The Italian University System:

Rules vs. Incentives

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1 INTRODUCTION

Nobody seems to be happy with the Italian higher education system. The list of complaints is exceedingly long, and so is the list of proposals. Most proposals are a linear combination of two categories: impose more rules, and provide more funds. But there is no evidence that the Italian higher education system is underfunded relative to a much better performing state system like the British one. And rules and regulation have always been supplied very elastically: the typical response to a perceived a problem is to impose a complicated set of rules that forbid a certain behavior, only to impose new rules when the system finds a way to circumvent the first set of rules.

A good example of this is the system of promotion. The old system, based on a large, nationwide competition fro all vacancies at once, was perceived as opaque, prone to manipulation by power groups, and fostering cronyism and favoritism. A new mechanism was devised, based on vacancy-specific concorsi in which a committee elected nationwide declares three idonei, who can then be promoted by any university within three years. The results have been disappointing. Almost from the introduction of the new system, proposals have accumulated on how to amend it, from changing the number of committee members to changing the composition of the committee, from reducing the number of idonei of each concorso to reducing the number of years during which the title of idoneo is valid.

But the system of promotion is so regulated and distorted that these proposals are a typical example of the theory of the hundredth-best: there is no way to tell what their effects will be. This system does not need patches, in the form of new rules: it needs a radical change of approach, whereby it is in the self interest of universities to appoint and promote the most productive individuals, and resources flow to the most successful institutions and their most capable members.

Indeed, this applies to the whole Italian higher education system. It needs to move from a system of rules to one of incentives, where merit and scientific production are rewarded. To achieve this, bad institutions must be allowed to contract and disappear, and good institutions must be allowed to thrive and expand. This cannot be done unless the Italian academic culture shreds its historical aversion to differentiation.

It is a widespread opinion that the Italian higher education system is getting ever closer to such a system, thanks to recent changes in the rules, including the much publicized "university autonomy". This opinion is based on a remarkable dose of hypocrisy. For instance, the claim is frequently made that the Italian promotion system is very close to a tenure system, in that each promotion is subject to a trial period. The final decision, however, is made by a national committee that has no reason to internalize the benefits and costs of the university the researcher belongs to. In practice, this step is a formality, and it appears that in the few cases where promotion is revoked, the candidate can always successfully appeal administratively against the decision, or wait another year for a different committee. The *de facto* rule is that in Italy there is no university-initiated termination of a university career. The whole process is just a very expensive and pompous machinery to ratify this rule. The Italian academic culture will also need to

shred this veil of hypocrisy before progress towards a true merit-based system can be made.

The plan of the paper is as follows. Section 2 briefly compares the main characteristics of the Italian and UK higher education systems. Section 3 carries out an empirical study of the process of promotion in Italy. Section 4 studies the financing of the Italian higher education system. Section 5 studies more specifically the financing and evaluation of research. Section 6 considers a few alternative proposals for reform. Section 7 concludes.

2 A COMPARISON OF THE UK AND ITALIAN HIGHER EDUCATION SYSTEMS

The Italian higher education system suffers from many, well publicized problems: to name only few, low retention rates, high average time to graduation, low attachment of professors to their institution. How do these problems impact on the two things universities are supposed to do: teaching and research? In this paper, I will mostly focus on research, largely because I know of no reliable measure of teaching performance independent of the labor market environment and outcomes.

In recent years, the OECD *Statistics of Higher Education* have been widely used to place the Italian higher education system in a comparative perspective, and the results are almost uniformly not flattering.[1] Yet, these comparisons are risky, because higher education systems are so diverse that one is never quite sure what is compared to what, despite recent efforts to lay down uniform definitions. In addition, such a large dataset unavoidably misses information on important variables, that only a more detailed comparison between fewer countries can show. Thus, in this paper I will concentrate on a comparison with the UK higher education system. This comparison is particularly informative because in one respect the UK system is very similar to the Italian one, in that it is almost entirely public; but in another respect it is entirely different, in that its Anglo-Saxon academic culture is often at the polar opposite of the Italian culture.

Table 1 on page 3 displays a few statistics on the research output of the two systems. It is apparent that, on virtually any dimension – output per million of PPP dollar spent (line 1), citation per million of PPP dollar spent (line 2), output per researcher (line 3), and average citation per paper published (line 4) – the research output and quality of the British system is superior to that of Italy.[2]

Table 1: Research output in UK and Italy, second half of the nineties

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[1] For a recent such comparative exercise, see Confindustria [2001].

[2] These data are based on the *International Science Institute* database. A typical objection to the use of this database is that it has an English language bias. However, the average citation per paper of the Italian system is persistently among the lowest even in fields where all relevant research is done in English: see Salter et al. [2000] and Confindustria [2001] for a breakdown by field.

		UK	Italy
1.	Papers per $million, 1997	16.0	9.0
2.	Citations per $million, 1997	70.5	34
3.	Papers per researcher, 1997	11.2	5.6
4.	Citation per paper, 1994-98	4.5	3.8

Sources:
Lines 1, 2 and 3: Katz [2000].
Line 4: Salter et al. [2000],   table 36.

What explain this difference? Consider a few explanations.

Explanation 1: fatigue. A frequent claim is that Italian researchers do not have time to do research, because they are too busy taking care of students. Table 2 on page 5 displays some statistics on the student and teacher bodies of the two HE systems. The British data refer to the 1998/99 academic year, and come from the *Higher Education Statistics Agency* of the UK; the Italian data refer to the 1999/00 academic year and come from the *Comitato Nazionale di Valutazione del Sistema Universitario* and *ISTAT*. Whether one considers all academic staff (line 1) or only those academic staff that are not exclusively involved in research (line 2), the Italian HE system is indeed only about 55 percent as large as the British system.[3] On the other hand, the student body of the Italian HE system is only about 13 percent smaller than the British system (line 3), and even slightly larger if one excludes postgraduate students (line 4). As a consequence, the student/teacher ratio in the Italian system is 70 percent higher than in the British system (line 5), and almost double if one excludes postgraduate students: the difference between the two systems remains the same even if one excludes academic staff that are not involved exclusively in research (lines 7 and 8).

However, what matters for the teaching load is not the head count of students, but the number of Full Time Equivalent (FTE) students: after all, if a student is formally enrolled but does not take any course, he imposes only some administrative work, but no teaching is involved. Lines 9 to 14 of Table 2 display the same statistics as lines 3 to 8, but using the number of FTE students instead of total enrollment. These figures show clearly one well known feature of the Italian HE system, namely the low effective attendance by students. In fact, FTE enrollment in Italy is less than 50 percent of total enrollment, while in the UK this ratio is about 75 percent (lines 9 and 10). As a consequence, the various measures of teacher / student ratios in terms of FTE students are now virtually identical in the two systems (lines 11 to 14).[4]

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[3] The figure in line 2 for Italy is an underestimate, however: it is well known that only nominally are the Italian *Ricercatori* exempt from teaching duties, while in fact they frequently have a heavier teaching load than their *Professori* (and no way to complain about this, if they want to pursue an academic career).

[4] An (almost) independent check on these calculations for Italy can be obtained from the data of the *Conferenza dei Rettori delle Universita' Italiane (CRUI)*, which give an average FTE student / teacher ratio in 1998 of 13.4, against 11.2 in line 11. However, the CRUI ratio uses only the number of professors *di ruolo* in the denominator, hence it excludes all professors a *contratto, lettori* etc., whose British equivalent are instead used in constructing the British figure. Including all types of professors in the

Table 2: Students and academic staff; student/teacher ratios

0.		UK 1998/99	Italy 1999/00
1.	Academic staff, thousands	131	72
2.	NRO academic staff	92	52
3.	Total students, thousands	1995	1728
4.	Excluding postgraduates	1590	1666
5.	Students / academic staff	14.1	24.0
6.	Excluding postgraduates	11.7	23.2
7.	Students / NRO academic staff	20.1	33.2
8.	Excluding postgraduates	16.6	31.9
9.	Total students, FTE, thousands	1464	809
10.	Excluding postgraduates	1247	747
11.	FTE student / academic staff	11.0	11.2
12.	Excluding postgraduates	9.3	10.4
13.	FTE students / NRO academic staff	15.6	15.5
14.	Excluding postgraduates	13.3	14.3

Sources:
UK: HESA [2000a] and HESA [2000b], unless otherwise noted; Italy: CNVSU [2001], unless otherwise noted.

Notes:
Line 0: UK: includes all universities. Italy: includes all public and private universities except Pisa S. Anna and Pisa Normale.

Line 1: UK: Full-time and part-time academic staff, wholly institutionally funded, partially institutionally funded, and funded via other sources. Italy: includes *ordinari, associati, ricercatori, professori a contratto, esperti* and *lettori*. Data on *professori a contratto, esperti* e *lettori* refer to year 1998/99 and come from ISTAT [1999].

Line 2: NRO: "Non Research Only": academic staff that are not involved exclusively in research. UK: source: HESA [2000b], Table 15. Italy: Line 1 less *ricercatori*.

Line 3: UK: includes Further Education students. Italy: includes students in *corsi di laurea, corsi di diploma, corsi di perfezionamento, corsi di specializzazione* (1997/98), *dottorati di ricerca*. The source for *corsi di perfezionamento* and *dottorati di ricerca* is MIUR [2001b]; the source for *corsi di specializzazione* is ISTAT [1999]. Data on *dottori di ricerca* does not include Universities of Roma La Sapienza, Messina, Lecce; data on *corsi di perfezionamento* does not include University of Modena and Reggio Emilia.

Line 4: UK: includes Further Education students. Italy: excludes students in *corsi di perfezionamento, di specializzazione*, and in *dottorati di ricerca*.

Line 5: UK: "Student full-time equivalent (FTE) data represents the institutions assessment of the full-time equivalence of the student during the reporting year 1 August 1998 to 31 July 1999." (HESA [2000a]) Italy: A FT equivalent student is defined as the ratio of the total number of exams passed in a given university to the total number of exams that should be taken by all students in that university to obtain their degree within the statutory duration of their course. No data on full-time equivalence of students in *corsi di perfezionamento, corsi di specializzazione, dottorati di ricerca*: these students have been given a full time equivalence coefficient of 1.

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denominator of the CRUI figure would give an even smaller FTE students / teacher ratio than 11.2. This consideration also applies to most figures on the teacher / student ratio circulating in Italy.

Explanation 2: underfunding. Thus, Italian researchers are not overworked, despite frequent claims to the contrary. Are they underfunded, as it is even more frequently claimed? Data on university finances in Italy have to be taken carefully. CINECA maintains a database on the budgets of each Italian university, broken down into the main revenue and expenditure items, based on information supplied by each university to the Ministry of Education (MIUR). However, the database is in its early stages, and still suffers from a few glitches. For instance, according to the instructions supplied to all universities, total revenues and expenditures should be derived exclusively as the sum of the components. However, only in 10 universities out of 65 for which I have collected data is the sum of the components equal to the figure for total revenues; only in 12 more is the difference of the two totals below 10 percent; in many cases, the difference exceeds 100 percent.[5]

Thus, while the dataset does not allow to reconstruct a reliable figure for total revenues and expenditures,[6] it can still be used to estimate spending and revenues per academic staff or per student, using only information from those universities that have meaningful budgets. The resulting figures are displayed in Table 3 on page 7. Note that I exclude all private universities, because often their budgets are less complete and not comparable to those of state universities, and the structure of their revenues and spending is very different. I also exclude all those universities whose totals differ from the sum of their components by more than 20 percent. Finally, I use data on "riscossioni" e "pagamenti" (i.e., roughly speaking, data on a cash basis) rather than "accertamenti" and "impegni" (i.e., on an accrual basis), because the former are considered of better quality than the latter.

If anything, Table 3 shows that Italian universities are better funded, per academic staff or per student, than British universities.[7] Total spending per academic staff is about 15 percent higher in Italy (line 1); spending per enrolled student is 30 percent lower in Italy (line 2), but it is 30 percent higher if expressed in terms of FTE students (line 3). Even allowing for substantial fixed costs per student, there is no evidence that Italian researchers or students have access to less overall resources than their British counterparts.[8]

Line 4 displays average spending on academic staff, per academic staff: hence, it approximates the average income of academic staff.[9] Again, there is no evidence that the average British researcher is better paid, quite the opposite.

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[5] Implausible as it may seem, one of the main problems of this database is that CINECA itself cannot tell whether the many blank cells in the tables supplied by the Universities mean "0" or "missing" (personal communication to the author).

[6] Data on the most important source of revenues for universities, the Ministry of Education, can be obtained from the budget of the latter.

[7] Figures on revenues instead of spending are very similar (revenues and expenditures include loans and their repayments).

[8] Again a corroboration of the figures for Italy comes from the CRUI data: according to this source, in 1998 spending per FTE was PPP $ 15,003, thus very close to the figure in line 3 of Table 3.

[9] The figure for Italy does not include pension contributions by Universities.

Table 3: revenue and spending data

		UK 1998/99 PPP dollars	Italy 1999/00 PPP dollars
1.	Spending per ac staff,	138,977	162,532
2.	Spending per student	9,125	6,697
3.	Spending per FTE student	12,435	16,854
4.	Spending on academic staff, per ac staff	45,394	57,962

Sources: UK: HESA [2000a] and [2000b]; Italy: CNVSU [2001a] and CNVSU [2001b].
Notes: UK: all UK universities. Italy: includes all state universities, except: Brescia, Cagliari, Calabria, Catanzaro, Chieti, Ferrara, L' Aquila, Parma, Perugia per stranieri, Roma (Istituto Scienze Motorie), Sassari, Siena, Siena per stranieri, Trieste. All data are expressed in PPP dollars, using exchange rates of .655 for the UK in 1999 and 1587 for Italy in 2000 (from OECD *Main Economic Indicators*).

