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MASTERS AND DOCTORS IN BRAZIL: JOBS AND POLICIES FOR GRADUATE EDUCATION

JACQUES VELLOSO
University of Brasília
(Center for Studies on Higher Education and
Faculty or Education)
nesub@unb.br

ABSTRACT

What are the jobs typically held by masters and doctors trained in Brazil? How do they perceive the relevance of research training to their professional activities? This article attempts to provide answers to these questions, based on data from a previous study and, in view of the evidence gathered, discusses aspects of policies for graduate education. The original study interviewed 8,7 thousand subjects who obtained their graduate degrees during the nineties, in 15 fields of knowledge, from universities located in different regions (all except the North) of Brazil. Data were aggregated into three groups or great fields of knowledge, allowing a new analytical perspective. In all groups, jobs held by masters are quite diverse and teaching in higher education usually is not the major occupation; as far as doctors are concerned, their professional activities are concentrated in the academy. Graduates frequently have positive perceptions on their research training, but masters who do not work in the academy typically have less favorable perceptions than university professors and researchers; among PhDs, however, similar differences are observed in only one of the groups studied. The evidence gathered thus suggests, for a number of fields, that models of graduate education would benefit from additional approaches to those currently adopted.

MASTERS – DOCTORS – JOBS – POLICIES FOR GRADUATE EDUCATION

Graduate education in Brazil is undergoing remarkable growth and is widening its coverage as far as fields of knowledge are concerned. Formally implemented in the mid-sixties, ten years later the number of degree programs offered barely approached one thousand. By the early nineties there were almost 1,500 degree programs being offered, encompassing all fields of knowledge, according to the breakdowns usually adopted.[1] The upward trend continued in the following years. Enrollment and the number of degree programs offered increased at an even faster pace during the last decade and in the past few years; available figures for 2003 indicate a total of 2,600

[1] Data is from C. B. Martins (2003).

degree programs in 1,800 graduate programs, enrolling about 110,000 students and granting 23,000 master degrees and 8,000 doctoral degrees. What do these graduates do; where do they work?

Some twenty years ago, the typical master and PhD working in Brazil had a university job. A survey conducted in the mid-eighties, involving masters and doctors from a wide diversity of knowledge fields, indicated that 70% or more of graduates were employed in higher education institutions – HEIs (Gunther and Spagnolo, 1986). The survey also showed that, when masters began their graduate training, almost half of them were working in colleges and universities (mostly public); among doctors, the corresponding proportion was 60%. This means that graduate degrees were leading to substantial changes in the professional activity of masters and doctors, particularly for the former. Most of the subjects interviewed had obtained their degrees abroad, were quite satisfied with their jobs and had a positive appraisal of their training.

During the past few decades, as graduate education expanded in Brazil, the proportion of graduates trained abroad correspondingly decreased, as suggested by data from the Directorate of Research Groups of the CNPq[2] (Guimarães, Lourenço and Cosac, 2001). In the roster of this Directorate, 40% of the researchers who obtained their graduate degrees until 1985 were trained abroad, a proportion that fell to 30% among those who graduated in the ensuing ten-year period. The decline continued in the following years, largely as a consequence of the expansion of graduate education in the country: among researchers whose degrees were granted in the second half of the nineties, less than 20% were trained abroad.

Training models have been a recurrent topic in the debate on graduate education in Brazil, possibly as a corollary of the expansion that has been occurring in this level of training. Agreement on the topic is seldom reached in these discussions, due to the diversity of the fields of knowledge concerned, with different sets of assumptions and goals, or due to the varied distances across personal and ideological preferences, as well as across academic and professional experiences of the participants involved.[3]

This article, hoping to offer some contribution to this debate, deals with training and jobs of masters and doctors who obtained their degrees in Brazil. One major focus of the study refers to their perceptions on the relevance of research training to their jobs. The empirical evidence gathered on these topics allows for highlighting a discussion on some aspects of training models and of policies for graduate education.

The text is divided into four sections, in addition to this Introduction. The following section briefly describes the scope of the original study, on which the data presented herein is based. The third section discusses results on jobs most frequently held by graduates, aggregating fields of knowledge into three major groups, as described below; for masters, taking into account those who were enrolled in a doctoral program, estimates are made regarding their future work in academia (universities and research institutions). The fourth section deals with graduates' perceptions on their research training, comparing those employed in academia with those working

[2] *CNPq* stands for the National Council for Scientific and Technological Development.

[3] See, for instance, Beiguelman (1998); Cavalheiro and Souza Neves (1998); de Méis, Leta and Lannes (1998); Cruz (2000); Guimarães and Caruso (1996).

elsewhere.[4] In the final section, in light of the evidence obtained, a brief discussion is conducted on policies for graduate education as far as training models are concerned.

Scope of the study

The data discussed here originated from a study conducted in three stages, involving masters and doctors who graduated in Brazil during the nineties, in 15 fields of knowledge. The first stage encompassed graduates in Business and Public Administration, Electrical Engineering, Physics and Chemistry, who completed their training in the period from 1990 to 1997; the second stage comprised former students in Agronomy, Biochemistry, Internal Medicine, Civil Engineering and Sociology who graduated between 1990 and 1998; and the last stage included masters and PhDs of Economics, Earth Sciences, Dentistry, Law, Mechanical Engineering and Psychology, who earned their degrees in the period from 1990 to 1999.[5] Fields of knowledge were selected in discussions with Capes[6] (the agency that supported the study by means of an agreement with Unesco), attempting to balance diversity and enrollment size. Thus, the fields chosen range from Social Sciences to Natural Sciences, and include those among the top 20 in graduate enrollment in Brazil.

Subjects were surveyed by means of questionnaires (usually filled out by interviewers in a telephone conversation), totaling about 6,100 masters and 2,700 PhDs. On average, individuals answering the questionnaires corresponded to 73% and 82%, respectively, of those to be interviewed. In the first stage of the study, the goal was to reach all of those to be interviewed. Beginning in the second stage, this strategy was combined with the use of systematic samples in programs with a relatively large number of graduates. As had been previously done in a former study on *students* of master and doctoral programs in the country (national samples), in data processing, observations were weighted in such a way that proportions of graduates in each program mirror their respective shares in the relevant field of knowledge. A more detailed discussion on populations, samples and variables can be found in Velloso (2002).

Most of the professionals surveyed had been trained in public universities, since Brazilian graduate education is concentrated in these institutions.[7] Although the subjects interviewed do not constitute samples from their respective populations in each knowledge field, the variety of institutions involved, as well as the diversity of their

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[4] Comparisons made were inspired in Clark's (1991) Academy-Market-State triangle.

[5] The study was conducted by means of a network, involving a coordinator (author of this article) located at the Center for Higher Education Studies, University of Brasilia (Nesub/Ceam/UnB), and six other research groups in five federal universities and in one state university.

[6] The national agency in charge of graduate education; *Capes* stands for the Foundation for the Coordination of Graduate Training of Higher Education Staff.

