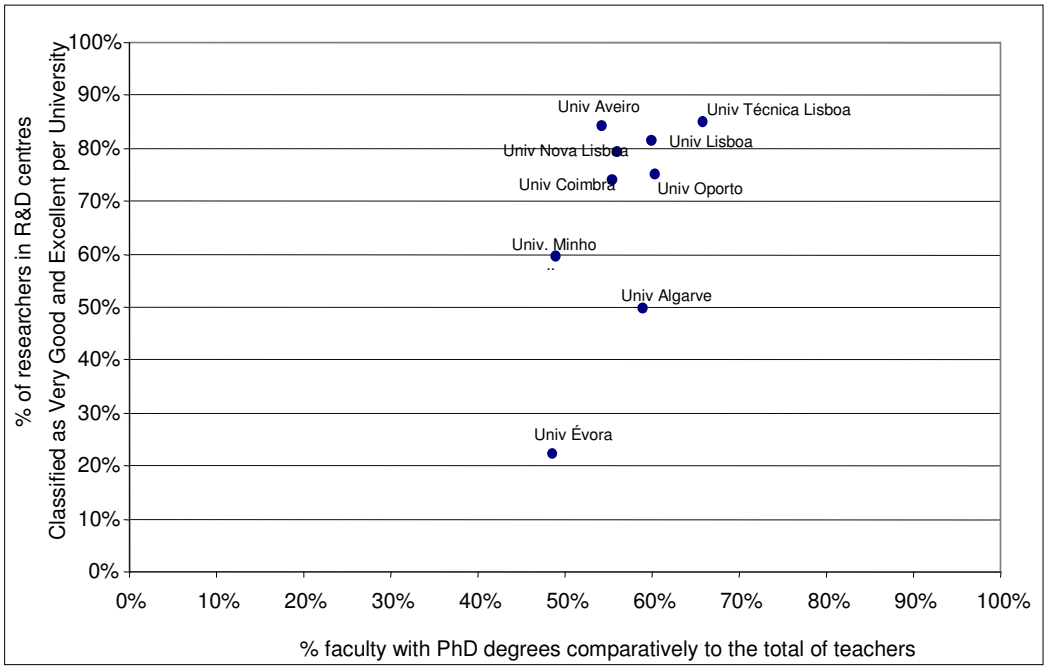
Table 3.32 –PhD holders in R&D units rated as Excellent and Very Good, by scientific area in 2000

Scientific areas	Global figures for Portugal	
	Number of PhDs (FTE) in centres rated as "Excellent" and "Very Good"	Percentage of eligible PhDs in centres rated as "Excellent" and "Very Good"
Mathematics	445	77%
Physics	304.25	84%
Chemistry	216	74%
Earth and Space Sciences	128	57%
Marine Sciences	209.5	88%
Land Sciences	74	17%
Health Sciences	600.5	79%
Civil Engineering	79	40%
Mechanical Engineering	161.75	64%
Materials Sci.& Engineering	185.25	73%
Chemical Engineering and Biotechnology	267	78%
Electr. & Computer Engin.	432.75	81%
Economics and Manag.	112	44%
Sociology, Anthropology, Geog.and Demography	134.75	51%
History	145.25	53%

Source: FCT

[19] See Heitor (2000), namely for the panels of Mathematics, Economics and Management, Earth and Space Sciences, and Electrical and Computer Engineering

Figure 3.25 – Percentage of eligible researchers in research centres that were rated as "Very Good" and "Excellent" in relation to the total of eligible PhDs per university



Note: Only the research centres belonging to the universities that provided the number of eligible PhD holders per centre in 2000 were considered. The evaluation of the centres was updated according to the evaluation process conducted in 2002. Source: FCT

6. The available data for polytechnics show that there has been a modest career progress in public polytechnics, Table 3.33. In 2005 there were 860 PhDs, which accounts for 24% of the staff in the academic career. This can be partly explained by the lack of updating of the number of places ("quadro") for hiring academic staff. Furthermore, contrary to public universities, the personnel hired under special contracts are quite significant, representing over 50% of the total staff. It should also be noted that the polytechnic academic career differs from the university academic career, both in structure and in the number of teaching hours. The structure differs also in that the major post-graduate requirement in the polytechnics has been the master level, while university careers require a Ph.D..
7. Analysis also shows that, from 1993 and 2003, the percentage of Coordinators has increased from 5.4% to 7.4%, the percentage of aggregates has increased from 17.8% to 25.3%, the percentage of assistants has decreased from 24.7% to 13.4%, while the percentage of specially hired staff has only slightly increased from 52.1% to 54.0%. This means that the intake of younger people (assistants) has slowed down, while a considerable number of staff members have completed their masters' degree and become "aggregates".
8. Table 3.34 presents the available data on the academic staff of private universities and the percentage of staff holding a PhD, together with student/staff ratio for undergraduate studies (which varies between 8.4 and 24.4).