With the data of Table 1 and Table 3, we can compute an estimate of unit labor costs of the two HE systems.[10] Line 1 in Table 4 displays the "labor" cost (that is, the cost in terms of expenditure on academic staff only), in PPP-adjusted dollars, of producing one publication in the UK and in Italy. Line 2 displays the labor cost of producing one citation. Producing one unit of research output (paper or citation) costs in Italy about 2.5 to 3 times what it costs in the UK, after adjusting for PPP. For several reasons, these estimates have to taken with caution.[11] Yet, the differences between the two countries are such that qualitatively they are likely to survive any robustness check.

Table 4: Unit labor costs in Higher Education

		UK	Italy	Italy/UK
1.	Unit Labor Costs, I	4,053	10,350	2.55
2.	Unit Labor Costs, II	919	2,739	2.98

Sources: Table 1 and Table 3.
Notes:
Line 1: Unit Labor Costs is defined as PPP$ spent on academic staff in 2000 per paper published in 1997. Constructed as: (line 4 of Table 3)/(line 3 of Table 1).
Line 2: Unit Labor Cost is defined as PPP$ spent on academic staff in 2000 per citation in 1997. Constructed as: (line 4 of Table 3 * line 1 of Table 1)/(line 2 of Table 1 *line 3 of Table 1).

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[10] The unit labor cost is the labor cost (total compensation) in nominal terms of producing one unit of output. It is also equal to the nominal compensation per person divided by the productivity of labor. When used to compare, say, manufacturing in two countries, it gives an idea of the "competitiveness" of the two sectors.

[11] Note, in particular, that I use the number of publications and of citations per researcher in 1997 but the spending on academic staff per academic staff in 1999 or 2000. Also, the source for the data on publications and citation per researcher and per million PPP$ in Table 1 is different from the source for the data on spending on academic staff per academic staff in Table 3.

Explanation 3: incentives. Thus, the Italian HE system does not seem to suffer from a higher student / teacher ratio or a lower funding than the British system. But the two systems differ fundamentally along an important dimension: differentiation between universities. Table 5 shows clearly that the UK higher education system allows for much more dispersion of the student / teacher ratios and of revenues per student than the Italian system.

Table 5: Dispersion of indicators, UK and Italy

	UK 1998/99		Italy, 1999/2000	
	st. dev. / mean	(max – min) / mean	st. dev. / mean	(max – min) / mean
Revenues per student	1.07	9.62	.34	5.24
Student per academic staff	.68	7.60	.49	3.29

Sources: UK: HESA [2000a] and [2000b]; Italy: CNVSU [2001a] and CNVSU [2001b].
Notes: data for Italy include only state universities.

This evidence suggests that perhaps what differs in the two systems is the incentives they provide students and professors. In the next two sections I consider two types of incentives, those deriving from the system of recruitment and promotion, and those deriving from the method of allocation of funds.

3 AN EMPIRICAL ANALYSIS OF APPOINTMENTS TO FULL PROFESSORSHIP

3.1 Recruitment, promotion and termination in Italian universities

To understand the structure of incentives, it is important to be aware that the Italian higher education system does not have a true tenure process. Formally, all researchers at all three levels (*ricercatore*, *professore associato*, and *professore ordinario*) are subject to a trial period for three years, after which they can be denied *confirmation* in their position. This system seems to be a formality. I have not been able to find systematic data on the process of *conferma*, but I have collected anecdotal evidence on several *ricercatori* and *associati* who were not confirmed by a national commission. All of them have either been confirmed after one year, by a different commission, or have appealed to TAR (the administrative courts) and have been

reinstated by their own university, possibly in a different capacity. Quite simply, it is all but impossible for a university to terminate the employment of one of its researchers.

This implies that career incentives are left entirely to the process of promotion. In this section, I carry out a statistical study of this process to full professorship in one specific area, Economics. This study requires some background information on the rules of the game, to which I now turn.

3.2 The process of promotion to full professorship

The rules for recruitment of professors by Italian universities changed radically in 1999. From that date, a university that wants to fill a vacancy initiates a concorso; a committee of five full professors is formed, one nominated by the university that wants to fill the vacancy, and four elected by the whole national body of full professors in that area. The committee meets to evaluate the scientific production of the candidates, and nominates three *idonei*. Out of these, the university that has initiated the concorso can (but does not have to) appoint one as professor; the other two *idonei* can be appointed full professors by any other university within the next three years.

This system replaces a previous system that had been in place since 1980, whereby full professors were appointed after a nationwide concorso, called every few years, that would evaluate all candidate associate professors in that area, and would nominate a number of winners equal to the number of outstanding vacancies. Universities with a vacancy would then bargain (or collude, or fight) over whom to appoint to which university.

It is interesting to go over the main reasons why the old system was discarded, and why the new system was expected to perform better.[12] For this, it is important to understand how the old concorsi worked in actuality. Because the concorsi were carried out so infrequently, typically the number of candidates was much larger than the number of commissioners. In a cooperative outcome (the norm), each commissioner was virtually guaranteed one position for the candidate of his choice, no questions asked; indeed, this was often the key incentive to take up the unpaid (and onerous) position of commissioner. Thus, the system generated two sets of winning candidates: those that were "matched" to a commissioner and to a university, and those who were not. The consequences were twofold. First, several universities were reluctant to fill vacancies via the concorso, because once the vacancy was posted they could have little control over the outcome; these universities would prefer to wait and see, and appoint professors by *trasferimento* after the outcome of the concorsi had materialized. Thus, a number of winning candidates were simply parked in universities far from their region of residence and preference, waiting for a trasferimento to their prefereed university; in the meantime, they would not develop any commitment to the university where they were parked. Absenteeism was endemic. Second, small universities, with little weight in the selection committee, would only get the second round picks of the winning candidates; again these

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[12] Checchi [1999] contains a good discussion of the costs of the old system and a at times prophetic discussion of the dangers of the new system.

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were usually candidates who were most unlikely to develop any attachment to that university.

In the best scenario, the new system would have allowed more control by each university on its own recruitment process and would have increased the transparency of the process. A university would initiate a concorso for its own vacancy, and would have control of 1/5 of the positions of commissioners. To avoid phenomena of inbreeding, however, the other commissioners would belong to other universities and would be nominated by all professors.

However, perhaps the biggest change from the previous system was that now the numbers of commissioners exceeds the number of idonei. In the old system, after the matched candidates were placed it was likely that an easy consensus would be found on the remaining candidates based largely on their scientific merits: the cost of promoting them was small, after each commissioner had had his own candidate promoted, and the benefit would be large, if anything in terms of image. In the new system, where the number of candidates exceeds the number of commissioners, there is no room for this common good. Only matched candidates can be promoted in each concorso: but which exactly, since the number of commissioners exceeds that of idonei? A stable equilibrium requires now some intertemporal (as opposed to intratemporal in the previous system) exchange of favors.

University X wants to promote its own insider, and initiates a concorso. The commissioner from university Y supports idoneita' for the insider of university X, with the mutual understanding that university X will return the favor in the future when it comes to promoting university Y's insider. A second way to circumvent the control over inbreeding that the new system was designed to achieve (in a benevolent interpretation) is for university X to send its insider to university Y's concorso, and promote him when he is made idoneo there. The result is that concorsi are possibly even less competitive than under the old system. In fact, it is well known in the profession that Concorsi typically come with a label attached, that of the candidate (usually the internal candidate) who is intended to win.

3.3 The data

To study the new concorsi more systematically, I have assembled a dataset on all candidates and commissioners in a number of recent concorsi for full professorship. Because collecting data on all concorsi would be an unmanageable task, I have focused on all concorsi in Economics, the only field I am familiar with. [13]

By the time this paper was written (mid-December 2001), 46 concorsi for full professorship with the new rules had declared a winner and the three idonei. The database I have assembled covers all candidates and commissioners in 40 of these 46 concorsi.

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[13] The subfields covered are P01A (Economia Politica), P01B (Politica Economica), P01C (Scienza delle Finanze), P01D (Storia del Pensiero Economico), P01E (Econometria), P01F (Economia Monetaria), P01G (Economia Internazionale), P01H (Economia dello Sviluppo).

For each candidate, the dataset includes biographical information (date of birth, date of promotion to associate professor [14], university where the candidate is associate professor at the time of the concorso, highest degree held and date it was obtained, etc.), and information on scientific production. The latter was obtained from an EconLit search, with each publication assigned to one of the following categories: first, second and third tier of the top 160 foreign journals according to the classification in Kalaitizidakis et al. [2000], first and second tier Italian journals (according to the classification of Checchi [1999])[15], other journals, foreign and Italian working papers, contributions to volumes, editorship of volumes, authorship of volumes. For commissioners, the dataset includes the same information on scientific output, but the biographical information is limited to the university they belong to; in addition, I also collected data on the number of votes each member obtained in the election of the commission.

Note that, while virtually all the top 160 foreign journals are refereed, only some of the Italian journals are, and even these only recently. Thus, I will also refer to the foreign journals as "refereed" journals. In contrast, volume contributions are very rarely subject to a formal refereeing process.

The full journal list, definition of categories, definition of other variables, the criteria used to construct the dataset, etc., are in Appendix A. One well known problem of EconLit is that it can easily list the same publication more than once: in contrast, all duplications have been eliminated in the database used here.[16] The database is also synchronized with the concorsi: only works dated before the application deadline of each concorso were considered. Note that I did not make any adjustment for coauthored work.

The dataset includes observations on 200 commissioners and on 371 candidates, corresponding to 206 different individuals (many individuals participated to more than one concorso).

3.4 Who evaluates whom?

Table 6 on page 12 lists a few statistics on the publication records of all the candidates and the commissioners in the dataset. On average, commissioners have 2.5 more EconLit publications than candidates. However, there is virtually no difference in the average number of refereed journal publications: all the difference is in the number of Italian and other journal publications and volume contributions. Turning to the main percentiles, the median number of refereed journal publications is 1 for candidates, and 0 for commissioners; but the median number of top, mid and bottom quality refereed

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[14] A few candidates were ricercatori at the time of the concorso, and one was working in the private sector: in these cases, the dataset records a missing value for this variable.

[15] I am not aware of any classification of Italian journals: hence, I am following here the subjective, but informed, classification by Checchi [1999].

[16] A second much debated problem is the English language bias. However, this problem is more serious for comparisons across disciplines: in Economics, it affects all candidates equally and is thus unlikely to cause systematic bias in the results. A third problem is that EconLit list publications only from 1969 onwards: this might be a binding constraint for a handful of commissioners.

journal publications is always 0 for both candidates and commissioners. At the 75th percentile, both candidates and commissioners have 2 refereed journal publications; but while the 75th percentile candidate has 1 publication in each refereed journal category, the 75th percentile commissioner. Only at the 95th percentile do commissioners have more refereed journal publications than candidates, reflecting the presence of few internationally eminent researchers in the commissions; still, even at the 95th percentile candidates have at least as many top and bottom refereed journal publications as commissioners.[17]

Where commissioners have a decisive edge, at all percentiles, is in volume contributions: most of them are volume contributions to edited volumes; less than 7 percent are authored or co-authored volumes, and about 15 percent are volumes edited or co-edited by the individual. We will see shortly that volume contributions are the category of publications with the largest and most significant effect on the probability of a candidate to be nominated idoneo.

Table 6: Publication record, all candidates and commissioners

	Cand.	Comm.	Cand.	Comm.	Cand.	Comm.	Cand.	Comm.
	avg		median		P75		P95	
Total Econlit	8.7	11.2	6	6	11	14	30	42
Journal	6.	7.5	5	5	9	10	19	28
Refereed Journal	1.8	1.9	1	0	2	2	7	10
Top Ref Journ	0.7	0.8	0	0	1	0	4	4
Mid Ref Journ	0.6	0.5	0	0	1	0	3	2
Bot Ref Journ	0.5	0.6	0	0	1	0	3	3
Italian Journal	2.7	3.3	2	2	4	5	8	11
Top Ital journ	1.4	1.5	1	1	2	2	5	6
Bot Ital journ	1.3	1.8	1	1	2	3	5	7
Other Journal	1.6	2.4	1	1	2	3	7	12
Volume	1.6	3.1	1	1	2	3	5	13
Volume Author	0.2	0.2	0	0	0	0	1	1
Volume Contr.	1.2	2.5	0	1	1	3	5	9
Volume Editor	0.2	0.4	0	0	0	0	1	2
Working Paper	1.1	0.6	0	0	1	0	6	2

Definitions: see Appendix A

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[17] The fact that the number of publications in a given category (like refereed journals) at a given percentile is greater than the sum of its components (like top, mid and bottom refereed journals) at the same percentile is not a mistake: it can happen if publications in different components category are concentrated in different individuals.

Table 7 compares the publication records of commissioners and candidates by concorso. To understand the information in this table, consider column 1a, labeled "Mean comm. > Mean cand.": this columns displays the number of concorsi in which the mean number of publications of the commissioners (in the category listed in the row) is larger than the mean number of publications of the candidates in the same category; column 1b displays the number of concorsi where the inequality is reversed (the complement to 40 of the sum of the two columns is the number of draws). Columns 2, 3 and 4 compare the third, [18] second and first best commissioner to the median candidate; columns 5, 6 and 7 compare the second best commissioner to the first, second and third best candidates.

From column 1, line 1, there are about as many concorsi in which the commissioners have more refereed publications than candidates, on average, as where the opposite is true; but when the top refereed journals are considered (line 2), candidates have a much better average performance. The comparison with the median candidate (columns 2 to 4) is also instructive; in more than 80 percent of the concorsi the best commissioner has more refereed journal publications than the median candidate (column 2a); but the relative position of commissioner deteriorates rapidly: only in 8 concorsi does the third best commissioner have more refereed journal publications than the median candidate; in 17 concorsi the opposite inequality holds (column 4).