[7] The public institutions were: Federal University of Bahia (UFBA), Federal University of Minas Gerais (UFMG), Federal University of Pernambuco (UFPE), Federal Rural University of Pernambuco (UFRPE), Federal University of Rio Grande do Sul (UFRGS), Federal University of Rio de Janeiro (UFRJ), Federal Rural University of Rio de Janeiro (UFRRJ), Federal University of Santa Catarina (UFSC), Federal University of Viçosa (UFV), University of Brasília (UnB), University of São Paulo (USP) – at this institution, in addition to the campus at the state capital, the campuses at Riberão Preto and Piracicaba were also included in the survey. The private institutions were: The Getulio Vargas Foundation in São Paulo (FGV-SP), the Institute for University Research in Rio de Janeiro at Candido Mendes University (IUPERJ/UCAM) and the Pontifical Catholic University of Rio de Janeiro (PUC-RJ).

geographical locations,[8] suggest that data gathered are fairly illustrative of the scenario in each field of knowledge and period studied.

A number of discussions based on the original data on the professional activities of graduates, by field of knowledge in which degrees were obtained, have been previously published elsewhere (Velloso, *cit.*; Velloso, 2003a). Data on jobs held by masters, by field of knowledge, were analyzed by Weber (2002; 2003); with a similar breakdown, Villas Bôas, Barbosa and Maggie dealt with jobs in academia for nine knowledge fields. Changes in teaching jobs for masters during the nineties were addressed by Balbachevsky (2003) for six of the fields of knowledge covered by the study, but not for the others. Results on the relevance of one or more of the aspects of graduate education – including research training –, as far as jobs are concerned, by field of knowledge in which degrees were obtained, for masters or doctors, encompassing all or part of the fields studied here, have also been previously discussed (Sampaio e Velloso, 2002a; Velloso, 2000; Velloso, 2003b). In this article, the original results were aggregated into three groups of knowledge fields in which degrees were obtained, allowing for a new analytical perspective, which until then had not been possible. On the other hand, it should be noted that the original research project was not designed for such an aggregation, since this would require producing new weighting procedures for data processing, and this was beyond the scope of the paper.[9] In addition, data for the fields in each group were gathered in different moments in time (1997, 1998 or 1999), depending upon the stage of the research project in which the field was studied. Thus, results presented here, by groups of knowledge fields, should be considered suggestive rather than conclusive.

The aggregation pattern that has been adopted here – as any other –, allows for a sharper perception of major trends and differences, but on the other hand conceals details that may sometimes be relevant. Thus, in an effort to allow the reader to benefit from the advantages of an aggregated presentation of data, and at the same time attempting to overcome the disadvantages arising from the exclusion of minutiae, a number of tables in the following section present both aggregated results *and* the range of data variation in each category of the variables; each range refers to lowest and highest values across knowledge fields in a given group of fields.

Data on research activities in Brazil are collected for some 50 knowledge fields and, for publication purposes, often are aggregated in a smaller or much smaller number of field groups – such as three –, as was done by the CNPq. Data published by Capes is usually presented at a lower aggregation level, although the agency is apparently

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[8] This does not apply to doctors in Business and Public Administration. At the time this field was studied, during the first stage of the research project, the number of Brazilian doctoral programs in the field was quite small; doctoral students in Administration were concentrated in two programs in the state of São Paulo, one at FGV-SP and the other at USP, and most of the PhDs of the field were graduates from these two institutions. Given the budget constraints for the research project, it was deemed more efficient to gather data on the doctors who graduated from these two institutions only.

[9] Note that weights used in data processing were originally computed for *separate analyses of each field of knowledge*, as originally conceived in the research project. As mentioned above, in this text, results are presented for three groups of knowledge fields. When data processing is made at once for *a set of fields*, tests have shown that results for each field usually differ slightly – from one to three percentage points – from those obtained when fields are processed *separately*. Thus, occasional references to results for a specific field may sometimes not coincide with previously-published data for the same field.

considering the adoption of an analogous aggregation procedure, suitable for its duties in the supervision of Brazilian graduate education. As of the writing of this text, it seems that decisions in this regard have not yet been made, although available information apparently suggests that *one* of the possible alternatives would be to aggregate knowledge fields into three groups: Basic fields, Technological fields and Professional fields. In the second semester of 2004, a committee established by Capes began preparing a new National Plan for Graduate Education. Since a few of the results discussed in this text may eventually be of some use for the debate on certain aspects dealt with in the mentioned plan, instead of using standard CNPq aggregation procedures, a different approach was adopted, namely, one of the alternatives that seems to be considered by Capes. Under this approach, knowledge fields included in the study were classified in the following three groups of fields: *Basic fields*: Agronomy, Biochemistry, Physics, Earth Sciences, Chemistry and Sociology; *Technological fields*: Civil Engineering, Electrical Engineering and Mechanical Engineering; and *Professional fields*: Business and Public Administration, Dentistry, Economics, Internal Medicine, Law and Psychology.

Finally, whereas it is appropriate to recall that all data have been gathered in the past decade, it should also be noted that, since then, apparently no major changes have occurred in the graduate education scenario in Brazil, except for rising rates of growth in enrollment and in the number of graduates, particularly at the doctoral level. From the standpoint of jobs for graduates, perhaps the change worth mentioning[10] refers to economic growth rates in the past few years, which tended to be lower than in the nineties, which meant a relative fall in the supply of employment opportunities, a new context that is probably advisable to be accounted for when reading interpretations presented in the following sections.

Professional activities of masters and doctors

This section deals with jobs held by masters and doctors who obtained their degrees in Brazil. The first part of the section, considering a set of major occupational groups, addresses the question: where do these graduates work? The following part concentrates on employment in higher education institutions – HEIs, with special attention given to masters and to migration across the public and private sectors. Here, the relevant questions are: are graduates in faculties of HEIs mostly recruited by the public or by the private sector? During the nineties, have there been any changes in the sector of employment? In the last part, which deals with masters only, taking into account those who were pursuing a doctoral program when interviewed, one asks: who are those likely to end up in academia in the future?

Where do graduates work?

[10] Other changes will be mentioned in due time.

Masters in Brazil hold quite a wide variety of jobs.[11] In Basic fields, most are employed in academia (universities and research institutions), which employs about half of the graduates, although other occupations also attract meaningful shares of masters: almost 20% have jobs in public administration and services[12] and about the same proportion work in private and public firms (table 1). Among those in universities, sociologists are the most noticeable graduates (see "highest" percentage), closely followed by physicists, while in research institutions agronomists (in Embrapa,[13] for instance) and chemists have the largest share.

