

## **The state of Portuguese research in economics: an analysis based on publications in international journals**

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Received: July 2001 / Accepted: November 2001

**Abstract.** In this paper I analyze the state of Portuguese research in economics based on publications in international journals for the period of 1986 to 2000. I find that scientific production is increasing but productivity remains low. I also provide a revealing characterization of the production habits of Portuguese researchers by answering the following questions: where do Portuguese researchers publish? who are the most active publishers? how often do they publish? how much do they collaborate? what is their background? Finally, I analyze the impact of that research based on citation counts.

**Key words:** Research in economics – Sociology of economics – Citation analyses

**JEL Classification:** A10, A14

### **1 Introduction**

In the year 2000, the European Economic Association (EEA) invited bids from European researchers to rank economics departments throughout Europe and to compare them with the top US departments. It viewed “this evaluation as a key step toward improving higher education in economics in European Universities”<sup>1</sup>. By its action, the EEA was acknowledging the need for European economists to realize where they stand in terms of their research and hoping that knowledge would increase their awareness regarding the importance and quality of their research.

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I would like to acknowledge the helpful comments of the Editor, Paulo Brito, as well as Ana Rute Cardoso, Clara Dismuke, João Santos Silva, Octávio Figueiredo, Pedro Pita Barros and Pedro Portugal.

<sup>1</sup> Source: EEA web page at <http://www.eeassoc.org/>.

In the last few years, economists in Europe have been actively trying to learn more about themselves and their research production, an activity their American counterparts have long been involved in. In fact, one can find a substantial amount of articles documenting the research practices of economists, yet most of these refer to the US case. There are rankings of economics Departments, [for example, Siegfried, 1972; Niemi, 1975, and more recently Conroy and Dusansky, 1995; Dusansky and Vernon, 1998] rankings of economists [eg. Scott and Mitias, 1996], estimates of the impact of scientific production on promotion policies, [eg. Katz, 1983] on wages [eg. Sauer 1988; Hamermesh, Johnson and Weisbrod, 1982], and innumerable other studies looking at different aspects of the research production process.

Thus, until a few years ago not much was known about the state of research in economics in Europe. Except for the study of Hirsch, Austin, Brooks and Moore (1984) who provided a worldwide ranking of non-US selected institutions (24 European economics departments were included) relative to a set of US departments for the period 1978–1983, all existing studies were undertaken in the last decade. Kirman and Dahl (1994) provided rankings for selected European Union research institutions while Kalaitzidakis, Mamuneas and Stengos (1999) carried out a more ambitious project by ranking European economics institutions based on publications in a restrictive core set of journals for the period of 1991–1996.

More recently, Coupé (2000), based on the *Econlit* publications from 1994 to 1998, elaborated a comprehensive ranking of all world departments and authors. Using different criteria he provided listings of the top 200 departments as well as a listing of the top 1000 authors in economics<sup>2</sup>.

Notwithstanding the important information conveyed by these rankings, their large scale approach does not provide much helpful insights about the state of research within individual countries. We learned from Kalaitzidakis *et al.* (1999) that only three Portuguese economics departments (the Nova University of Lisbon, The Portuguese Catholic University and the University of Porto) had enough publications in top journals to make it to the list of ranked European institutions<sup>3</sup> and from Coupé (2000) we realized that no Portuguese institution made it to the top 200 worldwide and only one Portuguese author made it in the top 1000.<sup>4</sup>

Therefore, it is only natural that in the last years several studies have provided country (or nationality) based analyses which nicely complement the information of these wider studies. Some of the more recent examples are articles by Combes and Linnemer (2000a), one which provided a detailed characterization of the publication of research articles in economics by French researchers and another, Combes and Linnemer (2000b), which studied the impact of that research based on actual citation counts. Dolado, Garcia-Romero and Zamarro (2001)

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<sup>2</sup> Available at <http://homepages.ulb.ac.be/~tcoupe/rank1000.html>.

<sup>3</sup> Out of 198 European institutions, the Nova University of Lisbon was placed at 45<sup>th</sup>, the Catholic University was 53<sup>rd</sup> and the University of Porto was 186<sup>th</sup> (using total AER standardized pages – rank 1).

<sup>4</sup> The author was Luís Cabral, ranked 854<sup>th</sup>.

analyzed the scientific production in economics of Spanish researchers (or researchers affiliated with Spanish institutions) and Baldwin and Carpenter (2000) ranked the scientific production of three Swiss economics departments. The only study that addressed the Portuguese case is that of Mata (1995) who, based on publications in international journals for the 1980–1994 period, provided a brief characterization of the status of economic research in Portuguese economics departments. Meanwhile, in recent years, several Internet sites have made available periodic information on the rankings of individual authors and Departments for several countries<sup>5</sup>.

In this paper I extend considerably the previous work of Mata (1995) by using data spanning to 2000. But there are other relevant differences between the two papers. Firstly, because I provide much more detailed information. Secondly, because I look at different aspects concerning the publication habits of Portuguese researchers. And finally, because I provide measures of the actual impact of these publications. The structure of the paper is as follows. In Sect. 2 I start with a discussion of issues surrounding data collection and treatment. In Sect. 3 I analyze the trend in publications. Section 4 contains an analysis of several different aspects regarding the work of Portuguese researchers in economics. Following that, in Sect. 5, I provide a citation based analysis of the impact of the publications. Conclusions are drawn in Sect. 6.

## 2 Data and methodology

In economics, the output of the scientific production process translates into different types of products. These can be books, articles in journals, theses, reports, working-papers, etc. For evaluation purposes, analysis is usually restricted to publications in refereed journals. By its nature, a publication in a refereed journal has already been subject to evaluation by its peers while the same does not necessarily apply to the other materials. Also, the existence of several comprehensive databases of articles facilitates the data collection process. Thus, in economics (as well as in many other sciences), for evaluation purposes, it is now a standard practice to equate scientific production with publications in peer reviewed international journals.

While most authors regard international publications as an acceptable measure of scientific production in economics, there is little consistency with respect to the range of journals which should be considered. To give some idea about the extent of these differences I note that Niemi (1975), Graves et al. (1984) and Hirsch et al. (1984) used a sample of 24 top journals, Scott and Mitias (1996) used 36 journals, and Kalaitzidakis et al. (1999) used a sample of 10 journals. On the other hand, more recent studies such as Dolado et al. (2001), Coupé (2000) and Combes and Linnemer (2000a,b) have selected to include all journals listed in the *Econlit* database.

<sup>5</sup> I am aware of such sites for Dutch economists (<http://cwis.kub.nl/~few5/center/sstaff/ham/top40.htm>), Belgian economists (<http://www.core.ucl.ac.be/econometrics/Bauwens/rankings/-rankings.htm>) and Portuguese economists (<http://nima.eeg.uminho.pt/rankings.asp>).