The last three columns describe how the second best commissioner performs relative to the top three candidates (presumably the candidates that, unconditionally, should have the best chances of becoming idonei). In about 80 percent of concorsi the first best candidate has more top refereed journal publications than the second best commissioner (column 5b), and only in 2 concorsi does the second best commissioner perform better than the first best candidate in this dimension (column 5a). But even a comparison with the third best candidate is problematic for the typical second best commissioner: only in 6 concorsi does the latter perform better than the former (column 7a, line 2); in 11 cases the opposite is true.

One should note that the numbers in Table 6 and Table 7 do not tell the whole story, however, because on average in Economics full professors are 7.2 years older than associate professors; hence, if one looked at number of publications per year the relative position of candidates would improve further and that of commissioners would worsen.

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[18] The third best commissioner is the median commissioner; on average, there are about 9.5 candidates per concorso; hence, the average median is about 5 candidates.

Table 7: Publication rankings of candidates and commissioners, by concorso

	1		2		3		4		5		6		7	
	1a	1b	2a	2b	3a	3b	4a	4b	5a	5b	6a	6b	7a	7b
	Mean comm. > Mean cand.	Mean comm. < Mean cand.	First best comm. > Median cand.	First best comm. < Median cand.	Second best comm. > Median cand.	Second best comm. < Median cand.	Third best comm. > Median cand.	Third best comm. < Median cand.	Second best comm. > First best cand.	Second best comm. < First best cand.	Second best comm. > Second best cand.	Second best comm. < Second best cand.	Second best comm. > Third best cand.	Second best comm. < Third best cand.
Refereed Journals	21	18	33	5	7	13	8	17	3	35	5	27	12	22
Top Refereed Journals	13	21	25	4	10	6	2	10	2	31	5	21	6	11
Italian Journals	21	19	37	1	30	4	19	16	8	29	13	20	17	14
Volumes	23	16	39	1	27	7	15	15	8	30	13	18	19	12

Legend: see text.

A different way to look at the same issue is to estimate the determinants of the number of votes each commissioner obtained in the election for each concorso. Table 8 displays the results of a regression of the number of votes obtained by a commissioner[19] on the number of journal publications (the sum of refereed journals, Italian journals, and other journals), the number of volume publications, and three dummy variables for commissioners that come from a Milan, Rome, or one of the remaining ten largest universities, respectively. If concorsi were designed to screen the ablest candidates, and this goal were widely shared, one would expect the profession would try to make sure that those professors who are better equipped to evaluate the candidates are elected. However, the two proxies for scientific production, total journal publications and total volume publications, are entirely insignificant, and so are the other variables. The very fact that no observable variable seems to have any explanatory power for the number of votes suggests that the motives to become a commissioner, and to elect one, do not coincide with the desire to screen the most worthy candidates.[20]

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[19] Currently, the dataset does not contain data on the number of votes obtained by the non-elected professors.

[20] This statement would become clearer if one looked at the pre-election periods of each concorsi. Bona fide electoral campaign are mounted, and camps are formed. In some cases the goals of campaigners are openly stated, in others they are not; although they are usually well understood by the profession. Unfortunately (but understandably), I have not been authorized by friends and acquaintances to publish a

Table 8: Determinants of commissioners' votes

Variable	Coeff. (t stat.)
No. of journals pubs.	.030 (.28)
No. of volume pubs.	.116 (.77)
Large university	-.131 (.08)
Milan	2.800 (1.25)
Rome	-1.771 (.89)
Nobs	160
Adj. R^2	-.003

Dependent variable: number of vote
obtained by each commissioner.

Based on the evidence so far, it would not be unreasonable to entertain doubts on the ability of most members of the average commission to evaluate the scientific production of the best candidates, and to put it in the context of the current literature.[21]

Yet, this might well be the efficient outcome. Once it is recognized that a specific concorso is not designed to genuinely screen out the applicants, but merely to ratify a decision already taken, it is perfectly efficient not to delegate the most productive members of the profession to sit in the commission.

3.5 What determines the probability of success?

3.5.1 A few statistics

The 40 concorsi in the dataset have generated 117 idonei; 91 of them had been appointed full professors at the time this paper was written. Table 9 on page 16 displays a few summary statistics on the outcome of these concorsi. 32 of them had at least an insider (i.e., a candidate who is an associate professor in the same university that carries out the concorso) ; in 26 of them at least one internal candidate was certified idoneo, for a

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selection of the e-mails they have received during these campaigns. These e-mails would have been more instructive than a thousand regressions.

[21] Although not shown in the data, the time of publications is also instructive. We have seen that the median number of refereed journal publications for commissioners is 0. If one considered only publications in the last ten years, it would probably be the case that even the 75th percentile would be 0.

total of 35 idonei insiders; of these, 32 were appointed full professors, 27 in their own university and 5 in a different university.

The next lines (6 to 15) calculate the frequency of certain events, conditional on the status of the candidate. 57 percent of insiders were declared idonei, against 27 percent of insiders. 52 percent of insiders have become full professors, and 44 percent in their own university; the same percentages for outsiders are 19 and 12 percent, respectively. Overall, 55 percent of idonei have been appointed by their own university (line 13); 70 percent of vacancies were filled by insiders (associate professors in the university that filled the vacancy, line 14); in 63 percent of cases, the university that carries out the concorso fills the position with an insider (line 15).

Note that only 5 appointments out of 91 concerned individuals who were outsiders in the university that had not called the concorso: in other words, if university X appoints the idonei of a concorso initiated by university Y, in 42 cases out of 47 the individual was associate professor either in X or in Y.

Table 9: A few statistics on concorsi

1.	# concorsi w/ insiders	32
2.	Of which w/ at least one insider certified idoneo	26
3.	# of insiders certified idonei	35
4.	# of insiders idonei appointed full professors	32
5.	Of which called by their own university	27
6.	P(idoneo | insider)	.57
7.	P(idoneo | outsider)	.27
8.	P(appointed by X | insider in X)	.44
9.	P(appointed by another university | insider in X)	.08
10.	P(appointed by X | outsider to X)	.05
11.	P(appointed by own university | outsider to X)	.12
12.	P(appointed not by X or own university | outsider to X)	.02
13.	P(appointed by own university | idoneo)	.55
14.	P(appointed by own university | appointed)	.70
15.	P(X appoints insider)	.63

Legend: University X is the university that
initiates the concorso

3.5.2 The effects of publications and "insidership" on the probability of success

Table 10 on page 18 displays the results from a logit regression[22] of a dummy variable taking the value of 1 if the candidate is made idoneo (an event that will be frequently referred to as "success" for brevity) on the following independent variables: the number of years the candidate has been associate professor, a dummy variable taking the value of 1 if the candidate is an insider in the university that has initiated the concorso, the number of commissioners from the same university as the candidate (excluding the internal commissioner for insiders), the number of candidates in the concorso, and four publication variables: the number of publications in refereed journals, in Italian journals, in other journals, and the number of volume publications. The publication variables are taken as deviations from the concorso–specific means (if this transformation were applied to the other variables as well, this would be identical to including concorso-specific constants). The regressions includes 331 observations out of the 371 candidates, because for 40 candidates I was not able to find information on seniority.[23]

Table 10 displays the marginal effects (multiplied by 100, to avoid cluttering the table with many decimal points) on the probability of success of a unit change in the independent variable; for the insider dummy variable, the table displays the change in the probability of success, associated with a change of status from external to internal candidate, all else equal. The columns of Table 10 differ in the points where the marginal effects are calculated. In column (1), all variables are evaluated at the mean; an extra refereed publication causes the probability of success to increase by 2.2 percentage points (pp), although this effect is not quite statistically significant; an extra volume publications (recall that this variable includes authored volumes, but mostly contributions, including introductions to edited volumes) has a slightly larger, and statistically significant, effect. Based on the point estimates, and if these effects were linear, it would take an outsider 13 refereed publications to make up for the advantage an insider has: being an insider increases the probability of success by 28 pp, and the effect is highly statistically significant. Having a commissioner from his own university helps the chances of success of an outsider, but this effect is very imprecisely estimated; as expected, the number of candidates has a negative and significant effect on the chances of success; but contrary to expectations, seniority as associate professor has a negative, albeit insignificant, effect on the probability of success. Note that all publication variables are jointly significant at the 6 percent level.

It is interesting to explore the effects of "insidership" at different points of the vector of publication records. In column (2), each publication variable is evaluated at its minimum value in the estimation sample; in column (3), at the median value; in column(4), at the maximum value. One might expect that being an insider has little value to a truly exceptional candidate, that no self-respecting commission can fail to promote,

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[22] Probit regressions give virtually identical results.

[23] This regression is similar to those in Checchi [1999] and in Campanella, Segnana and Soci [1999]. Both these contributions, however, study one competition for associate professors (with the old rules) instead of for full professor. I focus on full professorship because this would provide more variation in EconLit publications.

and to a truly unpresentable candidate, that no self-respecting commission can promote; whereas "insidership" should matter more to a mid-level candidate. Indeed, insidership has a non-linear effect: it enhances the probability of success by 19 pp for a candidate with the minimum level for publications, by 28 pp for a median candidate, and by 14 pp (and insignificant) for the best candidate.

Table 10: First regressions

	All at mean	All at mean, except publs. at min	All at mean, except publs. at median	All at mean, except publs. at max
	(1)	(2)	(3)	(4)
Years as associate Professor	-0.54 (1.06)	-0.31 (0.92)	-0.53 (1.05)	-0.39 (0.75)
No. of commissioners from same university	5.1 (0.65)	3.0 (0.65)	5.0 (0.65)	3.7 (0.60)
Dummy variable for internal candidate	27.9 (3.36)	19.1 (2.23)	27.6 (3.33)	13.7 (1.16)
No. of candidates in concorso	-3.3 (4.21)	-1.9 (2.62)	-3.2 (4.24)	-2.4 (1.30)
No. of refereed journal Publications	2.1 (1.77)	1.2 (2.51)	2.0 (1.80)	1.5 (1.26)
No. of Italian journal Publications	3.7 (0.36)	0.22 (0.38)	0.36 (0.36)	0.27 (0.38)
No. of other journal Publications	-2.4 (1.86)	-1.4 (1.73)	-2.3 (1.84)	-1.7 (1.08)
No. of volume Publications	2.3 (2.21)	1.3 (2.04)	2.2 (2.23)	1.6 (1.80)
P(idoneo)	.283	.137	.274	.822
Wald Chi2(8)	35.30			
P > Chi2	.0000			
Pseudo R2	0.119			
Nobs	331			
Wald Chi2(4)[*]	9.13			
P > Chi2[*]	.058			

Dependent variable: dummy variable taking the value 1 if the candidate is declared idoneo.
*Wald test for the joint significance of the four publication variables.

3.5.3 The role of commissions

Table 11 on page 20 explores further the role of commissions. The table displays results from estimates of the same equation as Table 10, but on two different samples: columns (1a), (2a) and (3a) on the sample of concorsi with average number of EconLit publications by commissioners above the median average, the other columns on the complementary subsample. The difference between the two samples is remarkable. In the high EconLit sample, being an insider has a small effect of 11 pp (and entirely insignificant) on the probability of success at the minimum number of publications, but an effect of 35 pp (and highly significant) in the low EconLit sample; very similar numbers hold at the maximum number of publications.[24] Another way to see the difference between the two samples is to consider the difference in the probabilities of success: in the high EconLit sample, going from the minimum to the maximum number of publications, holding everything else constant, raises the probability of success by 80 pp; in the low EconLit sample, by only 10 pp. In fact, the contribution of an extra refereed journal publication in the low EconLit sample is negative (although insignificant) both at the minimum and maximum number of publications; a test on the joint significance of the publication variables has a p-value of .05 in the high EconLit sample, and of .68 in the low EconLit sample. Note that, even in the high EconLit sample, an extra refereed publication has a positive effect only at an intermediate numbers of publications.

One interpretation of these results is that the selection and composition of the commission has an impact on the results. Suppose commissioners and candidates were assigned randomly to concorsi: then these results suggest that commissioners with few publications are less able, or willing, to screen candidates on the basis of their scientific productivity. Of course, another interpretation is that commissioners and candidates self-select into two different types of concorsi; one type in which it is common knowledge (although not to the econometrician) that scientific productivity will not be the main criterion, and one type where it is.

3.5.4 A further look at the role of publications

The results so far indicate that two types of publications – refereed journal publications and volume contributions – seem to have a statistically significant, although quantitatively limited, effect on the probability of success, at least in the high EconLit sample and intermediate levels of publications. But this result is largely due to intra-concorsi variation: if one reruns the regressions of Table 10 and Table 11 with the publication variables not in deviations from the means, the marginal effect of an extra refereed journal publication halves, and its t-statistics is always around 1 (results not shown).

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[24] The minima and maxima are specific to the two samples.