Table 1

Masters and doctors in the labor force: major types of jobs by groups of knowledge fields in which degrees were obtained (%)

Groups of knowledge fields/ Kinds of jobs	Masters			Doctors		
Basic fields	Lowest**	Average*	Highest***	Lowest**	Average*	Highest***
University	24.5	**40.3**	58.8	53.5	**71.8**	86.7
Public administration and services	4.9	**18.3**	29.1	2.9	**9.4**	27.8
Private/ public firm	3.6	**17.4**	26.2	2.7	**3.9**	5.8
Research institution	5.4	**11.8**	17.5	4.8	**11.8**	24.4
Self-employed		**2.4**			**0.5**	
Others	5.7	**9.8**	18.3		**2.5**	
Technological fields	Lowest**	Average*	Highest***	Lowest**	Average*	Highest***
University	26.1	**30.5**	36.1	65.9	**71.7**	79.5
Public administration and services	10.8	**14.6**	17,0	2.5	**6.0**	8.4
Private/ public firm	34.0	**39.2**	46.8	9.9	**12.2**	15.4
Research institution		**4.4**			**7.7**	
Self-employed		**3.5**			**1.7**	
Others	4.4	**7.8**	9.7		**0.6**	
Professional fields	Lowest**	Average*	Highest***	Lowest**	Average*	Highest***
University	19.7	**32.6**	43.6	35.8	**61.5**	73.1
Public administration and services	2.3	**24.5**	52.6	6.5	**17.0**	28.5
Private/ public firm	0.4	**16.3**	36.7	4.2	**5.2**	13.9
Research institution		**2.1**			**2.1**	
Self-employed	4.4	**22.0**	64.4	1.9	**13.5**	29.3
Others		**2.5**			**0.7**	

* **Average** = Percentage of graduates holding a kind of job, in a given group of knowledge fields.

** **Lowest** = The smallest percentage of graduates holding a kind of job, across *fields of knowledge* of the respective group of knowledge fields.

*** **Highest** = The largest percentage of graduates holding a kind of job, across *fields of knowledge* of the respective group of knowledge fields.

Highest and lowest percentages are not presented when the difference between them is smaller than 5 percentage points.

[11] Data refer to the main job held.

[12] The category "public administration and services" comprise occupations in the Executive, Judicial, and Legislative branches and the Public Prosecution Service (Attorneys) at all levels of government: federal, state and municipal.

[13] Embrapa stands for the Brazilian Agricultural Research Corporation.

In Technological fields, as one would naturally expect, the share of masters employed in universities declines and the proportion of those in private and public firms reaches 40%. The distribution of jobs held in each of the three Technological fields is rather similar, since the differences between the largest and smallest relative frequency in each type of occupational group are usually only about ten percentage points.

Another pattern of job distribution is observed in Professional fields – a pattern which was also expected, to a certain extent. It is instructive to compare this distribution with that observed in Technological fields. Although the proportion of masters employed in academia is similar to that observed for engineers, self-employed graduates gain an altogether different dimension, reaching about 20% of the total.[14] Similarly, and pursuing a little further the comparison with engineers, the share of employees in public administration and services also rises, encompassing ¼ of the masters in Professional fields. The largest differences across fields, however, are found within the Professional group, in which jobs in public administration and services are led by masters in Law, and the self-employed, by graduates in Dentistry; the smallest percentages in these occupational groups belong to graduates in Economics and Dentistry, respectively.

In short, work in a wide diversity of occupational groups is the expression that best summarizes jobs held by masters.

Thus, in a number of the fields studied, training at the master level continues to fulfill its original aim, namely that of upgrading the education of college faculties; in other fields, its major role – which was also envisaged in the original concept of graduate studies in the country[15] – has, *de facto*, been training cadres for other sectors of the world of work, such as public administration and services, private and public firms, as well as for self-employment. In effect, data indicate that in Basic fields most masters are employed in academia, while in the other two groups of fields most of the jobs are outside academia.

Differently from masters, PhD jobs are highly concentrated in academia (table 1). Employment in universities and research institutes encompasses 85% of all doctors included in the study. PhDs of Basic fields are somewhat similar to doctors of Technological fields, in the sense that the shares of university faculties in both groups are around 72% and the share of those in research institutions, about 10%.

However, in Professional fields the outlook is quite different: positions in universities encompass 62% of the PhDs in the group, whereas the share of self-employed, which was insignificant in the other two groups, is now close to 15%. In addition, occupations in public administration and services, which reach almost one fifth of graduates, is another characteristic that differentiates doctors of Professional fields from those of the other two groups, especially when these are compared with PhDs of Technological fields.

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[14] The questionnaire answered by graduates contained a set of items on the employment of graduates. For those employed, one of these items had five possible answers: "employee in the public sector", "employee in the private sector", "self-employed or consultant", "proprietor", "employee in NGOs and others". In this article, all of those who reported being "self-employed or consultant" were classified as such. This classification differs somewhat from that adopted in published data of the original study, and thus, results may differ accordingly.

[15] On the subject of the origins of graduate studies in Brazil, see, for instance, Gazzolla (1996), C. B. Martins (*cit.*) and R. Martins (1999).

Within groups of fields, there are noteworthy differences in two of the three groups, since in Technological fields, variations in the occupational distributions in Civil, Electrical and Mechanical Engineering are rather small, as also occurred in the case of masters. Within Basic fields, agronomists and sociologists have little participation in university positions (the "lowest" percentage in this type of job), whereas the lead belongs to physicists (the "highest"), who are not much farther ahead of biochemists and chemists. On the other hand, the highest involvement in research institutions is that of agronomists, and, in public administration and services, that of sociologists. Within Professional fields, doctors of Economics and of Internal Medicine are more often found in universities than elsewhere, and the smallest participation in these institutions belongs to Law doctors; these, in turn, lead the self-employed category, closely followed by graduates in Dentistry.

In spite of these differences, which should not overlooked, from an occupational viewpoint, the paramount distinction between doctors and masters is work in academia. Masters are typically engaged in a rather wide variety of occupational groups, while doctors are concentrated in jobs in universities and research institutions. Thus, Brazilian doctoral programs, in most of the knowledge fields studied, seem to be performing their chief and expected role, namely that of training high-level human resources for teaching and scientific and technical production in HEIs and research centers.

Employment in higher education: cross-section data and trends over time

Masters teaching in HEIs are mostly employed in public institutions, although there are marked differences between those of Professional fields and those of the other two groups. As the data in table 2 indicate, among the former, almost 60% are in private colleges and universities and, contrariwise, among the latter, about the same proportion teach in public institutions of higher learning. These data are in accordance with information from other sources regarding the expansion of Brazilian higher education in the past few decades: enrollment growth in the private sector occurred mainly in programs in Professional fields. They are also in accordance with the expected effects of public policies aimed at upgrading the training of higher education faculties in the past few decades. Two the major government programs for such policies were the PICD and later its successor, the PICDT,[16] both implemented by Capes. During the eighties, most of the scholarships granted by the PICD, for M.A. and M.Sc. programs in the country, involved young faculties employed by colleges and universities from the public sector but later, during the nineties, the participation of young faculties from private institutions in the PICDT was substantially enlarged. Actually, in view of the rise in degree requirements for hiring new faculty, which followed the advance of graduate education in the country, producing an upward shift in the supply of PhDs trained in Brazil. As noted by Balbachevsky (*cit.*, p. 282), *in many circumstances a master degree became insufficient to allow access to a faculty position in the public system of higher education*.