The *Econlit* database is produced by the American Economic Association and (as of June 2001) maintains regular updated information on 696 journals. By its own account it is the most comprehensive indexed database of the world's economic literature. However, it has some practical limitations, with the most relevant being: a) the information is not introduced in a standardized way and thus it becomes possible for the same author (or institution) to be listed under different denominations; b) for articles with more than 3 authors it only carries the information on the first author; c) several journals are only partially covered; d) it only provides information about affiliation for articles added after the late eighties; e) it has an "anglophone bias", in the sense that publications in English are over-represented in the database. *Econlit* covers a substantial number of less known journals which are more prone to coverage irregularities and more likely to be discontinued or only partially represented in the database. Moreover, the known "anglophone bias" of the *Econlit* database is more likely to affect these journals. Anyone can argue that an article in the *Bangladesh Economic Review* (listed in the *Econlit*) is less important than an article in the *Estudos de Economia* (a well known Portuguese economics journal not indexed in *Econlit*<sup>6</sup>) but the argument is harder to sustain for a journal with documented citation impact.

The other popular database used for these studies is the Social Science Citation Index (SSCI) published by the Institute for Scientific Information (ISI). Reportedly, the institute takes great care to include in its database only those journals that follow strict guidelines. Moreover, they also collect citation data for all the articles and, among other criteria, use quantity of citations to determine if a journal should be added to their database. As of June 2001, the SSCI listed 1752 journals, of which 171 were classified as belonging to the economics category. This database suffers from some of the same limitations as *Econlit*, namely a), c) and e).

My option of which journals to include differs from other authors and it constitutes a compromise between the two approaches. Thus, for the characterization of the state of the discipline (Sects. 3 and 4) I use only those journals that belong simultaneously to *Econlit* and that were classified in the economics category by the ISI. This amounts to a sample of 156 journals. By doing this I hope to restrict myself as much as possible to the subject of economics, thereby avoiding journals (and authors) in related areas. However, for the analysis of the impact of publications on the discipline (Sect. 5), I extend this set to a larger number of journals because I want as much as possible to select articles likely to be cited in economics journals. Thus I selected those journals that were indexed in *Econlit* and belonged to either of the following ISI categories: business, economics, finance, geography, industrial relations and labor, management, planning and development and social sciences (mathematical methods). This amounted to a total of 205 journals. By construction, I hope to have excluded those journals which contain articles with a negligible impact in terms of citation counts.

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<sup>6</sup> As a matter of fact *Estudos de Economia* is being replaced by this journal.

Hence, the database I will use in Sects. 3 and 4 covers all articles<sup>7</sup> published between 1986 and 2000 in “economics journals” by Portuguese researchers or researchers affiliated with Portuguese institutions. The information about these articles was primarily gathered in the *Econlit* database but, because of the limitations already mentioned, it was complemented with information from other sources<sup>8</sup>. My final sample consists of 264 articles and 96 Portuguese authors<sup>9</sup>.

For the analysis of Sect. 5, I collected information regarding the citations of all articles published up to 1999 (as articles published in 2000 would not have had time to generate citations) in a wider set of journals as described above. Consequently, we should bear in mind that when analyzing the citation impact I am extending the results to a slightly different set of (274) articles. Also, I only retained the information for citations in journals with a publication year of 2000 or earlier.

Finally, I should note at the outset that I will use the term “scientific production in economics” to refer to publications in the “economics journals” as defined. This by no means represents any kind of bias regarding the definition of scientific production. As I stressed earlier, I believe that research is a multi-dimensional activity which can not be reduced to a mere count of publications or citations. By the same token, I will occasionally apply the term “Portuguese researchers” to mean researchers affiliated with Portuguese institutions as well as Portuguese researchers affiliated with foreign institutions.

### 3 Evolution

In his evaluation of Portuguese research in economics for the period of 1980 to 1994, Mata (1995) identified 4 distinct periods: between 1980 and 1982 when there were a few sporadic publications; from 1983 to 1985 when there were no publications; from 1986 to 1991 when there was a steady flow of publications (about five a year) and the period after 1992 when there was an increase in the number of publications which subsequently remained steady at about 10 a year<sup>10</sup>. Thus, 1986 represents a turning point in the sense that from then onwards there was a regular presence of Portuguese researchers in the international arena. Fig. 1 shows the total number of publications (the outer series) as well as those publications for authors affiliated with Portuguese institutions (the inner series)<sup>11</sup>. It becomes clear that the last period identified by Mata (1995) extended

<sup>7</sup> I restrict the data to articles and notes and deliberately exclude other pieces such as comments, editorial material, book reviews, etc. Because of the time lag with which some publications are reported in the *Econlit* database I may have missed a small number of them for the year 2000.

<sup>8</sup> I used the June 2001 *Econlit* CD Edition. This information was complemented with other retrieved from the SSCI and in some cases with the visual inspection of original publications. Because the information on this database has been made available in the Internet for some time (<http://nima.eeg.uminho.pt>) I also received some feedback that helped me identify articles that would have otherwise gone unnoticed.

<sup>9</sup> The sample also includes 3 foreign authors affiliated with Portuguese institutions.

<sup>10</sup> Our data is not strictly comparable with Mata (1995) because of differences in the set of journals considered.

<sup>11</sup> Unless otherwise noted we use affiliation at time of publication.

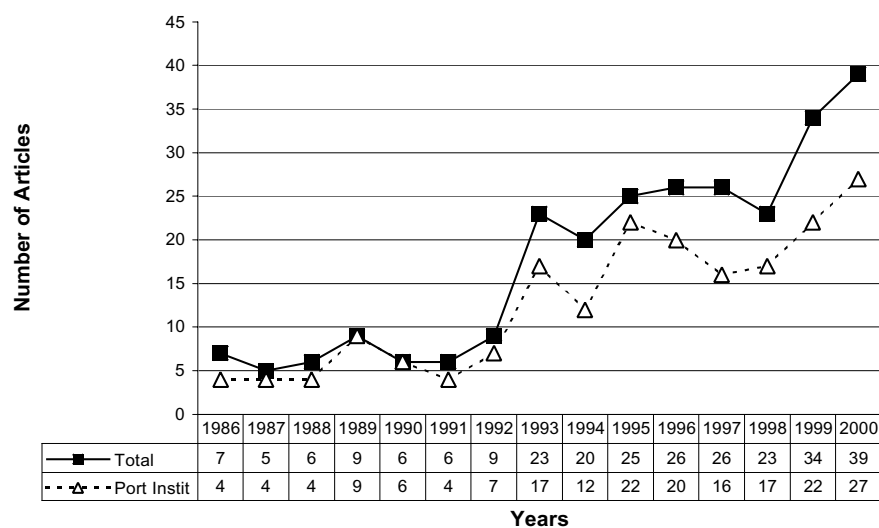


Fig. 1. Yearly evolution of scientific production in economics

until 1998. Apparently, from then on, the number of publications experienced yet another significant increase. This increasing trend may be an indication that Portuguese research is approaching international standards. An international comparison would certainly shed some light on the subject but we lack the data for a thorough analysis. However, based on the data reported on Combes and Linemer (2000a) and Dolado et al. (2001) I found some scant evidence of this by comparing the annualized adjusted growth rates for the number of publications for the 1990–1998 period (the only time period common to all databases). Interestingly enough these rates are identical for France and Spain (at 12%) but they amount to 20% for the Portuguese case<sup>12</sup>.

It is also clear that there is a widening gap between the two series. This reflects the increasing number of Portuguese researchers that are reporting affiliation with foreign universities. While in the past the foreign affiliations reported in publications often referred to the doctoral institutions that is not the case for the more recent publications. An analysis based on the current affiliation of the authors finds that presently 17 out of our 96 researchers were effectively based on foreign institutions.