Table 3.33 – Composition and qualification of the public polytechnics' academic staff

Institution	2002/03				2004	
	Coordinator	Aggregate	Assistant	Special	PhDs	Masters
Univ. Algarve*	19	103	30	201	38	193
Univ. Aveiro*	5	24	8	110	12	82
Beja	17	85	44	93	17	146
Cávado e Ave	1	9	18	42	6	31
Bragança	15	130	159	162	73	184
C. Branco	23	112	78	132	41	184
Coimbra	24	159	64	423	76	254
Guarda	18	81	79	91	27	151
Leiria	16	98	120	364	50	223
Lisboa	86	210	29	638	119	372
Portalegre	6	48	11	140	24	88
Porto	86	187	84	599	134	460
Santarém	23	99	53	116	28	161
Setúbal	23	118	24	328	54	254
Viana Castelo	17	74	34	144	43	166
Viseu	36	83	33	281	46	208
Tomar	26	54	34	145	23	103
Health sector**	135	297	141	200	49	403
TOTAL	**576**	**1971**	**1043**	**4209**	**860**	**3663**

Source: DGES, 2005. *Only polytechnic schools **Nursing schools integrated in the local polytechnic

Table 3.34 – The number and qualifications of academic staff members (FTE), private universities (2005)

	Ph.D.	Masters	No P.G.	Total (1)	%Ph.D.	Students (2)	Ratio (2)/(1)
Católica	405	338	412	1155	35.1	8974	7.8
Autónoma[a]	53	91	152	297	17.9	3785	12.8
Autónoma[b]	-	-	-	-	-	24	-
Internacional[a]	2	7	8	17	12.0	187	11.2
Internacional[c]	-	-	-	-	-	-	-
Internacional[d]	4	8	18	30	12.0	539	17.8
Lusíada[a]	50	96	104	249	20.0	4935	19.8
Lusíada[e]	49	72	68	190	25.8	4639	24.4
Lusíada[f]	24	29	14	66	35.7	1115	16.8
Portucalense[e]	28	45	32	104	26.8	2382	22.8
Independente[a]	31	31	66	128	24.3	3046	23.8
Atlântica[a]	5	7	7	19	27.1	222	11.4
F. Pessoa[e]	119	73	57	249	47.7	2827	11.4
F. Pessoa[g]	10	11	10	31	31.2	262	8.4
Lusófona[a]	148	182	241	571	26.0	9412	16,.5
Moderna[a]	21	26	26	73	29.1	989	13.6
Moderna[e]	9	30	18	57	15.9	937	16.4
Total	**957**	**1045**	**1234**	**3236**	**26.5**	**44275**	**13.7**

NOTES: a – Lisbon; b – Caldas da Rainha; c – Chaves; d – Figueira da Foz; e – Porto;
f – Vila Nova de Famalicão; g – Ponte de Lima.
Sources: OCES, 2005; DGES, 2005

2. The installed physical capacity

9. Tables 3.35 to 3.37 present data collected across all public institutions of higher education over 2006 and suggest that the available capacity is apparently adequate for the existing number of students, at least considering similar quantitative indicators of other EU countries. Even in those cases where the number of users exceeds the total available capacity (e.g. libraries and computer rooms) one has to consider that there may be several daily shifts, allowing for an increased number of users in good conditions.

Table 3.35 – Installed physical capacity of public institutions, as measured by DGES: total spaces (education and social support)

	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Administrative areas	7 587	243 899	34 906	33 854
Pedagogic areas	8 817	644 255	78 915	78 417
Pedagogic/scientific support areas	15 870	433 004	56 034	91 852
Social support infrastructures	3 258	508 331	69 221	79 704
Other Infrastructures	2 353	135 971	12 227	53 311
TOTAL	37 885	1 965 460	251 303	337 138

Source: DGES, 2006

Table 3.36 – Installed physical capacity of public institutions, as measured by DGES: student support systems

Central administration	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Administration	50	2 151	135	126
Offices	1	15		
Public attendance (a)	81	1 714	3 268	972
Technical personnel (b)	190	4 249	276	285
Others	86	2 045	292	398
Subtotal	408	10 174	3 972	1 782
Social support infrastructures				
Canteens	152	87 053	32 592	38 387
Bars/Restaurants	190	20 520	13 372	30 308
Halls of residence	2 686	223 475	14 282	nd
Sports (Including university stadiums)	149	171 426	7 467	9 140
Socio-cultural services	14	2 653	647	1 175
Health services	43	1 949	494	453
Others	24	1 254	367	107
Subtotal	3 258	508 331	69 221	79 704
Total SAS	3 666	518 505	73 193	81 486

Source: DGES, 2006

Table 3.37 – – Installed physical capacity of public institutions, as measured by DGES: available spaces