Table 11: High and Low EconLit commmissions

	All at mean	All at mean	All at mean, except publs. at min	All at mean, except publs. at min	All at mean, except publs. at max	All at mean, except publs. at max
	High Econlit	Low Econlit	High Econlit	Low Econlit	High Econlit	Low Econlit
	(1a)	(1b)	(2a)	(2b)	(3a)	(3b)
Years as associate Professor	-0.36 (0.51)	-0.09 (1.37)	-0.16 (0.45)	0.87 (1.27)	-0.22 (0.39)	-1.0 (1.38)
No. of commissioners from same university	8.9 (0.63)	7.1 (0.62)	4.1 (0.58)	6.6 (0.61)	4.5 (0.57)	7.7 (0.60
Dummy variable for internal candidate	22.4 (1.69)	35.3 (2.72)	11.1 (1.10)	34.7 (2.62)	9.7 (0.70)	35.4 (3.00)
No. of candidates in concorso	-3.0 (3.11)	-3.3 (2.51)	-3.2 (4.24)	-3.1 (2.41)	-1.8 (0.81)	-3.5 (2.16)
No. of refereed journal publications	3.0 (2.22)	0.45 (0.18)	2.0 (1.80)	-0.42 (0.18)	1.84 (0.83)	-0.49 (0.19)
No. of Italian journal publications	-0.49 (0.29)	1.4 (0.93)	0.36 (0.36)	1.3 (0.98)	-0.30 (0.23)	1.6 (0.90)
No. of other journal publications	-2.4 (1.49)	-2.2 (0.90)	-2.3 (1.84)	-2.1 (0.92)	-1.47 (0.63)	-2.4 (0.9)
No. of volume publications	2.5 (2.24)	1.7 (0.89)	2.2 (2.23)	1.6 (0.95)	1.54 (0.91)	1.8 (0.71)
P(idoneo)	0.242	0.322	.0873	0.286	0.873	0.384
Wald Chi2(8)	22.04	13.60	22.04	13.60	22.04	13.60
P > Chi2	0.0048	0.0929	0.0048	0.0929	0.0048	0.0929
Pseudo R2	0.162	0.095	0.162	0.095	0.162	0.095
Nobs	164	167	164	167	164	167
Wald Chi2(4)[*]	9.40	2.31	9.40	2.31	9.40	2.31
P > Chi2[*]	0.052	0.678	0.052	0.678	0.052	0.678

Dependent variable: dummy variable taking the value 1 if the candidate is declared idoneo.
*Wald test for the joint significance of the four publication variables.

Thus, the concorsi have some (limited) ability to screen the more productive candidates, but only within a concorso, not across them. This would not matter much if candidates were randomly assigned to concorsi, and each concorso had roughly the same mix of good and bad candidates. But the average numbers of EconLit and of refereed publications of candidates and of commissioners are highly positively correlated across concorsi (the correlation coefficients are .45 and .60, respectively). This implies that some

good candidates might be overlooked in favor or bad ones (even ignoring the effects of "insidership") just   because they are in the "wrong" concorso, with many good candidates.

The coefficients of all publication variable also become entirely insignificant if one estimates a regression with each subcategory of publications (for instance, top, mid and bottom refereed journals) separately, instead of the main categories as in Table 10 and Table 11 (results not shown).[25] This specification is very similar to that estimated by Checchi [1999] in a study of the determinants of promotion to associate professors. He found that virtually all publication variables (except volume contributions and publications in bottom Italian journals or in other journals) had a significant impact on the probability of being promoted associate professor. Interestingly, in Checchi [1999] at the mean an extra refereed journal publication increases the probability of being promoted by 6 to 8 pp, three to four times the effect estimated in Table 10 for promotion to full professors. But a publication in a top refereed journal increased the probability of being shortlisted for the oral exam by 98 percent (!).[26]

Checchi [1999] observes that, had the results of his regression been know ten years in advance, the best advice for maximizing the chances of being promoted *associate* professors would have been: "publish at least one article in the top 50 journals to enter the short list, and ask your university to put up a vacant chair." Things have become simpler after the reform: to be promoted *full* professor, all one needs to do is to make sure the second part of the advice is true; at most, he might want to make sure he has a few volume contributions, or the introduction to a few collections of essays.

3.5.5 Why the insider advantage?

Thus, the evidence suggests that the current recruiting system is not very effective in screening out the most deserving candidates: by far the single most important determinant of success is being an insider. This could be a rational response to a problem of imperfect information: an insider is less risky, because he has revealed more information.[27] This interpretation is implausible: if it were correct, one would expect that scientific productivity would matter at least for outsiders. But this is not the case. To show this formally, one would need to compute the marginal effects on probabilities at different levels of publication records, for insiders and outsiders. This would result in too many columns; but the same information can be gathered from a plot of the probabilities of success, from the regression of Table 10, as a function of the number of refereed journal publications, for insiders and outsiders. This is done in Figure 1 on page 22. At a given number of publications, the vertical distance between the two lines is the effect of being an insider; the slope of each line gives the effect of an extra   publication, for

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[25] This more detailed specification is very similar to that estimated by Checchi [1999].

[26] I suspect this result reflect the fact that the maximum number of refereed publications in the sample was one.

[27] This is probably the reason why internal candidates of US universities have a better chance at tenure than external ones, other things equal. Although I do not have hard figures, I believe the advantage of insiders in the US is nowhere as large as in Italy.

insiders and outsiders; the vertical distance between two points on the same line gives the effects on the probability of success of an extra number of publications corresponding to the horizontal distance between the two points.   The figure shows clearly that the effect on the probability of success of an extra refereed publication or volume publication is basically the same, except perhaps for volume publications at high number of publications; however, it is usually insignificant for outsiders.

Figure 1: Effects of publications, insiders and outsiders
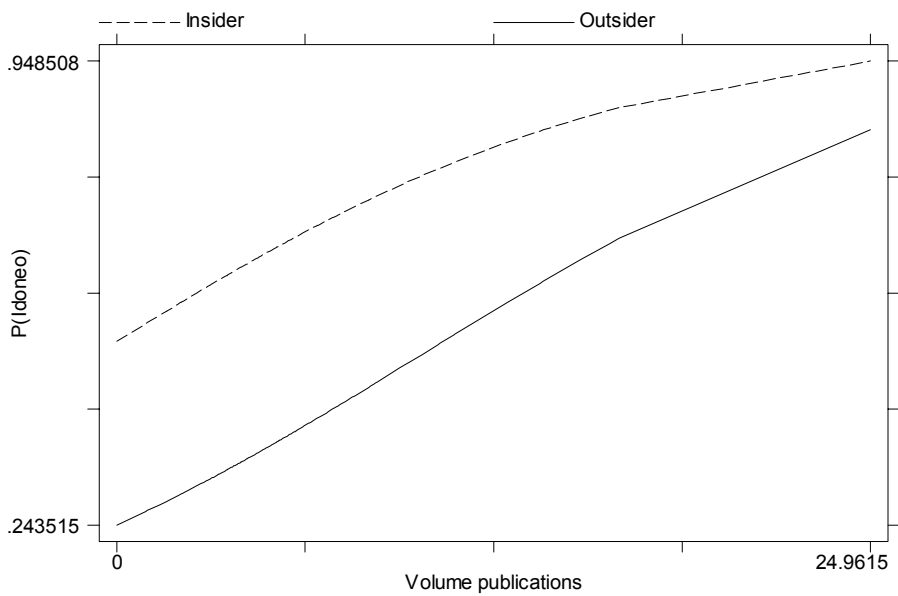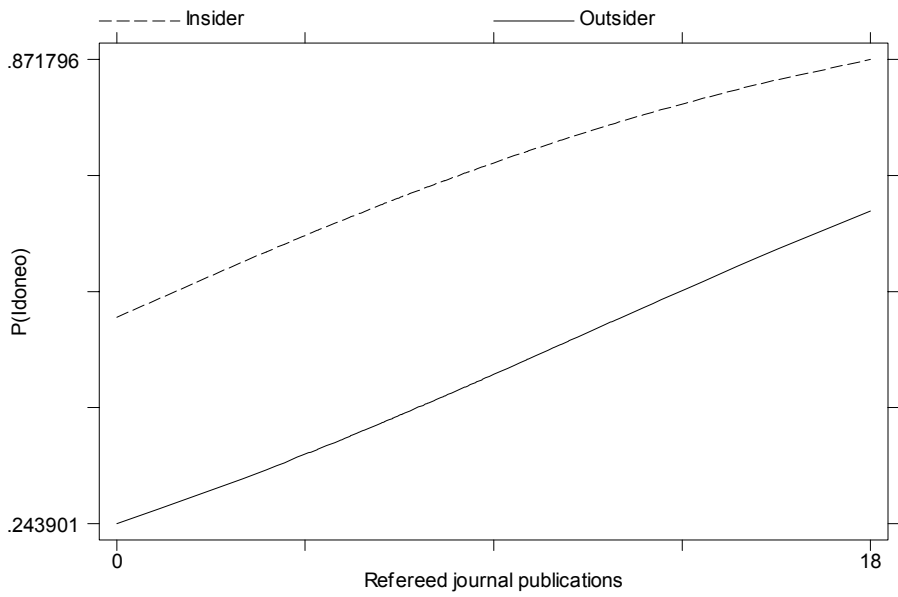
3.6 The costs of the system

Thus, the empirical evidence points to some considerable inefficiency rather than to an efficient solution of an asymmetric information problem. A system that does not screen out unworthy candidates effectively – and therefore does not provide an orderly system of promotion and exit –   is likely to have perverse effects on the age of its researchers.[28] Table 12 documents the strikingly high average age of Italian researchers relative to their UK counterparts, and the equally striking increase in the average age in the last 15 years. Italian researchers, on average, are 10 years older than their UK counterparts; and the average age has increased by 7 years over the last 15 years.

Table 12: Average age of researchers, Italy and UK

	UK 1998/99	Italy 2000		Italy 1985	
Average Age	41	50.6	$\begin{cases} 57.8 & (ord.) \\ 52.2 & (ass.) \\ 50.6 & (ric.) \end{cases}$	44.0	$\begin{cases} 54.2 & (ord.) \\ 45.5 & (ass.) \\ 36.7 & (ric.) \end{cases}$

Sources: UK: HESA [2000b]; Italy: CNVSU [2001].
Notes: data on UK include only "full-time non-clinical wholly institutionally financed academic staff"; data on Italy include only *docenti di ruolo*.

Table 13 compares the age distribution of the two HE systems. Once again, the difference is remarkable. Researchers younger than 30 years old account for less than 1 percent of non-student members of the Italian HE system, but for more than 9 percent in the UK; the share of researchers under 45 years (arguably the peak of productivity in many fields) is about 30 percent in Italy, 50 percent in the UK; 17 percent of the researchers are 60 or above in Italy, against only 3.5 percent in the UK.

Table 13: Age distribution of researchers, Italy and UK

	20-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66+
Italy	0,01	0,88	6,64	11,51	11,46	14,72	22,4	15,35	10,06	6,98
UK	1,62	7,58	13,05	11,48	15,76	18,04	16,87	8,98	3,41	0,20

Sources: UK: HESA [2000b]; Italy: CNVSU [2001].

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[28] In a system with meaningful tenure, individuals who are not up to the task would leave before retirement. Employer-initiated termination before retirement is not an option in Italy; and retirement itself occurs later than in the UK.

Notes: data on UK include only "full-time non-clinical wholly institutionally financed academic staff"; data on Italy include only *docenti di ruolo*.

What are the costs of an ill-designed (and worse implemented) mechanism for promotion? By definition, a system that does not reward scientific productivity adequately provides weak incentives for scientific research: the connection between the system of promotion and the comparatively low productivity of the Italian HE system will never be proved conclusively, but it is certainly tempting.

4 FINANCING

4.1 "Reducing imbalances"

In the year 2000, 71.6% of revenues of all state universities was from the Ministry of Education, 10.9% from student fees, and the rest from various other sources.[29] The largest part of financing from the Ministry of Education, about 90 percent, is channeled through the *Fondo Finanziamento Ordinario* (FFO). In turn, slightly more than 90 percent of this fund is allocated mostly on an historical basis: this component should decline every year, until it disappears in about 30 years;[30] the rest is allocated via the *Equalization Component* (*Quota di Riequilibrio,* QR), and is attributed to each university according to a formula designed, in theory, to achieve three fundamental goals (see Law 537/93, art. 5): (i) reduce differentials in unit costs per student across different universities in the same area,[31] (ii) reduce differentials in total funds across different areas,[32] and (iii) improve teaching and research. All this "tenendo conto delle diverse specificita' e degli standards europei" and of "condizioni ambientali and strutturali".

Other components of state financing, like *Fondo per la Programmazione* and *Fondo Incentivi*, as well as some ad hoc components of the FFO not allocated on an historical basis, are also intended to reduce some "disequilibria" or "imbalances" in some dimension.

This almost single-minded goal of reducing dispersion is probably the result of an academic culture that sees differentiation as the opposite of equity, and the sign of a market failure. But as I try to show in this section, this effort is misguided: differentiation can be "good" or "bad", depending on its causes; in fact, to promote the

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[29] These numbers are based, however, only on 40 out of the 57 state universities.

[30] The recursion started in 1993, when the FFO was attributed to each university in proportion to the sum of direct State spending plus State transfers to each university (Law 537/93, art. 5, comma 3).

[31] Note however that the wording of the law is ambiguous. The Italian text says: [the first goals is] "riduzione nei differenziali di costi standard di produzione nelle diverse aree disciplinari": it is not clear whether the cost differentials to be reduced are across universities in the same area, or across areas.

[32] Here too the wording is ambiguous: it is not clear whether the goal is to reduce differentials in total resources per student, per teacher, or other measures.

correct incentives for research and teaching, it is likely that *more* differentiation should be encouraged and promoted, along several dimensions.