Now I shift the focus to the analysis of articles for authors who report affiliation to Portuguese institutions. These institutions are all public universities except for one, the Portuguese Catholic University (UCP). The next figure shows the scientific production for the five most productive universities<sup>13</sup>.

<sup>12</sup> The rates for France and Spain may be over-estimated as they are exclusively based on data retrieved from the *Econlit* and thus may partially reflect the increasing coverage of this database.

<sup>13</sup> I ascribed the articles to the institutions based on the reported affiliation at the time of publication. I did not find any situation where an author reported affiliation to more than one Portuguese university. Consequently, I only adjusted the number of articles in the case of co-authorship between individuals displaying affiliation with different Portuguese universities.

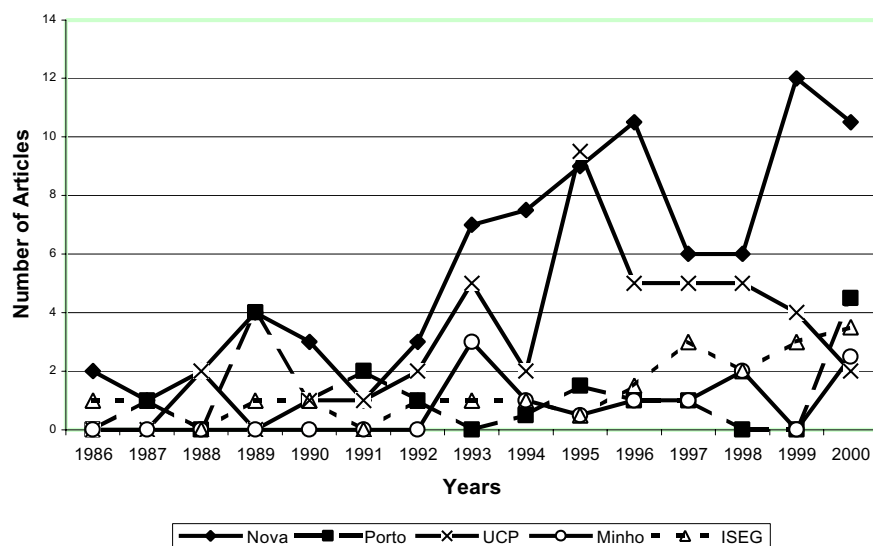


Fig. 2. Scientific production by institution

Since 1992, and with the exception of 1995, the Nova University of Lisbon (UNL) has consistently been the institution with the largest number of publications. Partly because of the slowdown in the scientific production of the UCP, the UNL has in recent years solidified its leadership staying well ahead of all other institutions. The most striking note is the sudden fall in the production at the UCP which started immediately after its peak in 1995. To a lesser extent it seems that the same thing happened to the University of Porto which, in 1989, seemed poised to dispute the leadership with other universities. Nevertheless, as shown in the next Table, if we compare the last five years with the preceding ones we can see that all Universities have increased their production (with institutions such as U. Coimbra, U. Açores and U. Évora showing up for the first time). Worth noting is also the increase in the number of publications at ISEG in the last five years.

To have an idea about the productivity of the Portuguese institutions I have added some additional information to Table 1. The row titled "PhDs" lists the number of researchers in each institution as of December 2000 and the following row shows the percentage of those researchers who published in the considered sample of journals (the row "B/A" in Table 1). The last row shows the average number of articles published by the researchers who show affiliation with the institution as of December 2000 (the value in parentheses adjusts for the number of authors in an article). It becomes obvious that in most institutions scientific production depends only on a relatively small number of authors and that there are substantial productivity differences across universities. If we take the UNL as a benchmarking reference (which seems legitimate as we know from international comparisons that it is not an exceptionally productive institution) we can conclude

**Table 1.** Number of publications and productivity by institution

	UNL	UCP <sup>a</sup>	ISEG	Porto	Minho	IST	Coimbra	Açores	Évora
1986–1990	12	3	4	6	0	1	0	0	0
1991–1995	27.5	19.5	3.5	5	4.5	1	0	0	0
1996–2000	45	21	13	6.5	6.5	2.5	2	1	0.5
PhDs <sup>b</sup> (A)	37(33.1)	28(21.5)	81(77.7)	37(37)	18(18)	2(0.8)	24(24)	4(4)	17(17)
Authors(B)	21	13	14	6	3	0	1	1	1
(B/A)	56.8%	46.4%	17.3%	16.2%	16.7%	0.0%	4.2%	25%	5.9%
Av. Prod.	4.4(2.7)	3.8(2.5)	1.8(1.2)	2.5(1.0)	3(2.3)	-	2(1.3)	1(1)	1(0.5)

<sup>a</sup>The number of PhD's for the Portuguese Catholic University includes both campuses of Lisbon and Porto.

<sup>b</sup>Lists the number of faculty holding a doctoral degree in economics as of December 2000. (the number in parentheses adjusts for partial time affiliation). This information was retrieved from the ministry of education website at [http://www.desup.min-edu.pt/rebid\\_m0.htm](http://www.desup.min-edu.pt/rebid_m0.htm).

that despite the growth of recent years the research productivity of Portuguese universities remains quite low.

In conclusion, there is a clear upward trend in the overall scientific production. At different rhythms all universities seem to contribute to that increase. Unlike a decade ago, the picture in 2000 is now much clearer. The UNL has an undisputed dominant position<sup>14</sup> being seconded by a group of Universities with comparable levels of production (UCP, ISEG, Porto and Minho) but quite different trajectories.

The difficulty of some institutions to maintain the higher levels of production achieved is evident and thus begets the following question: Is this a sustainable trend? In the next figure present indicators that may provide some insight. The first series shows the number of different Portuguese researchers publishing in a given year. Clearly, this number is increasing steadily. On the other hand, the number of authors publishing for the first time is, since 1992, relatively stable. Consequently we can infer that the number of researchers who are active publishers is increasing.

This can be corroborated by the values presented in Fig. 4. This figure shows the proportion of authors who have not published subsequent to a given year (the “drop-out” rate). For example, the figure for 1986 is 40% which means that 2 authors (out of the 5 different authors who published in 1986) do not appear again in my database in the following years<sup>15</sup>. Apparently, from 1986 to 1990 the “drop-out” rate declined steadily and, with the exception of 1996 and the latter years, it has stayed below the 20% level of 1989. However, not much significance should be attributed to the most recent values as they may yet change substantially.

<sup>14</sup> This level of concentration would most likely be enhanced had we considered present affiliation as a criteria to allocate the articles to the institutions.

<sup>15</sup> This does not mean that these researchers are inactive but only that they have not since published an article in any of the journals used to build the database.