Central administration	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Administration (Rector/President/Boards)	175	4 180	172	163
Meeting rooms	83	3 511	1 383	673
Secretariat	88	2 106	182	161
Accounts	83	2 226	210	213
Offices	464	7 763	772	690
Computer rooms	102	2 863	159	159
Personnel management	55	1 676	159	130
Acquisitions	37	1 036	46	46
Others	719	35 870	8 844	9 820
Subtotal	1 806	61 231	11 927	12 055
Schools – Administration	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Administration (Boards)	705	15 527	1 004	925
Meeting rooms	311	12 397	5 051	4 390
Secretariat	554	20 001	1 511	2 348
Accounts	262	8 085	706	646
Officies	1 542	26 915	2 129	2 300
Computer rooms	339	10 161	829	855
Others	1 660	79 409	7 777	8 553
Subtotal	5 373	172 494	19 007	20 017
Schools – Pedagogical spaces	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Classrooms	3 755	216 372	11 792	9 088
Conference rooms	659	86 035	20 465	18 883
Laboratories	2 802	179 724	35 572	37 088
Laboratory annexes and Workshops	976	29 487	2 230	5 829
Others	625	132 637	8 856	7 528
Subtotal	8 817	644 255	78 915	78 417
Schools – Support spaces	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Academic staff – Offices	10 022	162 782	15 465	15 425
Academic staff – Meeting rooms	421	14 614	4 959	4 383
Research laboratories	2 061	95 618	3 171	2 311
Libraries	2 014	96 449	15 161	30 479
Photocopies	214	7 040	742	4 593
Computer rooms	645	35 473	10 230	21 857
Study rooms	493	21 029	6 306	12 805
Subtotal	15 870	433 004	56 034	91 852
Schools – Other spaces	Number of spaces	Total Area (m2)	Estimated Capacity (users)	Number of typical users
Students Unions	434	25 340	1 891	14 646
Employment support centres	41	851	38	10 230
Others	1 878	109 780	10 298	28 435
Subtotal	2 353	135 971	12 227	53 311
TOTAL	**34 219**	**1 446 955**	**178 110**	**255 652**

Source: DGES, 2006

10. Table 3.17 provides a global quantitative picture, but do not convey any information about the quality of the built environment. It should be noted that various international review committees that evaluated R&D units since 1996 have identified a wide variety of situations concerning the availability and general quality of spaces to the practice of R&D activities. Main issues raised are about the morphology of the built environment, namely in what concerns the implementation of dual purpose spaces integrating teaching and research, in a way to foster the continuous interaction through proximity (and eventual share) of teaching (i.e.: study rooms) and research (i.e.: laboratories and researchers offices) areas. This type of spatial organization fosters a constant interaction between professors, researchers and students, allowing students to gain from R&D activities carried out in higher education institutions, as demonstrated through many international practices[20], as well as systematically referred by specialized associations[21] and in the literature[22]. All of these practices are based on the creation of conditions that are able to promote students' learning experiences through the nurturing of synergies between research and teaching.

20 See University of Melbourne Teaching Spaces Management Plan 2003-2007: http://www.ists.unimelb.edu.au/tic/tsmp.htm;

21 See Project Kaleidoscope (PKAL) http://www.pkal.org/template2.cfm?c_id=1048;

22 See O'Hare, M., (1998) "Classroom design for discussion-based teaching", *Journal of Policy Analysis and Management*, Vol 17, nº 4, 706-720

3. New publics and the adequacy to the labour market

11. Table 3.38 presents data on new entrants into the labour market over the period from 1992 to 2002. Despite a consistent increase of the percentage of new employees with a higher education degree (from 2.1% in 1992, to 10.7% in 2002) the data shows that over that period only 5.7% of the almost 2 million new employees had a higher education degree.

Table 3.38 – Qualifications of the new entrants into the labour market

Year	HE graduates		Non HE graduates/unknown		Total
	Number	%	Number	%	Number
1992	6 117	2.1	291 865	97.9	297 982
1993	5 292	2.5	202 661	95.5	207 953
1994	6 708	3.3	198 755	96.7	205 463
1995	6 470	4.2	148 384	95.8	154 854
1996	7 070	4.8	140 772	95.2	147 842
1997	9 048	5.8	146 903	94.2	155 951
1998	11 004	7.0	146 919	93.0	157 923
1999	12 583	7.8	148 592	92.2	161 175
2000	14 614	9.4	141 546	90.6	156 160
2002	29 931	10.7	249 045	89.3	278 976
Total	**108 837**	**5.7**	**1 815 442**	**94.3**	**1 924 279**

Note: Year 2002 accumulates data from 2001.
Source: SILATEE (2002) as cited in CIRIUS final report, 2004

12. Table 3.39 presents sample data about the areas of graduation of the new entrants to the labour market for the period 1994-97 and shows a decline in the percentage of graduates in economics and management and an increase in graduates from social sciences, while the percentage of engineering graduates remains almost stable. It should be noted that a recent report (Alves, 2005) on the employment of the graduates from the University of Lisbon (1999-2003) shows some additional interesting conclusions. Graduates in Medicine, Physics, Computer Sciences and Pharmacy (representing 45.7% of all the University's graduates) get, in general, employed once they obtain their degrees, graduates in Geography, Mathematics, Fine Arts, Design, Education, Psychology and Dental Medicine (30% of all graduates) are generally employed shortly after completing their degrees, while graduates in Philosophy, Geology, History and some graduates in Psychology (13.9% of all graduates) wait at least 12 months before finding employment.