[16] PICD stands for the Institutional Program for Educational Development of Higher Education Faculties; PICDT stands for the Institutional Program for Educational and Technological Development of Higher Education Faculties.

Table 2

Masters and doctors in faculties of higher education institutions (HEIs): employment by sector and groups of knowledge fields in which degrees were obtained (%)

Groups of knowledge fields/ Public and private sectors	Masters			Doctors		
	Lowest**	Average*	Highest***	Lowest**	Average*	Highest***
Basic fields						
Public HEI	49.2	**63.9**	87.5	74.4	**88.2**	94.9
Private HEI	12.5	**36.1**	50.8	5.1	**11.8**	25.6
Technological fields						
Public HEI	51.0	**62.5**	68,0	76.3	**88.4**	92.9
Private HEI	32.0	**37.5**	49,0	7.1	**11.6**	23.7
Professional fields						
Public HEI	34.1	**41.1**	94.4	61.8	**74.4**	94.8
Private HEI	5.6	**58.9**	65.9	5.2	**25.6**	38.2

* **Average** = Percentage of graduates in faculties of HEIs, in a given sector (public or private) and group of knowledge fields.

** **Lowest** = The smallest percentage of graduates in faculties of HEIs, in a given sector, and across *fields of knowledge* of the respective group of knowledge fields.

** **Highest** = The largest percentage of graduates in faculties of HEIs, in a given sector, and across *fields of knowledge* of the respective group of knowledge fields.

Although the group of Professional fields differs from the other two as far as teaching in private HEIs is concerned, there are noteworthy variations within each group. Within Basic fields, physicists have the largest participation in the private sector ("highest percentage"), closely followed by sociologists. Within Technological fields, the largest share of teaching jobs in private institutions is that of mechanical engineers, while within the Professional group differences across fields tend to be small, except for the minuscule share of those who graduated in Internal Medicine. Additional data revealed that masters working in HEIs are concentrated in universities (more than 80%) – as opposed to colleges; in Basic and Technological fields, employment in public institutions clearly dominates the picture, whereas in the remaining group, in most knowledge fields, proportions of public and private are rather similar.

What are the professional paths of masters employed by HEIs? Additional data obtained indicate that among masters who were teaching in HEIs when interviewed, only a small proportion (15%) was already employed in higher education at the time they applied for graduate studies. Among those few, in the public and private sector, almost all of them remained in the teaching profession (90%) after obtaining their graduate degrees. Further data processing, comparing graduates who had early employment in HEIs with those who were teaching when interviewed, revealed that only some 25% of the latter group was already in the teaching profession when they applied for graduate studies. Thus, masters who were working in HEIs when interviewed were recruited chiefly among those who had other types of jobs when they began their graduate training, and recruitment was done mainly by public universities.

Most of the PhDs trained in Brazil, as has been previously discussed, have jobs in higher education. In addition, as figures in table 2 show, these jobs are highly concentrated in the public sector – particularly when contrasted with masters employed by HEIs. However, there are substantial differences in employment across groups. Among doctors who earned their degrees in Basic and Technological fields, almost 90% are employed by the public sector, as compared to 74% of those of Professional fields. Looking into the private sector, PhDs of Sociology lead the participation within Basic fields, whereas in the other two groups the scenario is quite similar to that previously observed for masters. Comparing positions in colleges and universities, additional evidence obtained shows that about 93% of doctors in each group of knowledge fields were hired by universities. Thus, the outlook for jobs held by doctors in HEIs is a great deal more homogeneous than that observed for masters, and employment is much more concentrated in universities, most of them in the public sector.

How do professional paths of PhDs in faculties of higher education compare with those of masters? Additional data available show that, differently from masters, among doctors who were in higher education faculties when interviewed, the proportions of those who were already in the teaching profession when they applied for graduate training range from about half (in Basic fields) to more than 60% (in Technological fields). However, like masters, almost all of those who were in the teaching profession kept their jobs or obtained positions in other colleges or universities after completing their studies. Thus, the evidence gathered indicates that doctors working in higher education have been hired mostly among those who were already in the profession when they began their doctoral studies. But it also suggests that PhD education in Brazil, which is aimed at training independent researchers, has additionally been fulfilling the role of reallocating, to positions in higher education faculties, substantial shares of graduates who held other types of jobs before obtaining their degrees.

The previous discussion on masters and doctors in higher education involved graduates who obtained their degrees during the nineties. Did this picture, portrayed with cross-section data, remain the same during the period? Or did the demand for graduates, by the public and private sectors, shift in the period?

During the nineties, the demand and supply of graduates were affected by changes in higher education policies and in the behavior of the higher education system. For one thing, a fast rise in undergraduate enrollment in the second half of the decade led to an increase the number of positions available in the labor market for faculties. In addition, a new basic law for education, enacted in 1996, and related decrees and norms implemented in the following year, produced a number of substantial changes in the State's supervisory roles of higher education.[17] As established by the mentioned education law, the accreditation of programs offered by higher education institutions was required to be renewed every five years – until then, once granted, it, *de facto*, lasted forever – and, accordingly, innovations in educational policies began to be implemented. Noteworthy among these innovations were the establishment of a National Exam for Undergraduates, mandatory for every student in his last

[17] During the current year of 2004, several of the changes introduced at that time are being revised as an integral part of a university reform project of the incumbent government.

undergraduate year,[18] and the implementation of an appraisal of inputs to the supply of education in each institution, in which degrees held by the faculties were defined as one of the key gauges of the quality of teaching potential. These new polices, in conjunction with the very expansion of the higher education system, probably led to an upward shift in demand for faculties with graduate degrees, especially in the private sector, where the teaching staff typically has undergraduate degrees only[19] – except in a few of the Catholic universities.[20]

The effects described – rather, hypothesized – above may be approximately identified aggregating graduates in teaching jobs into two cohorts: those who obtained their degrees by 1994 and those who did so thereafter.[21] Table 3 presents figures on graduates in faculties in these two cohorts, in the public and private sectors of higher education. Consider the two cohorts of masters who obtained their degrees in the group of Basic fields, and were teaching in higher education when interviewed. Data suggest that proportions of those employed by the private sector remained fairly constant across the two cohorts. However, among those who graduated in Technological and Professional fields, the proportions in the private sector grew about 20 percentage points. This suggests that a sizeable movement of graduates toward the private sector occurred between the first and second half of the nineties.

[18] It was initially implemented for undergraduates in three fields of knowledge and in recent years, it encompassed almost twenty such fields. Published results of the exam typically rank degree programs in each knowledge field.

[19] The undergraduate training of this staff is sometimes supplemented by six-month post-undergraduate courses.