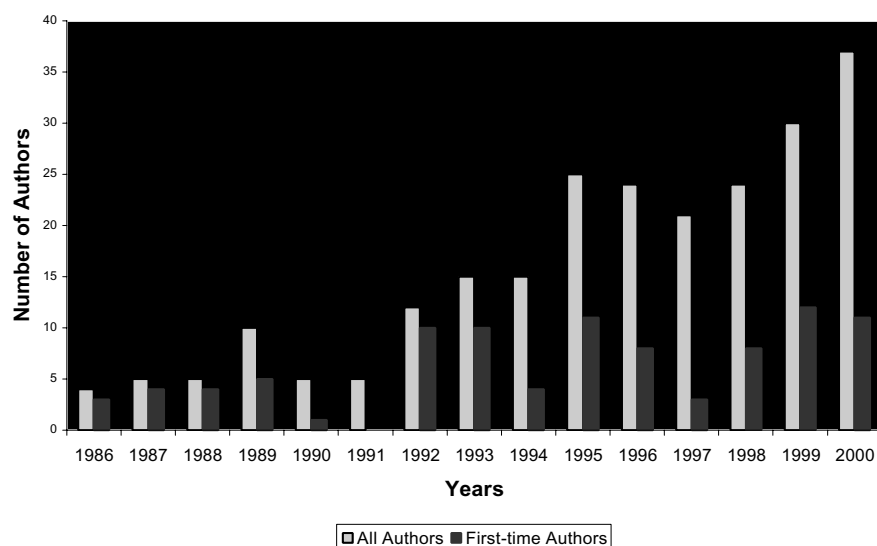


Fig. 3. Number of authors and first-time authors per year

#### 4 Characterization

In this section I intend to analyze in more detail several aspects related to the contributions of Portuguese researchers to the economics literature by answering the following questions: Where do Portuguese researchers publish? Who are the most active publishers? How often do they publish? How much do they collaborate? What is their background? The answer to these questions may be particularly relevant for those responsible for the development of policies aimed at stimulating research in economics.

##### 4.1 4.1 Where do they publish?

Table 2 tallies up the distribution of articles by journals (for the first 30 journals). The most striking feature is the high number of publications in the *Economics Letters* journal with more than double the number of articles of the second most frequent journal.

Comparable data for the 1990–1999 period for Spain (Dolado et al. 2001) also show the *Economics Letters* to be the journal with the most publications (54) but by a small lead as the *Journal of Economic Theory* follows suit with 52 and the *European Economic Review* with 39. Combes and Linnemer (2000b) also provide similar data for the 1969–2000 period for France showing that during that period, French researchers published 58 articles in the *Economics Letters* while, for example, they had 161 articles in the *European Economic Review*, 119 articles in *Econometrica*, 114 in the *Journal of Economic Theory* and 68 in the *Review of Economic Studies*. A possible explanation comes to mind for the prevalence

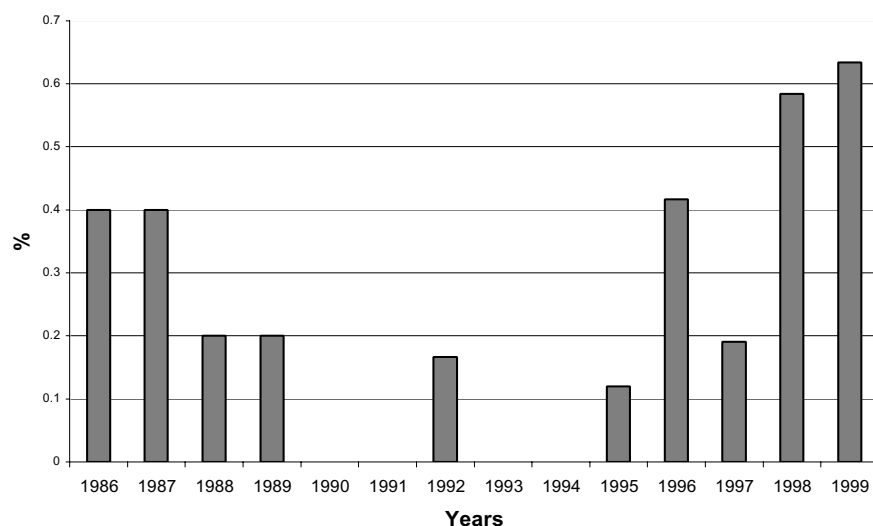


Fig. 4. "Drop-out" rate (for 1991 the value for the "drop-out" rate is undefined)

of publications in the *Economics Letters* journal. This journal publishes short articles and generally has a rapid turnaround time. Thus, researchers' eagerness to show publication results may translate in an excessive bias towards short articles instead of more lengthy articles which take longer to produce (and to publish). This may reveal some distortions in the mechanisms put in place by institutions to reward scientific production.

Another interesting aspect is that the second (first in number of pages) ranked journal is not a generalist journal (which potentially has a larger number of authors) but a specialty one, the *International Journal of Industrial Organization*. Other journals of industrial organization such as the *Journal of Economics and Management Strategy* and the *Journal of Industrial Economics* are also well positioned which suggests that Portuguese researchers are particularly active in this field<sup>16</sup>. Otherwise, the distribution of articles by journals shows a healthy diversification covering top journals in several distinct fields.

#### 4.2 Who are the most productive researchers?

I now look at the number of publications *per author* for the top 15 publishers. Using the last known affiliation of the authors (reported in front of the names in case of national institutions) we can see in Table 3 that, as expected, researchers based on foreign institutions top the listings whether we consider the total number of publications (unweighted) or publications adjusted by the number of authors

<sup>16</sup> That strength may be confirmed by the presence in editorial boards of these journals. As of the time of the writing of this article Luís Cabral was the general editor of the *Journal of Industrial Economics* and José Mata and Pedro Pereira both belonged to the editorial board of the *International Journal of Industrial Organization*.

**Table 2.** Publications by journal

		All researchers		Affiliated with Portuguese institutions	
		# of Articles	# of Pages	# of Articles	# of Pages
1	Economics Letters	31	170	25	134
2	International Journal of Industrial Organization	12	229	10	198
3	European Economic Review	8	112	7	103
4	Journal of Monetary Economics	7	191	6	171
5	Journal of Political Economy	6	157	5	125
6	Journal of Economic Theory	6	137	4	96
7	Journal of Economics and Management Strategy	6	132	2	29
8	Journal of International Economics	6	122	4	81
9	Journal of Urban Economics	6	116	1	21
10	Oxford Bulletin of Economics and Statistics	6	109	6	109
11	Journal of Economic Dynamics and Control	6	86	3	50
12	Insurance: Mathematics and Economics	6	77	4	51
13	History of Political Economy	5	110	5	110
14	Journal of Econometrics	5	110	3	56
15	Journal of Public Economics	5	95	2	21
16	Journal of Industrial Economics	5	79	5	79
17	Economic Theory	5	74	5	74
18	International Review of Law and Economics	5	62	0	0
19	Journal of Mathematical Economics	5	67	5	67
20	Applied Economics	5	44	5	44
21	Journal of Policy Modeling	4	98	2	35
22	Journal of Financial and Quantitative Analysis	4	90	1	26
23	Public Choice	4	87	3	63
24	Rand Journal of Economics	4	85	1	19
25	Environmental and Resource Economics	4	79	4	79
26	Journal of Development Economics	4	79	3	55
27	Regional Science and Urban Economics	4	74	3	57
28	Economic Modelling	4	68	4	68
29	European Review of Agricultural Economics	4	58	3	54
30	Economics of Education Review	4	51	4	51