4.2 The Quota di Riequilibrio

4.2.1 The formula of QR

Box 1 describes a simplified version of the formula that has been used since 1997 to allocate QR to each university (between 1995 and 1997 a different, more complicated formula was used, based on regressions involving many more variables).[33]

Box 1: The Quota di Riequilibrio

The allocation is driven by two key variables: the *cost-weighted number of students*, and the *number of FTE students*. The first variable is meant to capture a measure of "domanda di formazione", or financing needs, based on *standard unit costs per student* in each area and relative to a reference area, taken to be Law; the second variable is meant to capture a measure of "risultato di processo", or a measure of quality in teaching.[34]

To define these variables precisely, and in particular the construction of the standard unit cost per student, we need some notation. Let the index i denote a state university and the index k denote one of the 6 areas in which all *corsi di laurea* are grouped. Let S_i indicate the number of regular students in university i and let c_k^* indicate the *normalized standard unit cost* of area k, a concept that we define precisely below. The two key variables are defined as follows:

$$(\text{cost-weighted students})_i \equiv \sum_k S_{ik}\, c_k^*$$

$$(\text{FTE students})_i \equiv \sum_k \frac{(\text{ total number of exams taken in the year})_{ik}}{(\text{total statutory yearly number of exams})_{ik}}\, S_{ik}$$

The share of state university i in the QR of a given year is a weighted average of the shares of these two variables, relative to all state universities:

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[33] The 1997 formula was conceived by the *Osservatorio per la Valutazione del Sistema Universitario* (see OVSU [1998a]). The formula is explained clearly in Cicchitelli and Montanari [2000] and OVSU [1998A]. The original proposal by OVSU also included a component designed to incentivate research, which was omitted in the actual implementation of the instrument because of lack of data.

[34] The expressions in quotes are from DM 228 of 5 May 1999.

$$(1) \quad QR_i = .7 \frac{\text{(cost weighted students)}_i}{\text{(cost weighted students in all univ.)}} + .3 \frac{\text{(FTE students)}_i}{\text{(FTE students in all univ.)}}$$

Thus, the key variable is the *normalized standard unit cost* of area k, c_k^*. I now describe the construction of a simplified version of this variable.[35]

Step 1: Let G_i the number of equivalised teachers[36], and H_i the total funds received by the university, i.e. the sum of student fees and of the FFO accruing to that university. Small letters indicate variables in per regular student terms: thus, $h_i \equiv H_i/S_i$ is funds per regular student and $g_i \equiv G_i/S_i$ is equivalised teachers per regular student (henceforth the "teachers / student ratio" for brevity). The first step consists in estimating a cross section OLS regression of h_i on g_i:

$$(2) \quad h_i = \alpha + \beta g_i + \varepsilon_i$$

where $\alpha + \beta g_i$ is the conditional expectation of financing per student, given the teachers / student ratio.

Step 2: Let $\hat{g}_k$ be the sample average of the teacher / student ratio in area k. Using the OLS estimates of α and β in equation (2), a and b, the *standard unit cost per regular student* in area k is computed as follows:

$$(3) \quad c_k = a + b \, \hat{g}_k$$

Normalizing the standard unit cost of Law at 1 gives the *normalized standard unit cost* of area k, c_k^*.

Step 3: for each university, one can now compute the *total standard costs,* or *cost-weighted number of students,* as:

$$(4) \quad T_i^* = \sum_k c_k^* S_{ik}$$

In the above formula for the allocation of the QR, a weight .7 is attributed to the ratio $T_i^* / \sum_i T_i^*$.

How effective is this QR formula in achieving the three goals it should pursue? At present the QR formula accounts for less than 10 percent of total FFO, hence for a

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[35] The main difference for this presentation is that in the actual computation: (i) the process starts by estimating a regression of total funds received by university i on total students and total teaching staff, rather than a regression in per student terms directly; (ii) the "expected" number of teachers is allowed to be a piecewise linear function of the total number of students, to allow for possible economies of scale. The first step is unjustified, if most likely quite innocuous; the second step is awkward, largely because of the ad-hoc method it uses to formalize and estimate economies of scale.

[36] The number of equivalised teachers is defined as follows: $G_i \equiv 1$ x number of full professors + .72 x numbers of associate professors + .47 x number of assistant professors. The weights are based on average relative compensations.

marginal part of all revenues of the higher education system; thus, to carry out this exercise, it is best to imagine a steady-state, in which all funds are allocated according to the QR formula.

In fact, there seems to be substantial confusion in the debate about two notions of convergence: convergence to the QR formula funding over time, and convergence of unit cost across universities and / or areas. The current rules are likely to satisfy the conditions for the first notion of convergence: according to one interpretation of the current rules (see Chicchitelli and Montanari [2000]), the dynamics for the share of university i in the total FF, w_{it}, is given by

$$w_{it} = w_{it-1}(1-\theta) + (T_i^*/\textstyle\sum_i T_i^*)\,\theta$$

where θ is the quota of the FFO devoted to the Quota di Riequilibrio.[37] Hence, even if θ is constant over time, the system will converge to a steady state with $w_i = (T_i^*/\sum_i T_i^*)$, i.e. where the actual shares in the FFO are equal to the "theoretical" shares. But does this imply – as the goals of the QR require – that the actual unit costs in each university will converge to the standard unit costs of each area, and that differentials in total fund allocation across areas will be reduced? I now turn to an analysis of the goals of QR.

4.2.2 Goal 1: Reducing unit cost differentials across universities within an area

The main component of the QR formula, that based on the cost weighted student ratio, hinges crucially on the notion of *standard unit cost*. At a normative level, this notion is widely interpreted as a sort of norm to which the unit costs of training one student per year in each university should converge; at a positive level, it is frequently argued that the QR financing mechanism is designed precisely to provide the incentives to move towards this standard unit cost. Given the way standard unit costs are calculated, this can happen only if in each university the teacher / student ratio g_{ik} converges to the sample average $\hat{g}_k$.

To my knowledge, the mechanism through which the current QR formula should provide incentives to reduce differences in teacher / student ratios across universities has never been spelled out explicitly, but the underlying reasoning must be something like what follows. Assume that the parameters α and β of the unit cost equation (2) are the same in all areas: note that this assumption is implicit in the way equation (2) is estimated. Then, by the properties of OLS, for each area the sample average of the actual unit cost, $\hat{h}_k$, is also the standard unit cost c_k. Thus, on average university areas with above-average unit costs, i.e. for which $h_{ik} - c_k > 0$, would receive less than their costs and would have to shrink their teaching staff; in contrast, university areas with below average costs would receive more than their total costs and would be free to expand their

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[37] Even this formula is not free from ambiguity, however. I believe the legislation implies a different law of motion, $w_{it}\,FF_t = w_{it-1}(1-\theta)FF_{t-1} + (T_i^*/\sum_i T_i^*)\,\theta\,FF_t$. Assume FF_t grows at rate ρ: then the system converges only if $\rho > 1-\theta$, and it converges to $(T_i^*/\sum_i T_i^*)\theta\,\rho\,/\,(\rho-1+\theta)$. Only if $\rho = 1$ does w_i converge to $(T_i^*/\sum_i T_i^*)$.

teaching staff. It is in this sense, I think, that the current financing formula is believed to provide incentives for the actual unit cost h_{ik} to converge to the standard unit cost c_k.

This interpretation hinges crucially on the notion that the standard unit cost c_k is equal to the average actual unit cost $\hat{h}_k$ in each area. But it is easy to see that in general this will not be the case: in fact, there is likely to be a systematic bias. The key (unstated) assumption in estimating equation (2) was that the parameters α and β are the same in all area. This assumption is implausible: while β is approximately the same in all areas – a professor costs more or less the same everywhere –, the fixed cost α is much higher in hard sciences than humanities, because of the costs of laboratories and higher overhead. In addition, α_k is positively correlated with the teacher / student g_k ratio across areas: it is well known that scientific areas tend to have higher teacher / student ratios, and this is certainly the case in Italy as well, as Table 14 shows.

**Table 14: equivalised teachers per regular student, 1996/97**

Area (" Gruppi di facoltà ")	Equivalised Teachers per Regular Student, X100
Agraria	7,0
Architettura	3,0
Economia	1,5
Farmacia	3,4
Giurisprudenza	0,9
Ingegneria	3,5
Lettere e filosofia	2,7
Lingue e letterature straniere	3,7
Magistero	1,5
Psicologia	1,2
Medicina e chirurgia	10,9
Medicina veterinaria	6,0
Scienze MFN	6,7
Scienze stat., dem.e attuariali	4,5
Sociologia	1,0
Scienze politiche	1,7

OVSU [1998a], based on *Archivio dei ruoli del personale docente.* Murst-Cineca, and Rilevazione Murst-Istat.
As of 31.10.1997.

Consider, for illustrative purposes, the case illustrated in Figure 2. It shows two universities, A and B, and two areas, 1 and 2. The two areas differ only in their fixed cost α. If one estimated two separate regressions for each area, one would obtain the two parallel interpolants. But by pooling all observations, the interpolant one obtains is the heavier, steeper line. This regression overestimates β and underestimates α of *both* areas. As in the figure, it is even possible for the actual unit costs h_{ik} to be lower than their respective standard unit c_k in three out of four university – areas.

What does this imply? To discuss the implications for the incentives provided by the QR formula, one should take a stance on the objective function of a university and on the behavioral response of enrollment to changes in the teacher / student ratio.[38] Several alternative assumptions are obviously possible, but it is easy to think of perfectly reasonable scenarios in which the current formula does little or nothing to reduce unit cost differentials. Assume that the supply of students to each area is insensitive to the actual teacher / student ratio, and that universities aim at maximizing the FFO allocation.[39] teacher / student ratio of an area.

Figure 2: Estimation of standard unit costs
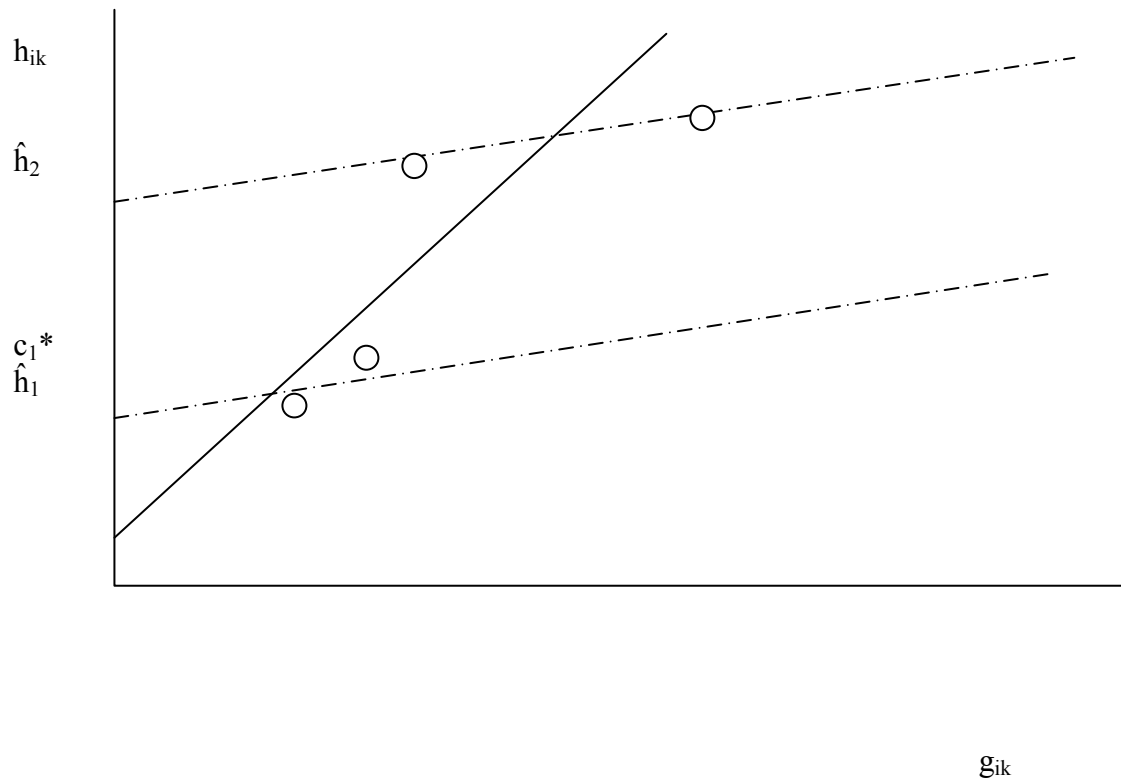
To understand the intuition for these effects, it is useful to think of the actual cost as actual spending per student and of the standard unit cost as the reimbursement per

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[38] In addition, the problem is dynamic, and there is a budget constraint each university must satisfy.

[39] To simplify the exposition, I also assume that all *corsi di laurea* last one year, and there are no students *fuori corso*, so that the flow and the stock of students are the same.

student.[40] The key insight is that the FFO allocation depends only on the number of students in each area, hence to maximize the FFO allocation a university should maximize the enrollment of students in areas with high standard unit costs c_k: to do so, Since in some areas the actual unit cost h_{ik} can be below the standard unit cost c_k in all universities, in these areas there is no incentive for high cost universities to reduce their costs: all can survive with their current costs. In addition, one should keep in mind that low cost areas are allowed to cross-subsidize high cost areas in the same university, which might undo much of the incentive effects of the allocation formula. This reasoning extends also if the enrollment of students responds positively to the university should thus *increase* the number of professors in the high standard unit cost areas. Of course, this would not be possible for high cost universities if standard unit costs reflected average unit costs: in this case, an attempt to expand enrollment in high cost areas would lead to a deficit if the actual unit cost h_{ik} is above the average unit cost $\hat{h}_k$. That university should then reduce professors in that area, to reduce the teacher / student ratio and the actual unit cost accordingly.[41] Thus, if standard unit costs reflected average unit costs, the system would indeed promote convergence of teacher / student ratios and of actual unit costs across universities: on average, university-areas with high teacher / student ratios would have to reduce the ratio because otherwise expenditures would exceed revenues. But given the way standard unit costs are estimated, as we have seen it is perfectly possible for all areas in a given university to have an actual unit cost below the standard unit cost, but above the average actual unit cost; in this case, there is no pressure for actual unit costs to converge.

Another way to state this intuition is that, for a university-area with a high actual unit cost to shrink, in general the number of teachers must decline. But at the same time, the FFO allocation is an increasing function of the number of students in high standard unit cost areas: to increase the enrollment of students in high standard unit cost areas, the number of teachers should increase in that area. This can be done if the actual cost is below the standard cost, although above the average actual cost.