Table 3.39 – Graduation areas of the new entrants into the labour market

	1994		1995		1996		1997	
Economics/management	1 632	22.2	2 000	28.5	1 984	25.5	2 527	25.7
Engineering	1 370	18.7	1 225	17.4	1 457	18.7	1 687	17.1
Arts	253	3.4	222	3.2	261	3.4	357	3.6
Sciences	469	6.4	393	5.6	509	6.5	583	5.9
Education	560	7.6	546	7.8	489	6.3	551	5.6
Health Sciences	345	4.7	299	4.3	289	3.7	342	3.5
Social sciences	581	7.9	485	6.9	546	7.0	605	6.1
Int. relations/communication	229	3.1	290	4.1	351	4.5	606	6.2
Agriculture, Agro Industries	275	3.7	208	3.0	213	2.7	227	2.3
Others	1 628	22.2	1 360	19.4	1 685	21.6	2 362	24.0
Total	**7 342**	**100.0**	**7 028**	**100.0**	**7 784**	**100.0**	**9 847**	**100.0**
	1998		1999		2000		2002	
Economics/management	3 161	26.8	2 997	22.6	3 006	21.4	5 610	19.8
Engineering	1 822	15.5	1 609	12.1	2 571	18.3	4 877	17.2
Arts	384	3.3	344	2.6	754	5.4	1 772	6.2
Sciences	574	4.9	525	4.0	501	3.6	1 506	5.3
Education	584	5.0	459	3.5	531	3.8	1 298	4.6
Health Sciences	398	3.4	327	2.5	504	3.6	1 189	4.2
Social sciences	795	6.7	756	5.7	2 157	15.3	4 536	16.0
Int. relations/communication	728	6.2	675	5.1	317	2.3	663	2.3
Agriculture, Agro Industries	265	2.2	192	1.4	173	1.2	294	1.0
Others	3 072	26.1	5 381	40.6	3 565	25.3	6 627	23.4
Total	**11 783**	**100.0**	**13 265**	**100.0**	**14 079**	**100.0**	**28 372**	**100.0**

Source: SILATEE (2002) as cited in CIRIUS final report, 2004

13. Despite the relative massification of higher education in recent decades, the rates of return of higher education degrees in Portugal have been persistently high, at the highest level for the 15 EU countries (Pereira and Martins, 2000). For example, Table 3.40 shows that 81.2% of the relative earnings of new employees with a higher education degree lie in the highest quintile, which compares against only 16.1% for non-graduates.

Table 3.40 – Relative earnings to the new entrants' average earnings

	HE graduates		Non graduates/unknown		Total	
	Number	%	Number	%	Number	%
Quintile 1	1 120	1.3	265 959	18.9	267 079	17,9
Quintile 2	1 513	1.7	331 972	23.6	333 485	22,3
Quintile 3	3 105	3.5	295 960	21.1	299 065	20,0
Quintile 4	10 947	12.3	284 440	20.3	295 387	19,8
Quintile 5	72 190	81.2	225 456	16.1	297 646	19,9
Total	**88 875**	**100.0**	**1 403 787**	**100.0**	**1 492 662**	**100,0**

Source: SILATEE (2002) as cited in CIRIUS final report, 2004

14. However, Table 3.41 shows that until 2000 there has been an apparent convergence of the relative earnings of graduates and non-graduates, a trend that seems to have been reversed in 2001/02.

Table 3.41 – Evolution of the relative earnings to the new entrants' average earnings

	HE graduates	Non graduates/unknown	Total
	Average	Average	Average
1992	2.74	0.96	1.00
1993	2.62	0.96	1.00
1994	2.47	0.95	1.00
1995	2.15	0.94	1.00
1996	2.04	0.94	1.00
1997	1.93	0.93	1.00
1998	1.93	0.86	0.94
1999	1.89	0.91	1.00
2000	1.77	0.90	1.00
2002	2.03	0.89	1.00
TOTAL	**2.03**	**0.93**	**1.00**

Source: SILATEE (2002) as cited in CIRIUS final report, 2004

15. Table 3.42 presents the evolution of the relative earnings of new labour market entrants with a higher education degree, by area of graduation and shows that engineering graduates have the highest earnings followed by the health professions. However, in the latter case one needs to take into account that most graduates have degrees in nursing and health technologies, not in medicine. It is also interesting to notice the decreasing trend in the earnings of graduates in economics/management.

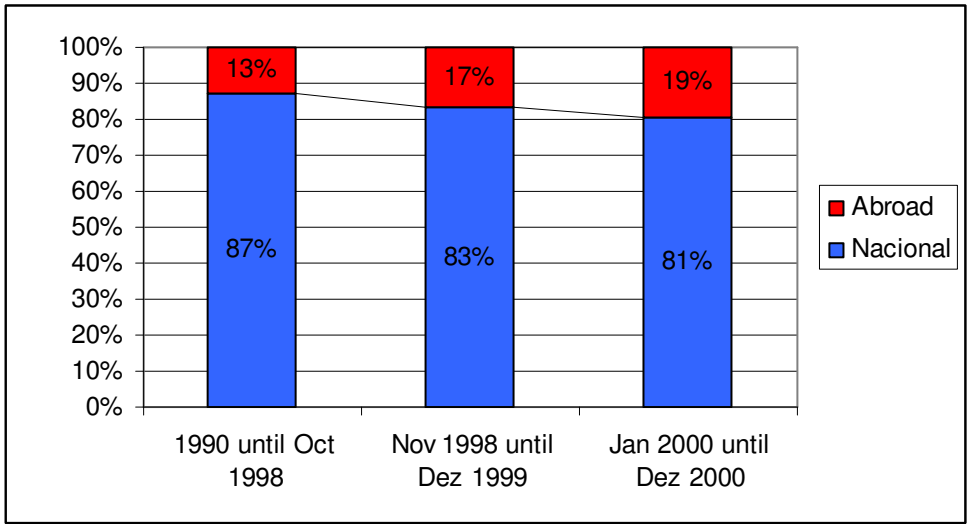
Table 3.42 – Evolution of the relative earnings to the new entrants' average earnings, by area of graduation