**Table 3.** Most Productive researchers

	#Pub		Adj. # Pub.
Alfredo Marvão Pereira <sup>a</sup> (12/13)	17	Luís Cabral <sup>a</sup> (12/11)	12.8
Luís Cabral <sup>a</sup> (12/11)	17	Pedro Pita Barros (7/7)-UNL	11.5
Sérgio Rebelo <sup>a</sup> (12/11)	15	Alfredo Marvão Pereira <sup>a</sup> (12/13)	10.5
Pedro Pita Barros ( 7/7)-UNL	14	Nuno Garoupa ( 3/3)-UNL	8.8
Mário Páscoa (7/14)-UNL	12	Sérgio Rebelo <sup>a</sup> (12/11)	7.0
Nuno Garoupa (3/3)-UNL	11	Mário Páscoa ( 7/14)-UNL	6.9
Pedro Portugal (13/10)-UNL	10	José Mata (7/9)-UNL	6.8
José Mata (7/9)-UNL	9	Isabel Horta Correia (8/7)-UCP	5.2
José Machado (7/11)-UNL	8	Ana Rute Cardoso (7/4)-U Minho	5.0
Isabel Horta Correia (8/7)-UCP	7	Fernando Branco (6/8)-UCP	5.0
Miguel Gouveia (7/9)-UCP	7	Miguel Villas-Boas <sup>a</sup> (8/9)	5.0
Vasco d'Orey (14/13)-UNL	6	Pedro Portugal (13/10)-UNL	4.7
Manuel M. Oliveira (13/13)- U Porto	6	José Machado (7/11)-UNL	4.1
Miguel Villas-Boas <sup>a</sup> (8/9)	6	Miguel Gouveia (7/9)-UCP	4.0
Leonor Modesto (7/12) – UCP	6	Pedro Neves (8/9)-UCP	3.8

<sup>a</sup> Indicates affiliation with a foreign institution.

(weighted). The values in parentheses in front of the name of each author are indicative of the number of years in activity. They are calculated as the number of years elapsed from the date of the author's first publication (in the considered set of journals) and from the year he obtained his PhD (in reference to 2000). The recent internationalization of our research becomes evident as we look at the short careers of some of the top publishers (eg. Nuno Garoupa, Ana Rute Cardoso). Moreover, practically all of the listed publishers are still actively involved in research activities, judging from the fact that, with only one exception, I was able to identify a publication for each one of them in the recent years (1998–2001).

Consistent with its institutional leadership, the UNL has 7 (out of 15) researchers among the top publishers<sup>17</sup> (6 if publications are weighted by the number of authors). Besides UNL, the Portuguese Catholic University is the only other institution that places more than one researcher in this listing.

The above numbers should be read with care as the researchers considered are still relatively young and thus with short active “research lives”. It will be interesting to reassess the stability of these results in the future. Another caveat stems from the fact that we are not taking into consideration the differences in the “quality” of the journals. I refrain from doing this exercise for two reasons. The first is that the author maintains available from some time now an online updated version (at <http://nima.eeg.uminho.pt>) that permits the elaboration of customized rankings of authors and institutions according to time period and several well publicized journal rankings. Second, in a latter section I provide rankings of

<sup>17</sup> This is no coincidence. 3 out of these 7 researchers were until recently affiliated with other institutions showing that UNL is (the only institution?) actively pursuing a policy of recruiting the most productive researchers.

researchers based on actual citations as opposed to “expected citations ” an implicit result of most author rankings based on journal quality.

#### 4.3 How is overall productivity?

In his analysis of the state of Portuguese research, Mata (1995) presented information on the number of publications per author. For the period of 1980 to 1994 he showed that 73.3% of researchers published a single article (33 out of 45). According to my data, that number drops down to 45.8% (44 out of 96). The next figure shows the distribution of authors by number of articles which, as expected, is highly skewed. This high degree of skewness which is common to all sciences is a consequence of what is known as Lotka’s law which, in its generalized form, states that the number of authors publishing  $n$  papers,  $a_n$ , equals  $a_1/n^c$  (Cox and Chung, 1991). The parameter  $c$  measures the degree of author concentration with decreasing values showing increasing author concentration. Using a sample of 20 journals, Cox and Chung (1991) report an estimate of 1.84 for economics while Coupé (2000) using all *Econlit* publications reports a value closer to 2. My estimates for this sample also conform to the generalized Lotka Law<sup>18</sup>, but they exhibit a much higher degree of author concentration ( $c=1.39$ ) than that reported by other authors. This is a surprising result and it may indicate that this sample is atypical in the sense that it includes relatively more productive authors or (a more plausible explanation) that a substantial fringe of (less productive) potential authors is being left out of the publication process.

#### 4.4 Intellectual collaboration

Of the 264 articles in this database, 39.77% (105) are single authored – a result well in line with the figures reported by Laband and Tollison (2000) for three prominent economics journals but substantially lower than the 56.5% found in Coupé (2000) for all *Econlit* journals. Thus, formal co-authorship is a prevalent method of work among Portuguese researchers. Curiously, most of the co-authored articles involve the collaboration between Portuguese and foreign authors (78%) which may indicate the existence of strong international ties<sup>19</sup>. However, a rough count of these articles indicates that most of the co-authorships with foreign researchers involve authors affiliated with the University where the Portuguese researcher took his PhD degree.

On the other hand cooperation between researchers affiliated with Portuguese universities is substantially low. Table 4 gives an idea about this pattern of collaboration showing the number of co-authored articles involving two or more

<sup>18</sup> The estimate for the intercept is non-significant but the quality of the overall fit is high ( $R^2=80.2\%$ ).

<sup>19</sup> 77 articles were co-authored between one Portuguese and one foreign researcher, 43 involved the collaboration of two or more foreigners and one Portuguese and 5 between two or more Portuguese and one foreigner.

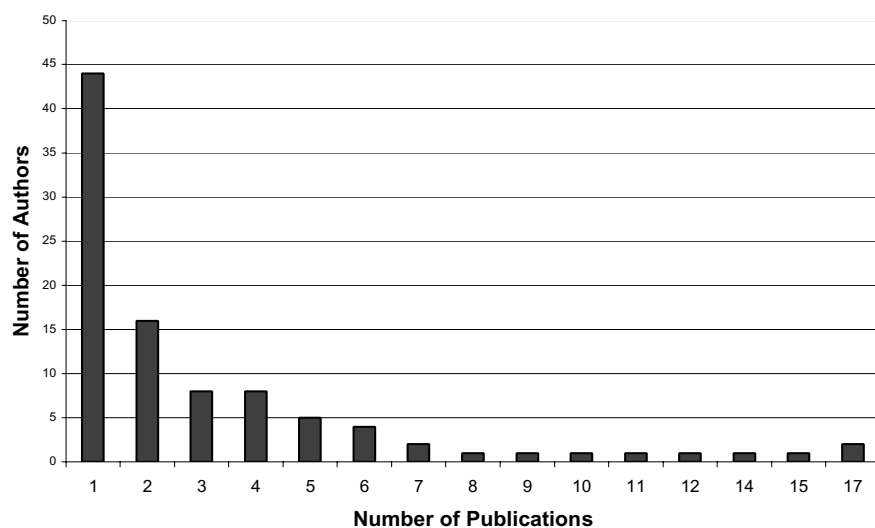


Fig. 5. Number of publications per author

Table 4. Cooperation among researchers in Portuguese universities

	UNL	UCP	Porto	ISEG	Minho	Other
UNL	14	0	1	2	0	2
UCP	-	5	0	1	0	0
Porto	-	-	3	0	2	0
ISEG	-	-	-	2	0	0
Minho	-	-	-	-	0	0
Other	-	-	-	-	-	0

researchers affiliated with Portuguese universities. Only 8 papers resulted from the collaboration of researchers affiliated with different universities while an additional 2 papers were the outcome of collaborations between universities and other governmental institutions.