4.2.3 Goal 2: Reducing differentials in resource allocations across areas

It is not clear why reducing differentials in resource allocations across areas should be a goal of any policy. Perhaps this could be justified if these resources reflect actual costs and the latter are systematically above some "norm" in some areas, and systematically below in others. In addition, it is not clear what "resources" means in this context – total resources, unit costs per student, unit costs per teacher?

Be as it may, the second component of the QR formula, based on the share of FTE students, is frequently interpreted as providing incentives to lower cost differentials *across* areas. Notice that its main difference with respect to the first component is that it

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[40] This is precisely the case in a steady-state in which all FFO is allocated based on the QR formula, and it covers the aggregate expenses of all universities.

[41] Of course, all this works if student enrollment is not *too* sensitive to the teacher / student ratio, in particular, if the elasticity is less than 1.

is directly proportional to the total number of FTE students, regardless of areas and costs. Thus, as argued by Cicchitelli and Montanari [2001], it would provide an incentive to reduce differentials in teacher / student ratio differentials across areas.

This is not entirely correct. The statement appears to be based on an implicit assumption of "constant coefficients": the number of students is a multiplicative, area-specific constant of the number of teachers. In this case, the formula provides an incentive to move teachers from high to low teacher / student ratios areas in order to gain students. However, what matters is the number of FTE students; and empirically areas with higher teacher / student ratios, like Medicine, also tend to have – not surprisingly – a higher value of FTE student per student. It might well be that moving a teacher to Medicine will cause an increase in the total number of FTE students; at the same time, it implies an increase in the teacher / student ratio in an area which already has an above average value of this ratio.

4.2.4 Goal 3: improving research and teaching

The original QR formula proposed by *Osservatorio per la Valutazione del Sistema Universitario* (see OVSU [1998a]) in 1997 included a third component, designed specifically to reward good research. This component, however, was omitted in the implementation of the formula, because of lack of the data needed to make it operational. Thus, at present there is no provision for research in the allocation of the FFO, not even in the QR formula.[42]

The second component of the QR formula, that based on the share of FTE students, is frequently interpreted as a reward for teaching quality: universities who produce more FTE students per student receive a higher FFO allocation per student. But the number of FTE students is a very crude – indeed, a dangerous – measure of teaching quality, because it provides perverse incentives to inflate grades and lower standards.

4.2.5 Too many goals, too few indicators

The QR formula, and indeed all state financing directed at reducing imbalances, suffer from a basic ambiguity on what the system is supposed to incentivate, and how. Recall that the funding system of FFO was designed to pursue three goals – improving quality in teaching and research, and reducing costs differentials within areas and across areas. But the QR is too blunt an instrument to do all these things at once, because it is based on just one "intermediate target", the teacher / student ratio.

There is little information in the teacher / student ratio *per se*. A high teacher / student ratio can signify two very different things: low efficiency in training students, or effort by the institution to provide a high quality service. Thus, a high teacher / student ratio is "bad" if it is the consequence of a large decrease in student enrollment, while the

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[42] In the yearly ministerial decree on the allocation of FFO, there are specific provision for research incentives: these will be discussed below.

teacher body has not changed;[43] it is "good" if it indicates an effort to provide good teaching. The same ambiguity presents itself if students are expressed in full-time equivalent units: a high teacher / FTE students is "bad" if it indicates that the university produces a lot of "fuori corso" students; but it is "good" if it indicates that the university is trying to reduce their number by providing more teachers. Without further information, one cannot disentangle the two explanations.

Examples of this ambiguity can also be frequently found in the ministerial decrees that each year state the rules of allocation of FFO. These decrees also budget a small part of the non-QR component of FFO to correct imbalances of various type. In the year 2000, DM 27 luglio 2000, No. 340 budgeted Lit 90 mlds for the "diminuzione degli squilibri nel rapporto docenti / studenti in gruppi di facolta' omogenee" (art. 6). It did not state whether low teacher / student ratios should be increased, or high ratios should be decreased; presumably, given that the measure required money, the DM had in mind increasing the low ratios. The teacher / student ratio here was taken to be a proxy for resources. In the year 2001, DM 23 aprile 2001, No. 96, art. 3, allocates 132.5 mlds for the creation of new "corsi di laurea" to universities with a higher teacher / student ratio, because these are the universities where in principle more new corsi di laurea can be activated. Here, a high teacher / student ratio is taken as a proxy for effort.

4.3 Other sources of funds

Besides the FFO, the *Fondo per la Programmazione del Sistema Universitario* is another important source of funds for the university system. Planning is done every three years, with a Ministerial Decree; the 1998-2000 cycle had a total budget of 410 mld, the 2001-2003 cycle has a total budget of about 735 mld.

Like all good plans, university planning has its own legal foundations, which – again like all plans – does not economize on words and good intentions (see DPR 25/98 and Biggeri [1998]). [44] The three year plans also display a persistent concern with the reduction of imbalances. Consider "Riduzione degli squilibri tra Centro-Nord e Sud"

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[43] This case is indeed common in Italian universities, and is one of the reasons for the higher dispersion in teacher / student ratios across areas than in most other OECD countries.

[44] Here is a summary from Biggeri [1998]: "....il regolamento indica chiaramente, in termini generali, l'obiettivo principale della programmazione che è la *qualificazione del sistema universitario*: (i) da perseguire corrispondendo alle esigenze di sviluppo culturale, sociale, civile ed economico (con particolare riferimento alla evoluzione e alle richieste del mercato del lavoro) e contribuendo alla riduzione degli squilibri territoriali, e (ii) da realizzare mediante la razionalizzazione dell'offerta formativa degli atenei e il potenziamento della ricerca in essi realizzata (finalmente anche la ricerca ha il posto che le compete!). Passa poi a specificare gli strumenti e le modalità della programmazione, che sono: (i) l'istituzione, la soppressione e la trasformazione di corsi, facoltà e atenei; (ii) l'adeguamento delle risorse delle università; (iii) gli accordi di programma tra Murst, atenei ed altri soggetti pubblici e privati; (iv) la partecipazione e il sostegno a iniziative cofinanziate dalla Unione Europea o da soggetti terzi. Infine, indica, in modo chiaro e convincente le procedure attraverso le quali si attua la programmazione triennale: (i) definizione degli obiettivi specifici del triennio e finalizzazione delle risorse, tramite un apposito decreto ministeriale; (ii) formulazione delle proposte da parte delle università e degli altri soggetti pubblici e privati; (iii) definizione delle iniziative da realizzare nel periodo del piano e dei criteri di ripartizione delle relative risorse finanziarie; (iv) valutazione dello stato di attuazione della programmazione."

("Reducing disequilibria between Center – South and North"), and "Decongestionamento degli atenei sovraffollati" ("Decongesting crowded universities"), both of which are present in both plans. What is the rationale for these goals, and how are they pursued?

Table 15 on page 33 displays a few statistics on the 10 largest universities and on universities of Roma III and Roma Tor Vergata.[45] Entries that are "worse" than the average of state universities are in bold. There is little evidence that the largest universities are worse off, in several dimensions. Relative to the average of state university, the student / teacher ratio of the largest universities is only marginally higher in about half the universities; and except for Roma III – as one would expect in a newly created university – La Sapienza and Tor Vergata have below average student / teacher ratios. Similar considerations also apply to the FTE student / teacher ratio.

This data might reflect different compositions; to see whether this is the case, the table also displays the same information for Economics. It is now even more the case that large universities are not doing too badly, and again La Sapienza and Tor Vergata have below average ratios.

Many of the largest universities also have higher funds per student than average, or only minimally lower. In particular, two of the three Rome universities (including the largest of all, La Sapienza) have above average fund per student.

Table 15: Large universities, 1998/99

	FTE students / docenti di ruolo	Students / docenti di ruolo	FTE stidents / docenti di ruolo, Economics	Students / docenti di ruolo, Economics	Revenues / student	Student fees / student
Bari	**16.17**	32.49	**32.14**	**73.62**	8.64	1.50
Bologna	**17.22**	**36.36**	**53.59**	**102.65**	**7.01**	1.41
Catania	13.06	**34.03**	26.74	**74.44**	**7.34**	**.88**
Firenze	11.76	26.97	16.74	42.32	8.96	1.87
Milano	**15.59**	**35.97**			**7.49**	1.54
Napoli	**15.55**	**37.84**	31.10	**78.79**	7.59	1.26
Padova	14.33	29.71	**55.34**	**94.08**	8.01	1.30
Palermo	**14.59**	**33.85**	30.71	58.53	**7.58**	**.64**
La Sapienza	13.81	**36.98**	15.91	65.07	8.11	**.94**
Torino	**14.98**	**38.52**	36.75	67.62	**6.34**	1.22
Tor Vergata	8.76	21.99	17.36	56.07	**7.24**	**.00**
Roma III	**18.81**	**35.59**	**57.68**	67.77	8.76	**.00**
Average	15.17	34.21	31.62	72.70	7.46	1.27
Average, state univ	14.50	33.51	30.52	73.10	7.59	1.10

[45] In the 1998-2000 plan, large universities were defined as La Sapienza, Milan, Federico II, Bologna, Bari, Turin; in the 2001-2003 plan, the funds are made available only to the three Universities in Rome.

In light of these results, it is difficult to understand why the 2001-2003 plan allocates all the finds for "Reducing congestion in the largest universities" to the universities of Rome.

Be as it may, how are the funds for the reduction of these "disequilibria" allocated in practice? The 1998-2000 plan provisions to allocate 60 mlds to reduce North-South differentials are a good example of how planning can quickly degenerate into an unmanageable set of detailed rules, with no apparent rationale. In fact, these rules are so representative of the dangers of bureaucratic degeneration of plans that they deserve a box of their own (see Box 2 on page 34).

Box 2: An interesting set of rules

In the 1998 plan, 60 mld over the three years were to be distributed to Southern universities according to the following criteria:

"a) il 35 per cento tra le Università, con esclusione di quelle indicate alla lettera b), in proporzione al rapporto tra il numero dei professori ordinari, associati e dei ricercatori e la popolazione della provincia sede dell'Università, ponderato con il numero degli studenti iscritti ai corsi di laurea e di diploma;
b) il 20 per cento tra le Università istituite in attuazione dell'articolo 9 del decreto del Presidente della Repubblica 30 dicembre 1995 e dell'articolo 3 del decreto ministeriale 30 marzo 1998, per il 50 per cento in parti uguali e per il 50 per cento in proporzione al numero degli studenti iscritti ai corsi di laurea e di diploma, ponderati secondo il tipo di facoltà nel modo seguente:
- umanistiche 3
- lingue, psicologia, sociologia 4
- economia, architettura 4,5
- scientifiche 7
c) il 25 per cento tra le Università che hanno attivato le iniziative alle quali si riferiscono gli articoli 8, 9 e14, commi 1 e 3, del presente decreto, in relazione alle stesse;
d) il 20 per cento tra le Università, con esclusione di quelle indicate alla lettera b), con i criteri che verranno definiti con decreto del Ministro, da inviare alla Corte dei conti, entro novanta giorni dalla pubblicazione del presente provvedimento nella Gazzetta Ufficiale."

The 2001-2003 plan seems to have taken a more reasonable approach. It allocates 45 mlds (to the Roman universities only), half according to the QR formula and half in proportion to the number of "corsi di studio potenzialmente attivabili e incentivabili"

This criterion, in turn, can easily reward universities with high teacher / student ratios, once again pointing to a fundamental ambiguity on the attitude towards this indicator.

The confusion gets worse because the ministerial decrees for the yearly allocation of the FFO seem to follow yet different criteria. In 2000, it allocated 60 mlds only to universities in the regions of objective 1, based on the number of students and socio economic conditions. The 2001 yearly ministerial decree allocates 30 mlds, this time to be distributed according to the QR rules.

Consider now the funds for "decongesting" the largest universities. As we have seen, there is no evidence that the largest universities are in a worse "disequilibrium" than most other universities. Still, the 2000 and 2001 ministerial decrees allocated 60 and 75 mlds, respectively, to this goal, in 2001 all to the Rome universities. But there seems to have been very little ex ante and ex post evaluation of how these funds have been allocated. The following passages are taken from a documents of the Osservatorio per la Valutazione del Sistema Universitario on the large universities. "Per il raggiungimento di tale obiettivo era prevista l'istituzione della II Università di Napoli, della III Università di Roma e del Politecnico di Bari, una serie di nuovi corsi di laurea in sedi decentrate per Bologna, Milano e Torino, nonché risorse finanziarie pari a 200 miliardi di lire. [...] non è stata definita la strategia da seguire per programmare e organizzare i singoli interventi, partendo da analisi e valutazioni fatte con riguardo e nell'ambito del bacino territoriale di utenza interessato [...], e neppure sono stati definiti i criteri per valutare le diverse fasi di attuazione delle iniziative e per verificare se quelle sviluppate avevano avuto successo o meno."[46]

5   THE PUBLIC FUNDING AND EVALUATION OF RESEARCH

Table 16displays an attempt at reconstructing the funds targeted at research or based on research output.[47] As one can see, public funding of research is a minimal part of FFO.

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[46] Similar considerations apply to the case of recently established niversities: "Nei successivi Piani di sviluppo dell'università sono stati previsti interventi e, in alcuni casi, anche assegnate risorse specifiche, in generale e per l'edilizia, per le costituende o costituite nuove sedi universitarie. Tuttavia non sembra si sia proceduto secondo una logica di programmazione dello sviluppo delle strutture universitarie sul territorio, verificando i potenziali bacini di utenza delle istituende sedi decentrate da trasformare poi in nuovi atenei o proponendo modelli organizzativi diversi a seconda delle diverse situazioni. Anche la programmazione dello sviluppo delle singole sedi è stata troppo spesso basata sulle iniziative e spinte locali e, soprattutto, non sono state effettuate le valutazioni delle iniziative, né in termini assoluti, né in termini comparativi di compatibilità con il sistema nel suo complesso e con le risorse disponibili."