	1994	1995	1996	1997	1998	1999	2000	2002	Total
Economics/management	2.56	2.31	2.20	2.05	1.92	2.00	1.83	1.75	1.99
Engineering	2.71	2.44	2.31	2.30	2.20	2.34	2.27	2.07	2.27
Arts	1.83	1.77	1.81	1.87	1.57	1.72	1.85	1.80	1.78
Sciences	2.13	1.93	1.81	1.75	1.81	1.78	1.96	1.96	1.90
Education	2.23	2.09	1.94	1.90	1.87	1.85	1.66	1.57	1.84
Health Sciences	2.28	2.35	2.40	2.32	2.17	2.17	2.10	1.93	2.13
Social sciences	2.13	2.04	1.89	1.88	1.85	1.74	1.83	1.72	1.81
Int. relations/communication	2.07	1.98	1.77	1.78	2.04	1.68	1.85	1.51	1.80
Agriculture, Agro Industries	1.97	1.91	1.80	1.81	1.77	1.76	1.65	1.61	1.78
Others	2.37	2.25	2.07	1.92	1.69	1.81	1.73	1.64	1.83
Total	**2.40**	**2.23**	**2.10**	**2.01**	**1.90**	**1.92**	**1.90**	**1.78**	**1.95**

Source: SILATEE (2002) as cited in CIRIUS final report, 2004

16. Beyond the aspects raised in terms of overall employment, it should be noted that brain drain has so far not been a problem for Portugal, but current international trends on the competition for skilled people do represent new challenges for Portuguese policies. Portuguese universities have increased the offer of PhD programmes, which in turn creates new challenges for the mechanisms that guarantee their quality, and the need to strengthen their internationalization and to establish international scientific research networks. Employing Portuguese PhD holders raises a series of new issues associated to emerging challenges and opportunities in terms of scientific employment, which can be analysed on the basis of three surveys carried out between 1999 and 2001 to former FCT scholarship holders since 1990. They clearly show that most of these former scholarship holders carry out their Professional activity in Portugal, mainly in higher education institutions, as Figure 3.26 shows. It is, in fact, the capability to train and attract new PhD holders, fostering scientific employment that determines the full maturity of a scientific system, and it is also decisive to improve the scientific activity in networks to promote the institutional relationship, either between university units, or between these units, State Laboratories and companies. The enhancement of these scientific-based networks, in addition to softening the effects related to the small size of research units, shall certainly encourage knowledge creation and diffusion, and scientific development in a context of constant change and growing scientific based-internationalisation.

Figure 3.26 – Results of the surveys made to former FCT´s scholarship holders that develop their professional activity in Portugal or abroad



Source: FCT 1997-2001 – 5 years Report, Portuguese Science and Technology Foundation; Primary data from OCES, Survey on the professional situation of former PhD scholarship holders.

17. It should be noted that the improvement of the S&T system over the last few years has been associated with a critical challenge related to the need to restructure the university faculty career's system. This includes understanding forms of merit enhancement devoted to young

researchers, regardless of the existence of vacancies in the university faculty staff derived from the number of undergraduate students. Indeed, the progressive saturation of these vacancies, at least in older universities, has stalled the attractiveness of scientific careers, which requires the change of university recruiting systems to schemes such as those in force in more developed S&T systems.

18. It is also worthwhile mentioning that, since 1998, there is a visible absorption of PhD holders by the private higher education and by the polytechnic higher education systems. This fact corresponds to a new situation that Portugal is facing[23], which needs to be duly analysed and dealt with, in particular by revising the faculty career statute in polytechnic institutes. These aspects obviously need a more detailed discussion about the institutional context in force, in particular the University Faculty Career (ECDU).

19. In terms of scientific employment, the information on the employability of Portuguese PhD holders since 1998 also shows that the importance of higher education in scientific employment has decreased. There has simultaneously been a slight growth of former scholarship holders working abroad, namely in universities or in research centres. Thus, it should be clear that the national and international mobility of new PhD holders, mainly within the European area and in a context of an effective need to promote the internationalization of research units, is particularly pertinent in the current development stage of the national S&T system. However, it should also be clear that the different surveys reflect a possible brain drain trend in Portugal, with the increasing permanence of Portuguese scientists abroad, unless short-term measures for the promotion of scientific employment are taken.