#### 4.5 Authors background

Of the 96 Portuguese authors identified in this database I was able to unearth information regarding the doctoral degree granting institution for 89 of them. The majority of them took their PhDs in the US (41 out of 89), some of them in top ranked universities such as Harvard, MIT, Stanford, Rochester, etc. The second largest group (24) had their PhDs in Portugal while practically all of the remaining had their degrees in Europe (10 in the United Kingdom, 5 in Belgium, 4 in France, 2 in Italy, 1 in Holland and 1 in Switzerland). However, if we restrict the attention to the top publishers in Table 3 (column 1) we verify that 10 took their degrees in the US, 3 in Portugal, 1 in the UK and 1 in Belgium (the results for column 2 are not much different – 9 from the US, 3 from Portugal, 1 from the UK, 1 from Italy and 1 from Belgium).

**Table 5.** Comparison of the dDistribution of PhDs by country of origin

	All PhDs (A)		Authors (B)		(B)/(A)
France	41	11.5%	2	3.03%	4.9%
Other	40	11.2%	8	12.12%	20.0%
Portugal	144	40.4%	20	30.30%	13.9%
UK	55	15.4%	6	9.09%	10.9%
USA	76	21.3%	30	45.45%	39.5%
Total	356		66		18.5%

More interesting is the comparison between the origin of the authors in this sample and the stock of Portuguese researchers in economics. The Observatório das Ciências e das Tecnologias (OCT) maintains an updated database of all PhDs granted by Portuguese universities as well as those PhDs which have been registered (or recognized) at a Portuguese University from 1970 on<sup>20</sup>. In the case of economics most of the records refer to individuals which are or have at some point been associated with an institution of higher education and thus it largely coincides with the existing stock of researchers in economics in Portugal.

The OCT database contains 356 records of individuals holding a PhD in economics of which 66 belong to our sample of authors<sup>21</sup>. Table 5 shows that the majority of individuals holding doctoral degrees in economics in Portugal took their degrees abroad, the United Kingdom, United States and France being their preferred choices. But when we restrict our analysis to those who publish in international economics journals we see that the importance of the US increases twofold. Surprisingly, except for the case of PhDs taken in the US, I find no evidence that a PhD taken abroad constitutes a clear advantage once it comes to publishing in international journals. PhDs from France may be underrepresented due to the “Anglophone” orientation of the analyzed publications. More puzzling is the result showing that only 11% of those holding a doctoral degree from a UK institution have published in these journals, a result 3 points below that of Portuguese institutions<sup>22</sup>.

We can go a little further and check the same distribution among the Portuguese universities. We can see on Table 6 that if we take Phds awarded as a measure of scientific production then the results differ considerably from those based on publications in international journals. By this measure ISEG is the most productive followed at distance by the UNL and the U. Coimbra. This result for the U. Coimbra is rather surprising given the results shown for this institution on Table 1. Understandably, we did not find a single “author” among the 14 Phds awarded by this institution. Actually, we can only find “authors” among

<sup>20</sup> The information is available at <http://www.oct.mct.pt>.

<sup>21</sup> The difference from the 96 authors in this database is accounted by the following factors: some of the researchers hold a PhD in an area other than Economics; some have never requested formal recognition of their degree (because they are hired by a foreign institution) and finally some publishers do not hold a PhD degree.

<sup>22</sup> However, a more detailed analysis should obviously take into consideration the quality of the PhD granting institutions.

**Table 6.** Phds in economics awarded by Portuguese universities

	Authors (A)	Phds (B)	A/B
ISEG	7	73	9.6%
UNL	6	15	40.0%
Coimbra	0	14	0.0%
UCP	4	8	50.0%
Minho	1	7	14.3%
Porto	2	5	40.0%
Algarve	0	5	0.0%
UTAD	0	4	0.0%
ISCTE	0	3	0.0%
Aveiro	0	2	0.0%
U. Lisboa	0	2	0.0%
UBI	0	1	0.0%

those institutions with an established record of publications in international journals (UNL, UCP, ISEG, Minho and Porto) with UCP showing a proportion of “authors” of 50% – better than the overall result for the US.

## 5 Impact

As stated earlier, there is a need to supplement an analysis of the quantity of articles with some measure of quality. Most studies have done this by resorting to journal rankings which are based on adjusted average citation counts for the journals<sup>23</sup>. These methods will reflect the expected impact of a particular article in the overall scientific literature (the Garfield Impact factor) or specifically on the discipline (as is the case with Laband and Piette indexes). However, true impact can not be measured by the index of citations of the journal in which the article was published but by the number of citations garnered by the article itself. As stated by Laband and Piette (1994) “citations are the scientific community’s version of dollar voting by consumers for goods and services”. Thus, I believe that article citation counts are a better measure of quality than the sheer number of publications or the “expected impact” of publications as they measure the quality and impact of a particular author’s research.

Based on all articles published in all journals that belonged simultaneously to the business, economics, finance, geography, industrial relations and labor, management, planning and development and social sciences (mathematical methods) of the SSCI and the *Econlit*, I searched the SSCI<sup>24</sup> and recorded the respective citing journal and year of publication. This allowed me to draw a more accurate picture of the true impact of Portuguese research in economics. However,

<sup>23</sup> Typical measures are based on the Garfield Impact factor published by the *Journal of Citation Reports* or the Laband and Piette (1994) indexes.

<sup>24</sup> I searched the database by introducing the first name of the author and the year of publication. For some articles this practice allowed me to find references that were not directly attributed to the article in the ISI database. In most situations this was due to an incorrect reference in the citing article regarding the page or volume number. Obviously, incorrectly referenced citations were considered only in the case I could unequivocally assign them to an article.

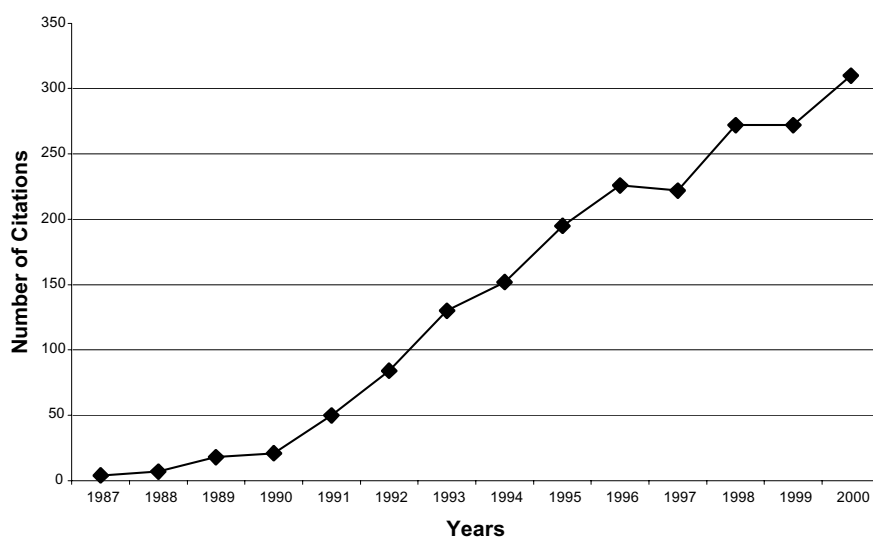


Fig. 6. Total number of citations received by Portuguese researchers in economics

some care should be exercised in analyzing these results as a substantial number of articles are still short-lived and likely to generate additional citations in the future.