[20] Government policies for higher education had effects in addition to those mentioned in the text, as far as demand for graduates is concerned. Hiring faculties in federal Brazilian universities, in order to fill vacant positions – such as those resulting from the death or retirement of faculty members –, depend upon an authorization granted by the Ministry of Education. Since the mid-nineties, in view of a new retirement law under discussion in Congress, an increasingly larger wave of faculty retirements has occurred in federal institutions of higher learning. However, authorizations to replace vacant positions, granted by the Ministry of Education, allowed for filling only a small fraction of these positions. These policies induced a fall in the demand for masters by federal colleges. They also induced a drop in the demand for doctors in federal universities, in which a PhD degree usually is a requirement for faculty positions.

[21] Assuming small mobility across jobs after obtaining the degree.

Table 3

Masters and doctors in faculties of higher education institutions (HEIs): employment by sector, groups of knowledge fields in which degrees were obtained, and cohorts (% and percentage points)

Groups of knowledge fields/ Public and private sectors	Masters			Doctors		
	Degree until 1994	Degree 1995 & onward	Change in private sector employment*	Degree until 1994	Degree 1995 & onward	Change in private sector employment*
Basic fields						
Public HEI	63.6	64.1	**-0.5**	92.8	84.1	**8.7**
Private HEI	36.4	35.9		7.2	15.9	
Technological fields						
Public HEI	71.3	53.2	**18.1**	92.0	85.8	**6.2**
Private HEI	28.7	46.8		8.0	14.2	
Professional fields						
Public HEI	57.2	32.3	**24.9**	72.0	75.5	**-3.6**
Private HEI	42.8	67.7		28.0	24.4	

* **Change in private sector employment** - differences (in percentage points) between percentages of two cohorts of graduates in faculties of private HEIs: those who obtained their degrees until 1994 and those who graduated thereafter, in a given group of knowledge fields.

Now consider that the basic law for education was enacted in the last month of 1996, and that most of the relevant decrees and norms that shaped new higher education policies were issued in the following year. Their effects, if any, would be observable starting in 1997. Thus, graduates in teaching positions were aggregated into other two cohorts: those whose degrees were granted by 1996 and those who obtained their degrees in subsequent years. Under this new grouping, data suggested that masters of Basic fields who engaged in teaching positions have also been attracted by the private sector, in which employment rose by 11 percentage points in the younger cohort as compared to the older one. In the other two groups of knowledge fields, previously-observed upwards trends in private sector employment continued, with gains of about 20 percentage points.

Indeed, results obtained seem to reflect or respond to extensive changes in the Brazilian higher education system during the nineties. The intensified recruitment of masters by the private sector in the second half – or last years – of the decade, as compared to a previous period, seem to be attuned with the new law for education and related norms, enacted in the late nineties. Results presented in the preceding paragraphs are probably an outcome of policies implemented in the late nineties, as the renewal of accreditations, which were associated with appraisals of inputs to the supply of education in each institution, both of them related to the issue of faculty credentials. In addition, published results for the National Exam for Undergraduates, ranking programs in each knowledge field, are likely to have produced effects similar to those of the other two innovations. The new procedures for accreditation, in which degrees held by faculties are considered to be a key gauge of potential educational quality, probably induced an intensification of competition among private HEIs. Hiring faculties with a graduate degree has apparently been a strategy adopted by many private HEIs that sought an official accreditation by the State.

Did the processes leading to movements of masters toward teaching jobs in the private sector also influence PhDs graduating during the nineties? Variations in the relative size of the two cohorts of doctors in faculties of private HEIs tend to be rather slim, as indicated by table 3. Among doctors of Basic and of Technological fields, the share of those who obtained their degrees in 1995 and thereafter is approximately twice the proportion of those who graduated by 1994, although differences in percentage points are not sizeable, corresponding to less than ten percentage points. The above-mentioned processes apparently only had weak effects, possibly because private universities did not invest heavily in hiring PhDs, and/or perhaps because most of these already had faculty positions before their graduate training.

Masters: doctoral training and likely work in the future

Figures presented thus far have shown that masters who earned their degrees in Brazil work in a quite diversified set of occupational groups. Data in table 1, which refer to graduates in the labor force, have indicated that slightly more than half of the masters of Basic fields work in academia, a share that drops to about 35% only among those of the other two groups, the Technological and Professional fields. But these figures are not very good predictors of the future jobs of masters. This is because a portion of these graduates were pursuing doctoral studies when they were interviewed and, as occurs with the PhDs interviewed, it is likely that many of them will end up in jobs in academia after earning their new degree. Thus, it is only appropriate to ask: who are those masters who will be in academia in the future? The question is relevant since Brazilian master programs usually train for work or study in a future academic environment (all master programs included in the survey offered academic – as compared to professional – programs).

In order to answer the preceding question, consider the figures on masters who were PhD students when interviewed, presented in table 4. Among masters of Basic fields, which naturally have a relatively stronger academic scope in the training provided, a comparatively larger fraction of graduates were pursuing doctoral studies. Half of the graduates of Basic fields were doctoral students, as compared to only roughly one third in the other groups. Additional data revealed that considerable proportions of doctoral students were not in the labor force, most of them probably holding scholarships.[22]

[22] In each of the three groups of knowledge fields, about 10 % of doctoral students took leave from their jobs in order to pursue doctoral studies. In addition to these, the proportions of doctoral students *not* in the labor force range from one third, in Professional fields, to two thirds in Basic fields; figures for Technological are somewhat in between the two extremes.

Table 4

Masters pursuing doctoral studies by groups of knowledge fiels (%)

Groups of knowledge fields	Doctoral student	
	No	Yes
Basic fields	50.0	50.0
Techological fields	63.7	36.3
Professional fields	70.3	29.7

A couple of assumptions are needed in order to answer the question. It is assumed that all masters who work in academia will keep their jobs in coming years. It is also assumed that a substantial portion of doctoral students will end up in academia in the future. Among doctoral students, the chances of ending up in academic jobs are assumed to be equal to the proportions of PhDs who were working in this occupational group when interviewed.

In estimating the order of magnitude of the share of masters who will probably work in academic jobs, one should consider that a portion of these graduates are already in academia. It was assumed that they would keep their jobs in coming years. What then needs to be done is to consider the group of PhD students who *do not* work in academia and to estimate, among these, how many would probably be employed in universities and research centers in the future. Data for such estimates are presented in table 5. Among graduates of Basic fields, for instance, 35% of doctoral students *do not* work in academia, as indicated in column 2 (a portion of these students work in other occupational groups and the remainder are not in the labor force).[23] It is assumed that the chances that these students will be employed in academia, once they earn their new graduate degrees, are equal to the proportions of doctors of Basic fields who hold academic jobs. Among PhDs of Basic fields, 84% work in academia, as shown in table 1.[24] Proceeding with the estimates for this group of fields, the 35% of masters who are doctoral students (and do not work in academia) are weighted by these 85%, and one obtains 29%, which is the proportion of students who are likely to work in academia once they earn their PhD.[25] Adding this figure to the share of masters already in academia, one obtains the proportion of masters who are likely to work in universities and research centers in the future (63%). The same rationale applies to the other two groups of knowledge fields.