[47] I abstract here from sources of funds for research different from the Ministry of Education, chief among these CNR, the Italian Research Council. CNR funding is directed mostly at hard sciences, for specific, high overhead cost project. In Economics, CNR funding used to have a poor reputation, with frequent accusation of favoritism and cronyism in the allocation of funds. These accusations are difficult to substantiate, partly because the CNR budget is very succinct. In any case, funding of Economics by CNR is small, about 5 mlds in 1999: the 1999 budget seems to indicate that virtually all these funds went to universities in Rome and Naples. CNR has been reformed recently.

Table 16: Funding of research, 1999/2000

		2000
1	Ministry of Education (MURST)	229
2	PRIN	251
3	Fondo Incentivazione	15
4	Programmazione	40
5	Young researchers	20
6	Centri di eccellenza	20
7	From enti esterni	528
8	From University	258
9	Fondo Finanziamento Ordinario	11,000

Sources: Lines 1, 7 and 8: CINECA database. Line 2: PRIN website.
Line 3: DM 340/00; Line 4: DM 313/99. Line 8 is not a net revenue
of the University system.
Notes: Line 1 includes PRIN. Inconsistency with line 2 is due to
different sources, or to different accounting methodology.

For state research funds to be allocated in an efficient way, it is important to have a system of evaluation of research in place. In this section, I briefly review funding and evaluation of research.

5.1 State funding of research

5.1.1 Progetti di Ricerca di Interesse Nazionale (PRIN)

A large part of the funds earmarked for research accruing to Italian universities comes under the heading of the *Progetti di Ricerca di Interesse Nazionale* (PRIN): these funds amounted to 201 mld in 1998, 237 mld in 1999, and 251 mld in 2000. In fact, PRIN is more important than these figures say, because as we will see much of the remaining government funding of research is linked to PRIN funding.

Currently, PRIN funds are allocated to individual projects after a peer-review process that involves, on average, 3 reviewers per project. About one third of the reviews is by foreign experts, a considerable achievement in the Italian cultural environment. About 20 percent of the projects are monitored ex post. At present, the result of the monitoring activity are available only for those projects approved the first year (1997).

How efficient is the refereeing process, in terms of rewarding researchers with good projects and / or a good track record? There is no systematic study of this process; in addition, while the list of the winning projects is publicly available, the list of the projects that have not been funded is not, making it impossible to perform a statistical analysis of the determinants of success.

Certainly the use of three reviewers per project, of which on average one third are foreign, is a positive sign. On the other hand, anecdotal evidence I have collected

suggests that the refereeing process for PRIN is still far from an NSF-style process.[48] The process of ex-post monitoring is still largely a question mark. At a minimum, it does not appear to be very timely: anecdotal evidence I have collected indicates that, by the end of 2001, there are researchers who have not received the final evaluation report on their 1998/99 projects, which was due in 2000.

5.1.2 Funding of research in the FFO decree

The *Fondo di Incentivazione* is a small fund at the Ministry of Education, created in 1999 (by art. 2, Law 370/99), and designed to provide incentives for specific purposes, determined each year in the ministerial decree for the allocation of FFO. Its total allocation was 60 mlds in 2000 and 60 mlds in 2001. A small part of this fund is related to research. The 2000 allocation (DM 27 luglio 2000, no. 340) set aside 15 mld for incentives for research, and the 2001 allocation (DM 23 aprile 2001, no. 96) another 40 mld. The criteria for allocating these funds are instructive.

In the 2000 allocation, the funds were to be allocated to universities in proportion to the increase in the research funds obtained from various external entities (MURST, European Union, other public agencies, and private entities) over the years 1993-97. Because of lack of any other information, the basis for the allocation of the 2001 funds consisted of two measures derived from the allocation of PRIN funds. The first measure, IF, is the share of researchers who have received PRIN funds in the total number of researchers who were entitled to compete for PRIN funding. The second measure, SF, is the ratio of the PRIN funding to that area over the years 1997-2000 to the total cost of the project, as declared by its proponents, and inclusive of the salaries of the researchers involved. A university-area is entitled to a share in the funds if its values for both IS and SF are above the national median for that area (see MURST [2001a]).

These indicators are very crude proxy for research quality. The first, as the document recognizes, is highly influenced by the "aggregation properties" of Italian research: as noted by the *Commissione di Garanzia* of PRIN, many PRIN projects involve a large number of researchers who are not "strictly necessary for the research project", and who are there "either for reasons of academic solidarity or to avoid breaking up established connections".[49] The goal of the second indicator is to screen out those projects that do not budget carefully, in particular by wasting resources on personnel costs. It is not clear why this should be the case: conceivably, the good projects led by highly regarded researchers are exactly those that attract lots of resources outside MURST; but it is exactly these projects that would get a low value of SF. The consequence is unavoidable, and it has been noted in the *Relazione finale della Commissione per la Valutazione dei Programmi di Ricerca delle Università (Anno 2000):*

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[48] For instance, after being appointed referee for a project a researcher received several calls from senior professors to "encourage" a positive review (the refereeing process is, theoretically, single-blind: the researcher who has submitted the project should not know the name of the referees).

[49] This feature is evident in the PRIN projects in the field I am familiar with, Economics. It is typical for these projects to involve 10 or 15 researchers in several universities, against a number of 2 or 3 (or even 1) in a typical NSF proposal.

"vi è tuttora una tendenza a limitare fortemente la richiesta di finanziamenti per la spesa di personale, in particolare di giovani con assegni di ricerca o contratti: tale elemento è stato sottolineato da molti revisori stranieri, sulla base della considerazione che questo costituisce una delle maggiori voci di spesa nei programmi internazionali." Surprisingly, the same Relazione does not make any connection between this problem and the rules of allocation of funds that have created it.

Clearly, quality of research matters in all this only in so far as there is a credible and meaningful quality assessment in the allocation of PRIN funds (for the 2001 allocation) or by other entities (in the 2000 allocation). As we have seen, there are doubts on this assessment.

5.1.3 Funding of research in the three year plans

The ministerial decrees allocating the funds for the Programmazione also typically include some initiatives aimed at funding research. The 1998-2000 plan allocated about 20 mlds each of the three years to fund projects by young researchers (below 35 years of age), to be distributed in proportion to PRIN funding. The 2001-2003 plan budgets a total of 60 mlds over the three years to fund 14 initiatives in as many universities (or groups of universities), "corsi di dottorato e attivita' di ricerca avanzata". In case of a positive outcome, the initiative will be accredited as a "Scuola di dottorato di ricerca di alta qualificazione". 40 percent of the funds are allocated equally, 20 percent based on the number of institutions involved, 20 percent based on the number of disciplines involved, and 20 percent based in the number of doctoral students involved. Again, there is no role for the quality of the project, or the track record of the researchers involved, in this allocation rules.

5.2 Evaluation of the university system

5.2.1 Institutional framework

In a system driven by public funding, evaluating research is a key preliminary requirement for providing the correct incentives. Evaluation (of research and other aspects) in the Italian university system is based on two pillars, the *Nuclei di Valutazione Interna* (NVI) in each university and the system-wide *Comitato Nazionale per la Valutazione del Sistema Universitario* (CNVSU).

The CNVSU (established by DM 22 february 1996) has a daunting set of institutional tasks (see Law 370/1999, art 2, comma 1).[50] Among its tasks are to define

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[50] Thye most recent list of these tasks includes: "fissare i criteri generali per la valutazione delle attività delle università, previa consultazione della Conferenza dei Rettori delle Università Italiane (CRUI) del Consiglio Universitario Nazionale (CUN) e del Consiglio Nazionale degli Studenti Universitari (CNSU), ove costituito; predisporre una relazione annuale sulla valutazione del sistema universitario;

the set of data that each NVI is required to transmit to CNVSU ST and to act as a clearing-house for the evaluation reports that must be produced by each NVI each year.[51]

5.3 Evaluation of research

In the 1998/99 list of variables to be provided by each university to CNVSU and to the Ministry of Education were also four indicators of research activity: two of research "input" – "Total research financing per teaching staff" and "External financing per researcher"; and two proxies for research output -- "Punteggio medio VPS per docente afferente" ("Average VPS points per teacher") e "Punteggio medio VPS per docente attivo" ("Average VPS points per active teacher"). These last two indicators were derived from the program *Valutazione della Produzione Scientifica nelle Università* (VPS) started by the *Osservatorio per la Valutazione del Sistema Universitario* (the predecessor of CNVSU). This program seems to have been inspired by the British RAE: each university lists its "docenti attivi", i.e. those researchers whose scientific output the University wants to be evaluated. Evaluation should have occurred in two phases: first a self-evaluation by the University, then an evaluation by a commission of experts to check the self-evaluation.

This type of evaluation seems never to have taken place. In fact, in the list of variables that the NVU are required to provide for the year 2000, the last two indicators have been replaced by "Tasso di partecipazione ai programmi di ricerca di interesse nazionale co-finanziati dal MURST (ex 40%)", and "Tasso di successo nella partecipazione ai programmi di ricerca di interesse nazionale co-finanziati dal MURST (ex 40%)". The first variable is defined as "the ratio of the number of participants to PRIN to the number of researchers entitled to participate" over the years 1997-99; the second variable is defined as "ratio of the number of participants to PRIN projects that were funded to the number of researchers entitled to participate", over the same period.

None of these indicators really provides a measure of quality in research. If research funds were competitively allocated, one could argue that "external financing per

promuovere la sperimentazione, l'applicazione e la diffusione di metodologie e pratiche di valutazione; determinare la natura delle informazioni e dei dati che i nuclei di valutazione degli atenei sono tenuti a comunicare annualmente; attuare un programma annuale di valutazioni esterne delle università o di singole strutture didattiche; effettuare valutazioni tecniche su proposte di nuove istituzioni universitarie statali e non statali in vista dell'autorizzazione al rilascio di titoli aventi valore legale; predisporre rapporti sullo stato di attuazione e sui risultati della programmazione; predisporre studi e documentazione sullo stato dell'istruzione universitaria, sull'attuazione del diritto allo studio e sugli accessi ai corsi di studio universitari; predisporre studi e documentazione per la definizione dei criteri di riparto della quota di riequilibrio del fondo per il finanziamento ordinario delle università; svolgere per il Ministro attività consultive, istruttorie, di valutazione, di definizione di standard, di parametri e di normativa tecnica, anche in relazione alle distinte attività delle università, nonché ai progetti e alle proposte presentate dalle medesime."

[51] The NVI was established by Law 437/99 and their objectives were revised in Law 370/99. Only the latter law established sanctions for non-compliance. In each university, the NVI consists of 5 to 9 members (some of whom can be drawn from outside the university itself). The NVI is designed to monitor "*anche mediante analisi comparativa dei costi e dei rendimenti, il corretto utilizzo delle risorse pubbliche, la produttivita' della ricerca e della didattica, nonche' l' imparzialita' e il buon andamento dell' azione amministrativa*" (Law 370/1999, art. 1, comma 1).

researcher" would provide a rough indicator of quality: better researchers get more contracts. However, external research funds also include public research funds, that are often assigned based on geo-political rather than quality considerations. In addition, there is an important composition effect: universities that are intensive in areas like humanities, however good they are, can never compete with science-intensive places in terms of external research contracts.

Of the other two variables, the first, "Tasso di partecipazione ai programmi di ricerca di interesse nazionale co-finanziati dal MURST (ex 40%)", is simply puzzling: it is difficult to fathom how this variable can be considered as proxy for research quality. The second, "Tasso di successo nella partecipazione ai programmi di ricerca di interesse nazionale co-finanziati dal MURST (ex 40%)"[52], is better, but again subject to the problems discussed above concerning the allocation of public funds for research. Both indicators also suffer from the "institutional solidarity problem" emphasized above. This is at places recognized by CRUI itself: the use of these indicators "potrebbe indicare come ottimali situazioni in cui a pochi ricercatori valenti si sono affiancati, vuoi per motivi di solidarietà accademica vuoi per non rompere aggregazioni consolidate, molti altri non strettamente necessari allo svolgimento della ricerca".

Research evaluation comes up in other places in the complex set of initiatives that characterize the Italian university system. The *Conferenza dei Rettori delle Universita' Italiane* (CRUI) has set up at least two committees to evaluate the research of Italian universities. The Commissione Valutazione della Ricerca "ha avviato, di concerto con il MURST e con il Comitato nazionale per la valutazione del sistema universitario, un progetto che si basa sull'utilizzo delle banche dati bibliografiche dell'ISI (Institute for Science Information, di Philadelphia) e ha l'obiettivo di valutare, attraverso la rilevazione sistematica di dati sulle pubblicazioni scientifiche, i risultati prodotti dalle università nel settore della ricerca" (see CRUI [2001a])

The following table displays the weights attached to different types of publications in Economics. According to this system, publishing a paper in *Econometrica*, the top journal in Economics, gets the author 1.5 points, exactly as many points as editing a collection of essays in Italian (provided, of course, one also writes the introduction). It is difficult to imagine a more radical departure from standard procedures in other academic cultures. For instance, in a tenure decision in a US university, editing a collection of essays would hardly be taken into consideration – and in some cases might actually send a *negative* signal regarding the candidate's opportunity costs in terms of research. Notice that nowhere in the report does the most common and natural criterion for research quality appear: publication in a refereed journal. In any case, I have not found any follow-up material on this two-year old "experiment".