### 5.1 Evolution of citations

Judging from the small number of citations received by articles published prior to 1987, I can confidently state that these articles went unnoticed by the international scientific community<sup>25</sup>. But after 1987, as shown in Fig. 6, as the production of articles increased, the number of citations rose steadily.

Given the increasing trend in number of citations since 1987, I next investigate which articles and authors contributed most to this trend. I will also try to get an idea of the areas within economics where Portuguese researchers are being cited.

### 5.2 By article

Of the 10 most cited articles in the database, 8 are authored by Sergio Rebelo. Moreover, 4 of his articles received more than 100 citations each.<sup>26</sup> His most cited article, published in 1991 (see Appendix) has 322 citations as of 2000, and it is still receiving a steady number of citations<sup>27</sup>. To put this result in perspective I

<sup>25</sup> The exception is an article co-authored by Jorge Braga de Macedo and published in 1978. As of 1987 this particular article had already been cited 26 times.

<sup>26</sup> Actually, 5 articles if we consider self-citations.

<sup>27</sup> From 1995 on, this article has received approximately 40 citations a year (39 in 2000).

**Table 7.** Number of total citations (excluding self-citations)

	# Cit		Adj # Cit
Sergio Rebelo <sup>a</sup> (12/11)	1150	Sergio Rebelo <sup>a</sup> (12/11)	667.5
Pedro Portugal (13/10)-UNL	178	Pedro Portugal (13/10)-UNL	86.2
Luís Cabral <sup>a</sup> (12/11)	76	Luís Cabral <sup>a</sup> (12/11)	48.8
José Mata (7/9)-UNL	70	José Mata (7/9)-UNL	44.7
António Mello <sup>a</sup> (5/12)	49	António Mello <sup>a</sup> (5/12)	23.0
M <sup>a</sup> Clementina Santos (11/5)-U Porto	45	Jorge Braga de Macedo(22/21)-UNL	22.0
Jorge Braga de Macedo (22/21)-UNL	41	Miguel Gouveia (7/9)-UCP	17.5
José Costa (13/16)-U Porto	33	Miguel Villas-Boas <sup>a</sup> (8/9)	16.3
Maria Ducla Soares (8/6)-UNL	33	Alfredo Marvão Pereira <sup>a</sup> (12/13)	16.0
Miguel Gouveia (7/9)-UCP	32	M <sup>a</sup> Clementina Santos (11/5)-U Porto	15.5
Alfredo Marvão Pereira <sup>a</sup> (12/13)	28	Fernando Branco (6/8)-UCP	13.0
Vasco d' Orey (14/13)-UNL	28	José Machado (7/11)-UNL	12.3
Nuno Crato (6/8)-ISEG	26	Vasco d' Orey (14/13)-UNL	12.2
Pedro Lima <sup>a</sup> (6/6)	23	José Costa (13/16)-U Porto	11.0
Isabel Horta Correia (8/7)-UCP	19	Nuno Crato (6/8)-ISEG	10.7

<sup>a</sup> Indicates affiliation with a foreign institution.

compared it with the results reported in Combes and Linnemer (2000b) for French researchers<sup>28</sup> using citation results up to 1998. According to these authors, the most cited article for the French case<sup>29</sup> (published in 1981) counted 452 citations while the second had 266 citations (published in 1985). Dolado et al. (2001) also report information about the most cited articles produced by Spanish researchers during the nineties. According to them, the most cited article<sup>30</sup> received 293 citations and only 3 articles had been cited more than 100 times. If we restrict our analysis to citations in economics journals, then Sergio Rebelo's prominence is even more evident. The first 9 most cited articles are his. Only one other author, Pedro Portugal, manages to place articles in the top 10.

### 5.3 By author

As expected, Sérgio Rebelo is a distant first with 1150 citations – more than half of the citations attributed to all Portuguese researchers together (1992). The second most cited researcher, Pedro Portugal, is also the most cited researcher affiliated with a Portuguese institution (UNL). Whether or not I weight citations by the number of authors the 5 top most cited authors remain the same. It is also instructive to compare Table 3, where I list the most productive researchers, with Table 7. Keeping in mind the proviso regarding younger researchers it becomes obvious that output does not necessarily translate into impact.

<sup>28</sup> Or researchers affiliated with French research centers.

<sup>29</sup> The article is: Davidson R, MacKinnon J (1981) Several tests for model specification in the presence of alternative hypotheses. *Econometrica* 49(3): 781–793.

<sup>30</sup> The article is: Barro R, Sala-i-Martin X (1992) Convergence. *Journal of Political Economy* 100(2): 223–251.

**Table 8.** Citations by author in economics journals (excluding self-citations)

	# Cit		Adj # Cit
Sergio Rebelo <sup>a</sup> (12/11)	1010	Sergio Rebelo <sup>a</sup> (12/11)	587.8
Pedro Portugal (13/10)-UNL	112	Pedro Portugal (13/10)-UNL	53.2
José Mata (7/9)-UNL	69	José Mata (7/9)-UNL	43.7
Luís Cabral <sup>a</sup> (12/11)	66	Luís Cabral <sup>a</sup> (12/11)	41.8
Jorge Braga de Macedo (22/21)-UNL	34	Jorge Braga de Macedo (22/21)-UNL	18.5
M <sup>a</sup> Clementina Santos (11/5)-U Porto	29	Miguel Gouveia (7/9)-UCP	13.5
Miguel Gouveia (7/9)-UCP	24	Alfredo Marvão Pereira <sup>a</sup> (12/13)	11.0
Maria Ducla Soares (8/6)-UNL	23	M <sup>a</sup> Clementina Santos (11/5)-U Porto	10.2
Alfredo Marvão Pereira <sup>a</sup> (12/13)	20	Vasco d' Orey (14/13)-UNL	8.8
Vasco d' Orey (14/13)-UNL	20	Mário Páscoa (7/14)-UNL	8.3
Isabel Horta Correia (8/7)-UCP	17	Isabel Horta Correia (8/7)-UCP	8.2
Manuel M. Oliveira (13/13)- U Porto	17	António Mello <sup>a</sup> (5/12)	7.8
Nuno Crato (6/8)-ISEG	17	Nuno Crato (6/8)-ISEG	6.8
Paulo Guimarães (5/8)- U Minho	17	Pedro Pita Barros (7/7)-UNL	6.5
António Mello <sup>a</sup> (5/12)	16	Manuel M. Oliveira (13/13)- U Porto	6.3
Pedro Lima <sup>a</sup> (6/6)	16	Pedro Lima <sup>a</sup> (6/6)	6.3

<sup>a</sup> Indicates affiliation with a foreign institution.