[23] The three categories of masters in table 2, presented in columns 1, 2 and 3, are computed considering *all* graduates interviewed , including those *not* in the labor force, while the proportions of the major types of jobs presented in table 1 refer only to graduates who are working in the labor force. This change in the denominator of the fraction accounts for differences in regard to the proportions of graduates in academia presented in column 1 of table 1 (labeled "average") and those presented in column 1 of table 5 (labeled "job in academia").

[24] Proportions of doctors in academia correspond to the sum of rows labeled "university" and "research centers" in table 1: 83.6%, Basic fields; 79.4%, Technological fields; 63.6%, Professional fields.

[25] (0.347 X 0.836) = 0.29, that is, 29%.

Table 5

Masters with jobs in academia when interviewed and estimates of their likely jobs in the future, by groups of knowledge fields (%)

Groups of knowledge fields	Job when interviewed			Job when interviewed and likely future job	
	Job in academia (1)	Doctoral students not working in academia (2)	Not working in academia and not a doctoral student (3)	Job in academia when interviewed and in the future** (3)	Job outside academia when interviewed and in the future*** (4)
Basic fields	33.5	34.7	31.9	62.5	37.5
Techological fields	28.0	22.6	49.4	45.9	54.1
Professional fields	31.0	17.1	51.9	41.9	58.1

* Percentages computed in regard to *all* masters interviewed, including those unemployed and those not in the labor force, in order to account for doctoral students who were not working.

** Basic fields: col. 3 = [col. 1 + (col. 2 X 0.836)]; Technological fields: col. 3 = [col. 1 + (col. 2 X 0.794)]; Professional fields: col. 3 = [col. 1 + (col. 2 X 0.636).

*** For each group, estimates presented are computed as residuals: col. (4) = [100.0 - col. (3)].

Estimates for the three groups are presented in column 3 of table 5.[26] Data suggest that among graduates of Basic fields, a considerable share of masters will probably end up in academic jobs: 63%. However, one may view this result from another perspective: a non-negligible proportion of these masters, nearly 40%, *do not* work in academia, nor is it likely that in the future they will have jobs in universities and research centers. Within the other two groups of knowledge fields, the majority of jobs is outside academia. More than half of masters of Technological fields, and close to 60% of masters of Professional fields, *do not* have jobs in academia *nor* is it likely that in the future they will work in this occupational group. Therefore, evidence suggests that Brazilian master programs, that typically have an academic scope, but that frequently have a terminal character[27] for their graduates, actually train for a wide variety of occupations. Jobs in academia are merely one of these types of occupations, which only prevail among graduates of Basic fields.

Training and work: relevance of research training

Masters, as it has been almost over-emphasized, hold a wide diversity of jobs; PhDs are concentrated in academia, although variations in their types of employment are not negligible. In this scenario, it is only appropriate to inquire about the relevance of training in regard to work. In this text, such question deals with research training. One asks: how do graduates perceive the relevance their research training in regard to activities performed in jobs held?

[26] It may be argued that estimates are conservative, since high rates of enrollment expansion in doctoral programs are enlarging PhD opportunities for masters and, therefore, their chances for future work in academia. On the other hand, the estimates implicitly assume null attrition rates in doctoral programs, that is to say, it is supposed that *all* PhD students will earn their degree. Actual attrition rates in doctoral programs and enrollment expansion rates tend to offset each other.

[27] The "terminal character" of master programs is meant to say that their graduates typically do not pursue doctoral studies. The expression is borrowed from the expression "terminal curriculum", which is not intended for further academic work. The issue of this terminal character of Brazilian master programs – in a number of knowledge fields – will be taken up again later in the text.

Graduates at the master level have very positive perceptions regarding the relevance or their research training, as indicated by data in table 6.[28] Among masters of Basic fields, 74% said that research training obtained in graduate studies had a high relevance for their jobs. Within this group, chemists and geologists have the highest level of satisfaction with the relevance of research training ("highest" percentage), while agronomists and sociologists are the least satisfied.

Table 6

Relevance of research training to jobs held by masters and doctors, by groups of knowledge fields (%)

Groups of knowledge fields/ Relevance of research training	Masters			Doctors		
	Lowest**	Average*	Highest***	Lowest**	Average*	Highest***
Basic fields						
No relevance/ some relevance	18.8	**25.9**	34.0	4.3	**11.1**	23.6
High relevance	66.0	**74.1**	81.2	76.4	**88.9**	95.7
Techological fields						
No relevance/ some relevance		**29.5**			**14.6**	
High relevance		**70.5**			**85.4**	
Professional fields						
No relevance/ some relevance	23.5	**32.7**	42.0	8.0	**21.2**	36.7
High relevance	58.0	**67.3**	76.5	63.3	**78.8**	92.0

* **Average** = Percentage of graduates reporting a given level of relevance of research training, by groups of knowledge fields.

** **Lowest** = The smallest percentage of graduates reporting a given level of relevance of research training, across *fields of knowledge*, in the respective group of knowledge fields.

*** **Highest** = The highest percentage of graduates reporting a given level of relevance of research training, across *fields of knowledge*, in the respective group of knowledge fields.

Highest and lowest percentages are not presented when the difference between them is smaller than 5 percentage points.

Results obtained for masters of Technological fields regarding levels of satisfaction are similar to those for Basic fields, although the former present less variation across fields; perceptions are quite similar across the three engineering fields. Yet, among masters of Professional fields, appraisals of research training in relation to jobs tend to be less favorable than among graduates of Basic fields. Within the group of Professional fields, dentists and psychologists have higher levels of satisfaction as opposed to administrators and economists, with lower levels of approval. In all three groups of knowledge fields, however, positive appraisals prevail.

Among PhDs, levels of satisfaction are higher than among masters. Almost 90% of PhDs of Basic fields said that the research training obtained in their doctoral studies had great importance for the work performed (table 6). As one moves from this group to the other two groups, the proportions of doctors who share the same opinion tend to decline, as was observed for masters, although levels of satisfaction are always higher

[28] The questionnaire used in the survey asked respondents about the relevance of their research training (in graduate studies) to jobs held when interviewed. Alternatives presented in the questionnaire were as follows: "no relevance", "some relevance", "high relevance". In table 6, these three original alternatives were aggregated into two, "no relevance/some relevance" and "high relevance", since the latter category will be used later, for comparisons between two clusters of occupations.

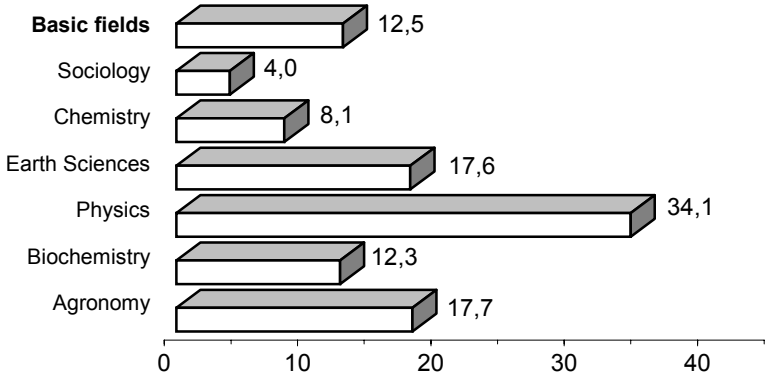
as compared to masters in each group. Among doctors of Basic fields, the highest and lowest levels of satisfaction across fields follow the pattern observed for masters. Among PhDs of Professional fields, there also some similarities with masters of the same fields, since administrators and psychologists lead the highest and lowest levels of satisfaction, respectively.