23 See the FCT's quinquennial Report (2002): FCT 1997-2001 – 5 years Report, Portuguese Science and Technology Foundation

4. Internationalization as an opportunity for increasing enrolments

20. The rational underlying current national policies thoughout EU to foster the internationalisation of higher education is basically of political, cultural and economic nature. The political rationale for the internationalisation is based on the perception that "it is not possible to vindicate the quality of the education system isolated from the international, and in particular the European, context". For Portugal, the cultural rationale is rooted in the language and in the co-operation with Portuguese Speaking Countries. This has contributed to the relative internationalisation of the Portuguese higher education in countries where Portuguese is the official language (Angola, Mozambique, Cabo Verde, Guiné Bissau, S. Tomé e Príncipe – the African Countries with Portuguese as Official Language, PALOPs – East Timor and Brazil. In particular, there are special regimes for access to higher education for students from the ex-colonies, both in public and private higher education institutions (universities and polytechnics).
21. There are also foreign students enrolled as normal students within Portuguese higher education institutions and Figure 3.26 presents the number of these students by Continent of origin. Half of the students come from Africa (PALOPs). Among the European students the main percentage is from Luxembourg. More recently this scenario has changed, as citizens from Switzerland, France, Belgium and United Kingdom have become the main European groups in Portuguese tertiary education (OECD).

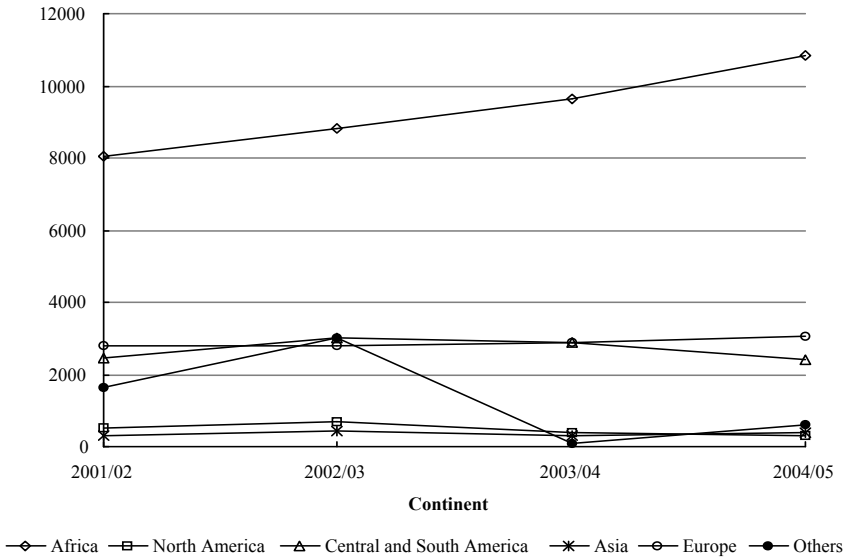


Figure 3.26 – Foreign students enrolled in Portuguese institutions as regular students
Sources: OCES, 2005

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PART IV

MAIN ISSUES AND CHALLENGES

1. The analysis presented in the previous parts of this report shows, in general, an absolute level of indicators that reveal the dual characteristics of Portugal's commitment to the knowledge economy, notwithstanding the impressive growth over the last decades. Indeed, the current emerging discussion on the role of tertiary education for a knowledge based society should be understood in the context of the social and economic change in Portugal within the European Union, especially in terms of the need to evolve to a knowledge driven economy.
2. It is important to note that the current policy challenges correspond to a period of relative stagnation in the growth of higher education students after a period of more than 30 years of consecutive growth. Over the last decades Portugal has been able to increase its higher education system at a growth rate that has no parallel in other European countries and today participation (18-22 years) corresponds to a gross enrolment rate over 50%, with the number of enrolled students increasing almost 800% relative to the student population in 1974. Research activities also increased substantially over the last decade: the number of PhDs in Portuguese Research Units increased over 130% from 1996 to 2003, the yearly number of new PhDs more than trebled from 1990 to 2004, while the number of Portuguese scientific publications increased fourfold between 1991 and 2001.
3. This process has been associated with the development of a complex network of institutions, integrating 14 public universities and one university institute and 15 public polytechnics, together with a network of about 117 private institutions. These include a Catholic University with *campi* in several towns, 14 universities, 3 polytechnics, other 27 diverse institutions teaching university level programmes, and around 70 other institutions teaching polytechnic programmes. In this context, a number of challenges and issues need to be addressed, including:
    - How to improve the regulatory framework and to adequate the supply of tertiary education to the labour market, in a way to foster quality, with the necessary specialization? How far the country requires strengthening lifelong learning, vocational training, and certification of formal or informal training, as well as more flexible study schemes?
    - Which level of public funding to guarantee the adequate growth of the knowledge base? Which implications for the organization of the supply of higher education and, in particular, for post-graduation education?
    - Which governance system and institutional autonomy for higher education institutions?
    - How to enlarge the number of students, decrease drop-out and retention rates and help qualifying the Portuguese population? Which social support and loan systems?
    - Which strategies to promote access for new publics, including students who have left the education system before enrolling in higher education, including those from working class and lower class backgrounds?
    - Which effective need to promote the internationalization of higher education and research units? Reflecting upon a possible brain drain trend in Portugal, Which career prospects for research and academic staff?