If I restrict the count strictly to citations reported in economics journals (as classified by the ISI), some authors who also work in non-core economic fields drop out of the listings, such as José Costa (regional science) and Miguel Villas-Boas (marketing). Pedro Portugal loses citations due to the fact that he gets a substantial number of citations from other labor related areas. Nevertheless, he maintains his post as the most cited researcher affiliated with a national institution.

Again, a note of caution is needed in interpreting these results. These tables are merely informative and except for the top ranked authors, the differences between the values are too small to justify any credible hierarchy of individuals. Moreover, many of the articles in our database are still likely to generate additional citations and that will produce substantial changes in any of the tables.

#### 5.4 By journal

Finally, I want to elicit by journal type, the areas within economics where Portuguese researchers are getting cited. To do this, I report by citing journal, the number of citations attributed to articles in the database. The first column ranks the journals where these researchers have been most cited. However, this distribution is quite illusory, as it is largely driven by the citations of one author (Sérgio Rebelo). Thus, in the right half of the next Table, I recalculate the distribution, excluding the citations of articles attributed to this author.

The results do not show much more than what could have been inferred by looking at the areas of specialization of the most cited authors. Besides macroeconomics and monetary economics, labor and industrial economics seem to be

**Table 9.** Number of citations by citing journal

1	Journal of Monetary Economics	147	Journal of Labor Economics	26
2	Journal of Economic Dynamics And Control	79	Industrial and Labor Relations Review	24
3	Journal of Macroeconomics	68	Applied Economics	22
4	American Economic Review	64	International Journal of Industrial Organization	22
5	Journal of Public Economics	57	Small Business Economics	22
6	European Economic Review	46	Review of Industrial Organization	20
7	Journal of Money Credit and Banking	41	Economics Letters	16
8	Economics Letters	37	Journal of Econometrics	16
9	Applied Economics	36	Journal of Finance	16
10	Journal of Political Economy	31	Review of Economics and Statistics	16
11	Applied Economics Letters	30	Applied Economics Letters	14
12	Journal of Development Economics	29	Journal of Industrial Economics	14
13	International Economic Review	27	Rand Journal of Economics	14
14	Review of Economics And Statistics	28	Economics of Education Review	13
15	Journal of Labor Economics	27	American Journal of Agricultural Economics	11
16	Oxford Economic Papers	27	Industrial Relations	11
17	Journal of Applied Econometrics	26	Journal of Economic Literature	11
18	Journal of Econometrics	26	Journal of Human Resources	11
19	Economic Inquiry	25	Journal of International Money and Finance	11
20	Economic Journal	25	Journal of Policy Modeling	11
21	Canadian Journal of Economics	24	Journal of Public Economics	11
22	Industrial and Labor Relations Review	24	Journal of Regulatory Economics	11
23	Revue Economique	24	Southern Economic Journal	11
24	Journal of Economic Literature	23	Journal of Financial Economics	10
25	Journal of Economic Theory	23	Marketing Science	10

areas where Portuguese researchers are getting more citations. Other relatively strong areas are finance and econometrics.

## 6 Conclusion

The number of publications in international journals authored by Portuguese researchers has been consistently increasing over the years whether or not we restrict the analysis to researchers affiliated with Portuguese institutions. This increase seems to be due to two factors: on one hand there is an increasing number of researchers publishing in international journals while on the other, authors are publishing more often and remaining active for longer periods of time. In the last five years all Universities have increased their scientific production with some institutions showing up for the first time. The Nova University of Lisbon has managed to establish itself as the leading research institution in economics fol-

lowed at a distance by a group of four other Universities. Nevertheless, research productivity at Portuguese Universities remains low.

The distribution of articles by journals shows that a (relatively) large number of articles are published in the *Economics Letters* journal. The most productive researchers are either affiliated with foreign institutions or with the UNL. Most of these researchers are still actively publishing and a few are rather young. The number of publications per author reveals a degree of author concentration much higher than expected, which may suggest that a substantial fringe of potential authors is being left out of the publication process. Also, Portuguese researchers develop a substantial number of articles in co-authorship with colleagues from foreign institutions but only rarely with colleagues affiliated with other Portuguese institutions. There is clear evidence that researchers with a PhD from a US institution are more likely to publish in international journals. These aside, I find no evidence that a PhD taken abroad constitutes a clear advantage once it comes to publishing in international journals.

Finally, a look at the citation impact of the articles authored by Portuguese authors revealed that Sergio Rebelo is undisputedly the most influential Portuguese researcher in economics. Pedro Portugal is the most cited author affiliated with a Portuguese institution. An analysis of citing journals showed that besides macroeconomics and monetary economics, labor, industrial economics, finance and econometrics are also areas where Portuguese researchers are gathering citations.

## Appendix

### *Most cited articles (2000 excluding self-citations)*

The first number after “Number of citations” is the total number of citations received in all SSCI journals while the second number refers exclusively to citations in the economics journals of the SSCI. Self-citations are excluded. The value in parentheses is the ranking with respect to citations in economics journals.

1 (1). Number of citations: 322/286

Rebelo S (1991) Long-run policy analysis and long-run growth  
Journal of Political Economy 99(3): 500–521

2 (2). Number of citations: 225/191

King RG, Plosser CI, Rebelo S (1988) Production, growth and business cycles:  
I. The basic neoclassical model  
Journal of Monetary Economics 21(2/3): 195–232

3 (3). Number of citations: 147/125

King RG, Rebelo S (1990) Public policy and economic growth: developing neo-  
classical implications  
Journal of Political Economy 98(5): 126–150

4 (4). Number of citations: 111/102

King RG, Plosser C I, Rebelo S (1988) Production, growth and business cycles: II. New directions  
Journal of Monetary Economics 21(2/3): 309–341

5 (5). Number of citations: 99/84

Easterly W, Rebelo S (1993) Fiscal policy and economic growth: an empirical investigation  
Journal of Monetary Economics 32(3): 417–458

6 (6). Number of citations: 72/64

King RG, Rebelo S (1993) Low frequency filtering and real business cycles  
Journal of Economic Dynamics and Control 17(1-2): 207–231

7 (7). Number of citations: 58/52

Burnside C, Eichenbaum M, Rebelo S (1993) Labor hoarding and the business cycle  
Journal of Political Economy 101(2): 245–273

8 (-). Number of citations: 50/19

Addison JT, Portugal P (1987) The effect of advance notification of plant closings on unemployment  
Industrial and Labor Relations Review 41(1): 3–16

9 (8). Number of citations: 49/44

Stokey NL, Rebelo S (1995) Growth effects of flat-rate taxes  
Journal of Political Economy 103(3): 519–550

10 (10). Number of citations: 41/33

Addison JT, Portugal P (1989) Job displacement, relative wage changes, and duration of unemployment  
Journal of Labor Economics 7(3): 281–302

The following is the ninth most cited article if we restrict ourselves to citations in economics journals.

- (9). Number of citations: 39/37 (9)

King RG, Rebelo S (1993) Transitional dynamics and economic growth in the neoclassical model  
American Economic Review 83(4): 908–931

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