In further comparisons between masters and doctors, data indicate that positive appraisals are about 10-15 percentage points higher among the latter. Therefore, research training in PhD programs seems to better relate to future jobs of their students than master programs.

Ongoing debates on models of graduate education in Brazil have embraced a number of topics and, among these, the scope of research training has been a major subject of disagreement. Data in the table have shown that masters of the three groups of knowledge fields highly value the research training that they had during their graduate education.

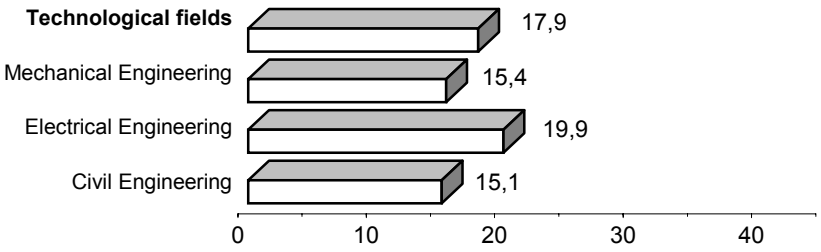
Masters work in a wide diversity of occupational groups, as previously discussed. Since the programs in which they were educated have an academic scope, it is only appropriate to ask how graduates employed in academia appraise the relevance of their research training as compared to graduates working elsewhere. Results obtained suggest that appraisals in general are quite different for graduates in these two sets of occupations. For masters in academia, research training obtained tends to play a larger role in the activities performed in their jobs than for graduates in other types of employment. These differences were computed for those who said that the research training had "high relevance". For masters of Basic fields, differences in percentage points are illustrated in graph 1, for each of the fields of knowledge. In this group, in most knowledge fields there are considerable differences, as large as 10 percentage points or more. Among masters of Agronomy, for instance, 74% of those employed in academia said that research training obtained in their graduate studies was highly relevant for their jobs, as compared to only 57% of those working elsewhere; the distance between these two clusters of occupations corresponds to a sizeable difference of 17 percentage points. Differences in responses reported by masters of Biochemistry, Physics and Earth Sciences across the two occupational clusters also had similar orders of magnitude – or higher.

Graph 1 - Masters of Basic fields, with jobs in academia and outside academia: differences in the relevance of research training ("high level of relevance"; percentage points)



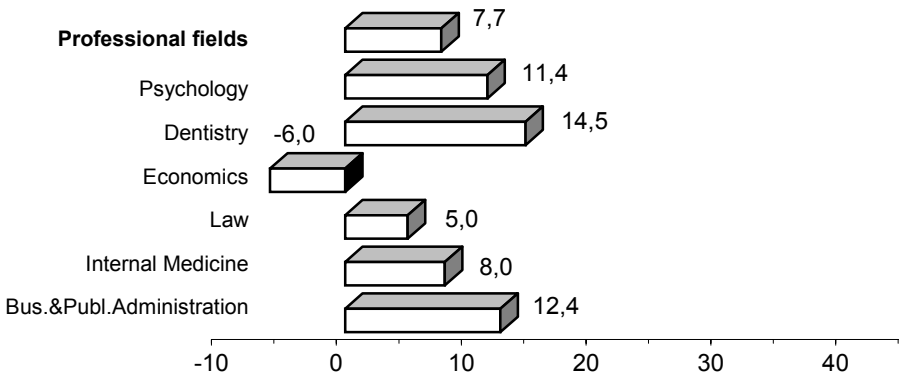
For masters of Technological fields, variations in differences in the value of research training are often smaller than for masters of Basic fields (graph 2). Masters of Civil Engineering, Electrical Engineering and Mechanical Engineering, who do not work in academia, value less the relevance of their research training than their colleagues employed in academia: appraisals of the former range from 15 to 20 percentage points lower than the latter.

Graph 2 - Masters of Technolgical fields, with jobs in academia and outside academia: differences in the relevance of research training ("high level of relevance"; percentage points)



Among masters of Professional fields, differences tend to be smaller and less frequent. In only three out the seven knowledge fields – Administration, Dentistry and Psychology – are considerable differences (10 or more percentage points) found in the assessments regarding the relevance of research training for jobs.

Graph 3 - Masters of Professional fields, with jobs in academia and outside academia: differences in the relevance of research training ("high level of relevance"; percentage points)



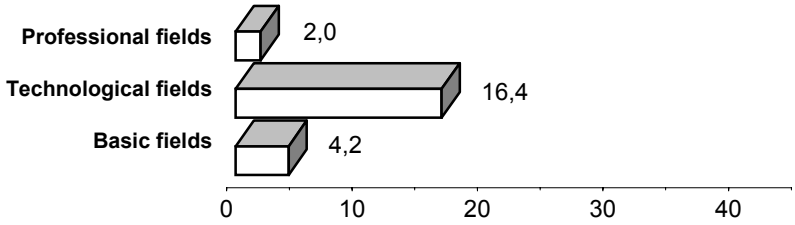
On the whole, these results produce clear signals that should be taken into account by policymakers as well as by all those involved in the training of masters in Brazil, in the relevant knowledge fields. Although masters in general have a favorable appraisal of the research training obtained in their graduate education, in many knowledge fields, those working outside academia – which often correspond to large portions of graduates –, as compared to masters employed in academia, believe that such training is much less useful for their professional activities. Therefore, there is an equation to be solved in regard to the training that has been given in graduate programs in these knowledge fields.

These data may be viewed from two different perspectives. On one hand, since masters usually have a highly-positive perception of their research training, results are good evidence of the success of their academic training programs. On the other hand, the differences that were observed in ten out of fifteen fields of knowledge under study, and which were found in all three groups of knowledge fields, are perhaps suggestive of some shortcomings in the training provided when the labor market is taken into account, i.e., when the large portions of masters not working in academia are accounted for. This seems to have important implications for the training of masters in Brazil and for graduate education policies in the country.

For PhDs, the picture is quite different. In general, perceptions of PhDs in academia – by far the majority of graduates – on the relevance of their research training, as compared to those working elsewhere, bear little resemblance to the scenario observed for masters. According to the data illustrated in graph 4, considerable differences in the relevance of such training in regard to work performed are found among doctors of Technological fields only.[29]

[29] In the fields of Civil Engineering and Electrical Engineering, differences found are larger than 15 percentage points.

Graph 4 - Doctors with jobs in academia and outside academia: differences in the relevance of research training ("high level of relevance"; percentage points)



Differences such as those observed for PhDs of Technological fields suggest that policies for graduate education in Engineering would possibly benefit from experiences that reduce distances between doctoral training and the world of work; a couple of examples are found in France and Germany.