4. Clear policy options are essential for guaranteeing the qualification of Portuguese people in the European space, implementing the Bologna process and reinforcing the system of higher education, promoting the quality of the system and extending access to new publics. Contrary to what is sometimes affirmed, Portugal does not have too many graduates, but actually has too few. Holding a qualification from higher education is a social resource which is critical for future learning, life plans and employability. Making higher education training more socially and culturally relevant for and improving its quality will simultaneously attract more people to attend courses and assure better conditions for their successful completion.
5. In fact, Portugal is one of the European countries with the lowest number of graduates, and increasing the academic and professional qualifications of the Portuguese society continues to be an essential factor for our economic, social and technological modernization.
6. But the analysis of tertiary education should be framed conceptually in a systemic view of the role of science and technology, in which the main issue affects knowledge sharing and diffusion. Therefore, analysis should focus on the understanding of a complex national context, considering the following factors:
    - People: it refers to the country's human capital, in particular, to the levels of formal education held by its workforce. The country at large is still characterized by a workforce with rather low educational and training levels, contrasting with a younger population with similar qualifications levels as other OECD's countries. This fact has resulted in new challenges for the workforce qualification's development, and for the attraction of new talents to S&T in order to foster scientific employment and expand national and international knowledge networks.
    - Knowledge: it is linked to the creation of new knowledge in Portugal, because the country has serious deficits in R&D scale and intensity in comparison with the other OECD's countries.
    - Ideas: regarding, in particular, knowledge diffusion and therefore the innovative capacity, to which the relationship of firms with academic research brings about new challenges and also an increasing accountability of its activities.
7. Moreover, other aspects should be noteworthy within a conceptual framework, such as:
    - Infrastructures: consists on the necessary conditions for the development of tertiary education, namely for the functioning of scientific institutions and their relationship with higher education, society, and firms in particular.
    - Institutions: consists on the sufficient conditions for a knowledge driven society, including the necessary reinforcement of the scientific institutions, as well as the legal framework under which higher education develops.
    - Incentives: consists on the necessary conditions for a higher education system, especially in terms of public and private efforts that are vital to develop new and disseminate existing knowledge. In this context, market conditions, competitive structure and naturally public policies are considered, especially associated with higher education funding and evaluation.
8. Taking the conceptualization of knowledge-based economies into account, it can be said that the performance in competitive knowledge environments depends basically on the quality of human

resources (namely, their specialization, competences, educational level, and learning capacity) and on the activities and incentives, which are oriented towards knowledge creation and diffusion. With regard to this point, Portugal shows a clear deficit.

9. Several studies over the last decades have continuously shown that the complexity of the innovation process favors societies organized around a demanding culture with evaluation routines and open to criticism. This requires structures that are prearranged formally and institutionally (i.e., schools, firms, universities, laboratories, governmental and non-governmental organizations, namely for the promotion of scientific culture). For that reason, it is vital for States to make the autonomy of universities and scientific institutions feasible, as well as enable a sustainable development possible regardless of external alterations to science development. This is a major objective of the current government programme, but it represents a major challenge for the institutions themselves, as well as for the overall governance of the higher education system.
10. In order to allow scientific organizations and higher education institutions to develop and promote themselves autonomously, the diversity of funding sources should be facilitated and the governance of the system renewed. The institutions themselves must defend their own budgets, namely in face of independent peers. It is obvious that this process involves institutional reform, deriving from the higher education institutions' need to evolve towards responsibility and accountability to society.
11. Within the higher education system, the strengthening of science and technology institutions necessarily involves the sustainability of incentive programmes and the continuous implementation of independent scientific evaluation models, which have been put in practice and disseminated in OECD's most industrialized countries. Portuguese institutions have experienced these processes in a systematic way only since 1996 and such practices should be continued and fully appropriated in Portugal.
12. In this context, Table 4.1 presents main Governmental goals, as expressed through the revised country strategy to achieve the Lisbon Goals, as well as the Government's Technological Plan. The main objective for higher education during the present legislature is to contribute towards overcoming the country's scientific and technological delay and to fulfil the urgent need to guarantee that new generations are qualified for the requirements of the European space, guaranteeing the full integration and qualification of national institutions of tertiary education in Europe.
13. The international qualification of our tertiary education is essential today for the development of the country and the employability of our graduates. This challenge involves assuring the transition from an education system based on the transmission of knowledge to a system based on competence building. This is a central and critical issue all over Europe, and particularly in Portugal, given the extremely high drop-out and failure rates in our country and the conservative influence of rhetorical and passive methods of teaching.