The curriculum for PhDs in Engineering fields at the University of Grenoble, in France, actually has two branches in the curriculum, chosen and followed under the guidance of the advisor. Recruitment criteria used by academia differ from those used by other sectors of work, especially industry (Mangematin, 2000). Both sectors value research but, when hiring job candidates, academia tends to give more importance to articles published in journals of high standards, while preferences of industry usually fall on cooperation established between a firm and the student during his doctorate. Under these circumstances, doctoral students who intend to have academic jobs after graduation typically publish more than their colleagues who plan to work elsewhere. These, in turn, when they prefer future employment in industry, usually establish cooperation with the sector early in the doctoral research, often in research and development projects (R&D), giving less emphasis to publications. Under these processes, the future professional path of a PhD is built during graduate training.

The Fraunhofer Institutes in Germany is another kind of experience aiming at bridging gaps between doctoral training and work, and which has also recently been implemented in the U.S. It should be adapted to the Brazilian context, improving the training researchers in Engineering who aim to work in firms after graduation, as argued by Melo (2003). Briefly, these institutes provide opportunities for supervised engineering practice during their doctoral training – resembling those faced by medical interns –, whereby students deliver the services expected from a fully licensed professional, in activities under industrial and public sector contracts, often participating in R&D projects; these opportunities additionally allow dealing with state-of-the art technology, beyond the constraints of university budgets.

Concluding remarks[30]

In this section, results in research training of masters and doctors are reviewed, and some of their implications are discussed, as far as policies for graduate education

[30] This section is largely based on Sampaio and Velloso (2002b).

and training models are concerned. The discussion deals with the following question: on balance, and according to the perceptions of the masters and doctors interviewed, what do data on the relevance of research training tell us?

Let us begin with data obtained for doctors, making a few comparisons with results for masters. Among doctors, jobs in academia clearly outweigh all other types of work, and they tend to be concentrated in colleges and universities. In this scenario, when comparing employment in academia and work elsewhere, sizeable differences in the relevance of research training to jobs held were only observable among PhDs of Technological fields. Among masters, however, such differences were identified in knowledge fields of all three groups: Basic fields, Technological fields and Professional fields. In fact, training in our doctoral programs seems to be quite well attuned to the future professional activities of their students.

PhD programs in Brazil should definitely have as their major aim the training of independent researchers, for scientific investigations or for research and development projects, as has actually been done. Nevertheless, as data for some knowledge fields have indicated, sharp differences in the relevance of research training were reported by graduates with different types of jobs. Assuming that doctors included in the survey are not atypical as compared to others that graduated in the nineties, in these knowledge fields, the differences found seem to suggest that some reflections on the design of current doctoral training are in order. They should recognize that jobs held are relatively diverse and take into account the probable future employment of doctoral students.

Are data on perceptions of masters, on the importance of their research training for their jobs, pointing in the same direction as the evidence gathered for doctors? Apparently not. Data suggest that graduate education in master's programs in Brazil tend to be less attuned to the future world of work of their students.

Research training obtained by masters in their graduate studies has differentiated effects on their work, depending upon the type of job they hold. This training is typically quite relevant for masters employed in universities and research centers, but its importance is usually weakened when graduates work elsewhere. There are quite a few remarkable differences between these two groups of occupations, which were found in several of the knowledge fields studied, and in all three groups of knowledge fields; as a matter of fact, these are not surprising differences, since all masters interviewed graduated from programs that have an academic – rather than professional – scope. It is true that, when one views these results from another perspective, they are highly suggestive of the success of the training provided in these academic programs. However, more often than not masters have – or are likely to have – jobs outside academia. Within the three groups of knowledge fields, substantial portions of masters work outside academia – in private and public firms, in government services, in addition to those who are self-employed –, and are unlikely to move into employment in universities and research centers. As a matter of fact, among masters of Basic fields, it was found that that most graduates are – or will probably be – employed in academia.

The diverse occupational profile of masters, much more heterogeneous than that of PhDs, has clear effects on the perceived degree of relevance of research training, which often depends upon the type of job held. This scenario, providing evidence that was not suggested by that obtained in the early eighties (Gunther and Spagnolo, *cit.*),

may help to open a new discussion on the aims of Brazilian master programs and on goals of policies for graduate education.

In this new scenario, the discussion may be carried out in two steps. The first step involves two basic issues. The first issue has to do with the terminal[31] character of the degree granted by master programs, in the sense that sizeable proportions of graduates of the three groups of knowledge fields are not likely to pursue further academic training in the future. Another issue has to do with the usual prerequisite for entering a doctoral program in Brazil, namely that of a master degree, as is customarily required. The rationale put forward by Beiguelman (*cit.*, p. 37) is quite germane to the issue, when he asks: if *master programs aim at training researchers, does it make any sense to require that masters run a second academic marathon in order to obtain a PhD degree?* As matter of fact, the question points to one of the paradoxes of current graduate education in Brazil, especially in those knowledge fields in which most doctoral programs have achieved higher levels of academic development. These issues are evidently related to improvements in specific aspects of the structure, rules and regulations pertaining to the system of graduate education in the country.

In a second step, the discussion on graduate education would undoubtedly benefit from information on jobs held by graduates as well as from data on the relevance of their training for their professional work. The results presented herein may be pertinent input to that effect.

Data obtained on the relevance of research training in regard to jobs held by masters, associated with the terminal character that an M.A. or an M.Sc. degree has for considerable proportions of graduates, have a logical implication. The evidence suggests, for a number of knowledge fields, an enlargement of training options currently being offered by master programs. Although an extensive upgrade of faculty qualifications is still needed in the Brazilian higher education system, especially in private colleges and universities – in spite of increased recruitment of masters in the recent past –, the fact of the matter is that demands from other sectors of the world of work have been substantial, and these sectors have been hiring sizeable shares of graduates over time. Thus, evidence seems to suggest the need to diversify current patterns of graduate training at the master level, taking into account, for instance, new concepts being adopted in some scientifically central nations – particularly those in Europe – since the early nineties.[32] Under these new concepts, approaches to research training were broadened, addressing a variety of future jobs of graduates; going beyond the walls of academia, they also sought to meet demands from other sectors of society.

The notion of diversifying training models at the master level in Brazil allows at least two interpretations. For some, it means expanding the number of and enrollment in the so-called 'professionalizing master programs', which began to be implemented in the nineties, training for jobs outside academia and having a terminal character – in the sense that their graduates are not expected to pursue doctoral studies. For others, it may mean diversifying curricula in graduate programs with an academic scope, so that probable major types of jobs of future graduates are accounted for. Among these – or other – options, appropriate choices certainly depend upon the knowledge field involved. At any rate, evidence suggests that these or similar choices will have to be

[31] See footnote 27.
[32] See, for instance, Teichler (1991); Kiniven; Ahola; Kaipanen (1999).

made by public policies, for the benefit of the development of graduate education in Brazil.

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