Table 4.1 Main Government Goals for 2010, as expressed through the Government's "Technological Plan"

Context	Indicator	Source	EU 15	EU Leader	Spain	Portugal	
			2003			2003	Goal 2010
Characterization of Human Resources	1. Tertiary graduates in science and technology per 1 000 of population aged 20-29 years	Eurostat	12,2 (2001)	24,2 (IE)	12,6	**8,2**	**12**
	2.Students (ISCED 5 and 6) as % of corresponding age population - of 20 year olds	Eurostat, Key statistics 2002/03	33,5% (EU25)	54,6% (EL)	38,1%	**29,9%**	**40%**
	3.Students (ISCED 5 and 6) as % of corresponding age population - of 24 year olds	Eurostat, Key statistics 2002/03	18,7% (EU25)	37,7% (FI)	20,2%	**18,3%**	**28%**
	4. S&E graduates (ISCED 5 and 6) as % of new degrees	Eurostat, Key Figures 2005	24,2%	30,5% (SE)	28,1%	**19%**	**25%**
	5. Percentage of the adult population aged 25 to 64 participating in education and training	Eurostat	-	35,8% (SE)	5,1% (2004)	**4,6% (2005)**	**13%**
	6. New graduates per each new PhD	National statistics, own calculations	-	7 (2004) (DE)	30 (2003)	**51 (2004)**	**35**
S&T Resources (input)	7. Total R&D personnel (FTE) per thousand labour force	OCDE, MSTI	10,5%	21,8 (FI)	7,8	**4,7**	**7,5**
	8. Number of researchers (FTE) per 1000 labour force	Eurostat, Key Figures 2005	5,4 (EU25)	16,2 (FI)	4,9	**3,6**	**6**
	9. Highly qualified scientific and technical workers as % of total labour force	Eurostat, Key Figures 2005	13,8% (EU25)	21,2% (DK)	15,3%	**7,8%**	**11%**
	10. Business Enterprise Expenditure on R&D (BERD) as % of GDP	Eurostat, Key Figures 2005	1,23% (EU25)	2,95% (SE)	0,57%	**0,26%**	**0,75%**
	11. Percentage of Gross domestic expenditure on R&D (GERD) financed by government	Eurostat	0,70%	1,0% (SE)	0,42%	**0,47%**	**1%**
S&T Performance (output)	12. New PhDs per thousand population aged 25-34	OCES, INE	-	-	-	**0,60 (2003)**	**0,9**
	13. New PhDs in S&E fields of study per thousand population aged 25-34	Eurostat, Key Figures 2003-4	0,55 (2001)	1,37 (SE) (2001)	0,35 (2001)	**0,30 (2001)**	**0,45**
	14. Number of scientific publications per million population	Thompson Scientific, Key Figures 2005	439	1642 (SE)	588	**406**	**650**
	15. Number of patent applications to the European Patent Office (EPO) per million inhabitants	Eurostat	158,72 (2000)	361,50 (SE) (2000)	28,75 (2001)	**4,01 (2000)**	**12**
	16. Number of patents granted by the United States Patent and Trademark Office (USPTO) per million inhabitants	Eurostat	66,66 (2000)	494,16 (LI) (2002)	8 (2002)	**1.29 (2002)**	**4**
	17. High-tech manufacturing industries - exports as % of total manufacturing exports	Eurostat (comext), UN (comtrade), Key Figures 2005	19,7% (EU25)	51,6% (IE)	9,3%	**11,6%**	**15%**
	18. Technology balance of payments (receipts-payments) as % of GDP	OCDE	- 0,06% (2001)	0,51% (BE+LU) (2001)	- 0,14% (2001)	**- 0,28% (2001)**	**- 0,15%**

14. But the challenges for Portugal also include improving access to tertiary education and creating the conditions for enabling every citizen to gain access to life-long learning, and developing the role of the institutions of higher education in this process. In this context, the main objectives of the Government for the 2005-2009 period include:
    - Implementing the Bologna European process for the reform of tertiary education, which is an opportunity to stimulate entry into higher education, improve the quality and relevance of the training provided, and to encourage mobility and internationalisation.
    - Reinforcing a system of tertiary education with autonomous institutions, facilitating the reform of the way these institutions are governed in order to develop a culture of accountability and

to make forms of organisation and management more flexible, promoting the de-governmentalisation of the system and valuing partnerships between national and foreign institutions.

- Promoting the quality of the system, valuing the need to work with various types of public, which would require the structuring of an internationally recognized quality assurance system, developing the present model of assessment and financing and developing a national system of accreditation.
- Promoting equal opportunities for access to tertiary education, improving attendance and completion of courses in higher education, attracting new types of public, in a logic of life-long learning and the improvement of social action in schools.

15. For these objectives to be achieved, it will be necessary to:
    - Give priority to the consolidation and re-organization of the system of tertiary education, avoiding further expansion of infrastructures without a serious critical review of the capacity installed;
    - Promote the independent, transparent and rigorous assessment of the public and private, university and polytechnic systems, working with international standards (namely as set by OECD), to permit the necessary stream-lining and re-organization of the present system in the light of the challenges in the future;
    - Stimulate the diversity and flexibility of the system of higher education, particularly in terms of specialization and institutional performance and guaranteeing a closer relationship between the university and polytechnic sub-systems, valuing excellence in both;
    - Create and develop a system of accreditation for all of tertiary education according to international standards which, together with the progressive internationalization of the present system of assessment, may contribute to internationalizing our education system and improving the regulation of the system to benefit public interest, clarifying the role of the State in relation to the institutions;
    - Clarify the public funding system of the institutions of higher education, guaranteeing the necessary stability in the institutions and elements of trust between the institutions and the State;
    - Review both the laws regulating the autonomy of the universities and polytechnics and those regulating academic careers, in order to adapt the objectives of higher education to the European space.