A second CRUI committee, the Commissione Ricerca, has started a second "experiment". This committee is composed of a Commissione Rettorale and a Commissione di Delegati Rettorali. "Gli obiettivi della Commissione dei Delegati Rettorali per la ricerca sono in particolare dedicati all'individuazione di temi strategici, all'elaborazione di un piano volto alla creazione di un'anagrafe della ricerca, alla realizzazione di un quadro nazionale dei finanziamenti dei programmi di ricerca, alla catalogazione organizzata degli istituti nazionali ed internazionali, alla raccolta delle

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[52] This is the same variable used as a criterion in the allocation of the *Fondo di Incentivazion,* and called Indicatore di Successo-Partecipazione (IS).

proposte presentate dalle università riguardo al Piano Nazionale della Ricerca" (see CRUI [2001b]).

This statement is revealing of a few persistent dreams and obsessions typical of academic cultures that do not appreciate the value of competition and individual initiative in research: (i) The persistent dream of a small group of individuals (12 in this case) planning the research of the future (ii) The persistent dream of cataloguing research, an idea that has failed any time it has been tried.[53] In this case as well it appears that nothing came of this experiment: As far as I can tell, nothing came of that commission: no report seems available, and the last (and only) mention of the commission on the CRUI website refers to a comment it should have produced on an audition by the then Minister Berlinguer in 1997. There is no trace of such document, and no mention of any activity of the commission after 1997. Still, a response to an email I sent to a member of the commission confirms that it still exists.

5.4 Conclusions

Except possibly for the small PRIN funds, research quality plays essentially no role in allocating state funds to the university system. In fact, the history of the allocation rules can be read as a remarkably careful exercise in excluding any meaningful evaluation of research output and quality from the allocation parameters. The few parameters that are allegedly related to research are a parody of the notion of research evaluation.

Despite a remarkable production of symposia, studies, declarations, committees, subcommittees, surveys, and decrees, there is a persistent reluctance to accept the notion of competition in research, and the idea that good quality research is what is consistently judged as such by the international collectivity of peers.

6 PIECING IT ALL TOGETHER

6.1 Objectives and constraints

The optimal method of funding the HE system depends on one's goals. It is therefore important to state clearly (albeit at this stage a bit generically) the goals that underlie the following proposals. I believe these goals are widely shared, although by no means universal:
  (i)   excellence in research
  (ii)   efficiency in producing human capital
  (iii) equity in access to higher education

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[53] Italy is a small country. In the era of Internet, it is almost certain that individuals working on similar issues will know of each other projects before the webmaster of CRUI uploads it on the CRUI website.

(iv)   equity in the burden of financing higher education

A fifth goal is frequently cited, namely reducing income inequality.[54] I do not consider this goal here: the optimal degree of income inequality is a highly debatable concept, and in any case it is likely that more efficient instruments than higher education are available to achieve this goal.

I will also take for granted that some government intervention is justified, for at least four broad classes of – very standard – reasons:[55]

(i)   Credit market imperfections. Human capital cannot be collateralized, and there is adverse selection in private credit markets.

(ii)   Risk. There is individual uncertainty about the relationship between investment in higher education on one hand and human capital and earnings on the other. For a number of reasons, this risk is difficult to diversify away in the market; hence, wealth will affect the amount of investment in higher education of risk-averse individuals.

(iii)   Human capital spillovers. If the social returns to higher education are higher than the individual returns, individuals by themselves will invest less than the socially optimal amount in higher education.

(iv)   Less than full appropriability of the results of basic research.

Even this list is not uncontroversial.[56] For instance, there is some evidence that credit constraints in financing education affect a relatively small share of the population (perhaps 20 percent) in the US; in Italy, with much less developed credit markets, it is probably safe to assume that a large mass of individuals would be credit constrained, if HE were priced at close to its cost.

The evidence on human capital spillovers at the HE level is perhaps even more inconclusive. This is doubly unfortunate, because the existence of human capital spillovers is closely intertwined with the fourth goal above, achieving equity in the burden of financing HE. At present, "reverse redistribution" is a feature of HE financing in all state systems, and particularly in Italy where tuition fees are extremely low. This subsidy to HE investment could be justified if there are human capital spillovers, so that even in the absence of credit market imperfection investment in HE would be socially suboptimal. But if there are no human capital spillovers, then it is not clear why HE investment should be subsidized any more than, say, investment in computer equipment. The data do not speak clearly enough to resolve this issue; but even if one accepts the existence of human capital spillovers on faith, I believe the degree of reverse redistribution in the current Italian funding system is hard to justify,

 It is important to re-iterate that all this creates room for government *intervention* of some sort; nothing so far speaks for the need of government *provision* of higher education. Indeed, in an unconstrained optimum a purely private system can best take care of goals (i) and (ii), while government intervention will be needed for goals (iii) and

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[54] Note that this goal is not the same as "equity in access to higher education".

[55] See Cantor and Venniker [xxxx] for a brief exposition.

[56] See e.g. Miron [2000]. In addition, a fourth reason for government intervention is often cited: imperfect and asymmetric information on the nature of the service provided by universities. True, university education is purchased once, perhaps twice in a lifetime, and typically individuals have very limited information on the service provided by each university. But it is not clear at all that the government has any advantage in matching individual students with individual universities.

(iv). It is also important to distinguish these reasons for government intervention from other frequent criticisms of a private higher education system, listed in the next Box.

Box 3: Other market failures in higher education

What is a good or bad university? Mostly, what "the market" determines them to be. There are widespread fears that "the market" might not work in this case. These fears take several forms, and it is important to make them clear in order to debunk these myths.

(i) *Consumers – students and their families – might not be well informed to make the correct decisions. In particular, they cannot evaluate research.* This argument has no basis. Cars are certainly more obscure objects, to the vast majority of individuals, than HEIs: everybody can confidently say that Harvard is better in virtually all dimensions than Montana State University, but very few individuals can confidently assess the safety of a Fiat vs. a Renault.

It might also be true that individual families have enough information or competence to evaluate the research output of a HEI. But they do not need to. But it is easy to gather information on the reputation of a HEI, based for instance on hiring patterns by companies, the experience of acquaintances, discussion in the media. Moreover, just as there is a thriving business of specialized auto magazines that test cars and their safety features, the same way there is a thriving business of magazines rating colleges on several dimensions. For many universities, the median salary after graduation is a common and well publicized figure.

(ii) *The market will cause a race to the bottom*. To attract students, the argument goes, HEIs will lower their teaching and graduation standards. There is some truth in this argument: grade inflation is certainly a feature of today's US academic market. But there is a natural limit to the process: the ultimate judges of a HEIs are not their graduates, but the companies that hire them. A piece of paper attesting that Mr. Smith has graduated from university X has little value if it is well known that university X gives away diplomas.

(iii) *Some subjects will suffer or disappear*. There is little doubt that market mechanisms will cause a readjustment in the relative importance of subjects. The argument typically applies to Humanity subjects, for instance Classic Studies in Italy. But again there is a natural limit in this, as the relative size of the student body in different subjects is also determined by conditions of demands: if the state education system requires many Latin teachers and experts of Etrurian archeologists, there is a natural lower bound to the shrinking of Classic Studies departments.

This conclusion, of course, is subject to Latin teachers and Etrurian archeologists being paid above the reservation wage of prospective students. The counterargument would then be that these professions are typically paid little. But this reflects the priorities of a society, rather than the priorities of the HE system. If society really values its Etrurian and Latin past, then the state should pay them more and pay ballet stars on public TV less. More generally, it should subsidize Classic Studies departments if it is

believed that their positive spillover effects are not adequately internalized by the HE system.

Still, it is unrealistic to think that the present system of state HEIs can be dismantled in the foreseeable future; hence, as a matter of realism, I will assume that state HE system will remain in place. The first key question then becomes how to provide the correct incentives to state universities to achieve goals (i) to (iv). But in the long run the most powerful incentives are those arising from competition: the second key question is therefore how to enable this competition, i.e. how make a level field for private universities. The next sections will address these questions.[57]

6.2 Financial incentives in higher education

Good research is made of two basic ingredients: good researchers and, especially in hard science, availability of resources to fund capital spending of good projects.

For individuals to have incentives to become good researchers, the system must be allowed to reward good research: this calls for terminating the age-based salary differentiation of the present system, and instituting a meaningful **quality-based salary differentiation**. This, in itself, will not provide incentives to promote good researchers (and, in fact, might provide incentives to *hamper* their career) unless a HEI bears the consequence of bad appointments. This calls for a funding system where "**money follows quality**", or **quality-based funding**. Roughly speaking, the first issues refers to how to distribute a given amount of funds to a HEI among its professors; the second issue refers to how to allocate funds across universities. I now turn to an analysis of the two issues, in turn.

6.3 Financial rewards to research output at the individual level

There are basically two ways of rewarding good quality research financially and eliciting research effort. The first consists in linking salaries to some evaluation of research output; the second consists in allocating the second tier funds for research – the research council funds for individual projects – according to project quality. The two are not equivalent, and present different dangers.

Salary differentiation is not a problem in private HEIs. At first sight, it is problematic in state HEIs, for all the usual reasons, and more. In particular, given the amount of politicking and patronage in state HEIs, it is perfectly conceivable that it could be used to the advantage of unworthy researchers who manage to attract visibility or extract rents, for political or other reasons. But, on second thought, the problem is not really different than in private HEIs: even in the latter, powerful groups in a department

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[57] Several considerations will overlap and coincide with those developed in Hansmann [1999].

could direct resources to their own advantage, with little or no relation to research output. But there is a natural limit to this process: throwing resources at unworthy researchers eventually lowers the standards of the department, reduces enrollments and external resources, which in turn affects all the other members of the department. Thus, the other members of the department and the administration of the institution will make sure that salaries reflect quality. With the system of funding to state universities considered below, where "money follows quality", the same will happen in state HEIs. Of course, this system will only work if salary decisions are decentralized to a HEI or even to a department.[58]

6.4 Quality-based funding of state universities

6.4.1 "Money follows students"

For good research and teaching to be rewarded, and bad appointment decisions to be penalized, the funds flowing to a university must also be related to its overall quality. In a system without credit market imperfections, this would be achieved trivially via a privatized system. If a HEI appoints an unworthy professor, its reputation falls, it loses some of its better students, and external financing from other sources also decreases.

It is a widespread misconception[59] that a similar system can be replicated even in a state system that does not allow for tuition differentiation: the way to achieve this would be a method of financing whereby "money follows students", on the assumption that students choose on the basis of quality. This would allow students to "vote with their feet", and achieve two results: (i) allow more consumer choice, and (ii) increase competition among suppliers. In turn, this type of financing could be achieved by a simple application of a flat voucher scheme or, equivalently, a fixed subsidy to the university per student, as it is approximately the case currently in Italy.[60]

Consider a world where quality of a HEI is unrelated to costs, and there are still no credit market imperfections. Then in a state system that does not allow for tuition differentiation, students and money would indeed flow to the better HEIs, and the bad ones would have to shrink, and perhaps disappear if there are substantial fixed costs.

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[58] The problem is a bit more delicate when it comes to research council funds: examples of these funds are, in Italy, CNR funds and the MURST funds for *Progetti di Ricerca di Interesse Nazionale*, or PRIN. Contrary to first tier funds, these second tier funds have, from the point of view of the individual HEI or department, no alternative value: if the award is not granted to a member of the HEI or department, it will be granted to another institution. Hence, there are less incentives to make sure that these funds are awarded to the best researchers within each department. See Lazear [1999] for a study of the most efficient allocation rules for this type of funds.

[59] I have made a small contribution to this misconception, with an article in "Il Sole 24 Ore" with Alberto Alesina which advocated a system of vouchers. Since we did not further specify the form of the vouchers, it could have easily been interpreted as a system of flat vouchers (and, in all honesty, this interpretation would have correctly captured our thought at the time). While I cannot speak for my coauthor, I now believe that such proposal would be misguided.

[60] In a flat voucher scheme the value of the voucher is fixed, regardless of the university the student attends.

But in the real world better HEIs cost more, and there are credit constraints. Then a system of flat vouchers or fixed subsidy per student would indeed be a case of "money following students", but it would not provide the correct incentives. If it covers the cost of the best HEI, it implies an enormous waste of resources; moreover, if the total demand for higher education is largely inelastic, and *if HEIs are allowed to choose their students*, even the worst university is the residual recipient of all the students rejected by the other universities, and might actually thrive in this role.[61] If instead the voucher or the subsidy covers the cost of the worst university, *de facto* students cannot vote with their feet if there are credit market imperfections.

Broadly speaking, there are two ways to allow research output and quality to play a role in funding, even in a state system. The first is to keep undifferentiated tuition, but link state funds directly to research output and quality (output-based funding); the second consists in differentiating tuition, coupled with government intervention to overcome capital market imperfections. Both systems are observed in practice: the first in the UK, the second in Australia. Of course, the two systems are not equivalent: roughly speaking, the first subsidizes supply, and both subsidize demand in different ways. In addition, they would not have the same effect on the competition between private and public universities. I now turn to an analysis of these two options.

6.4.2 Output-based funding of research

In an output-based funding system, funds to HEIs are allocated on the basis of the latter's research output. It is easy to criticize output-based funding, since unavoidably it must incorporate some element of subjectivity and, as a consequence, it is frequently perceived as reflecting some underlying "bias". For instance, the standard list of complaints against bibliometric and peer-review methods includes: English-language bias, bias against younger researchers, and bias against innovative, but more risky research. Much of this criticism is misplaced: for instance, the English-language bias could be relevant when comparing countries or fields, but it is much less relevant when comparing individuals and departments of a given country within a field. The bias against young researchers can be eliminated by giving adequate weight to the flow of research, rather than concentrating exclusively on the stock. Ultimately, however, some element of subjectivity is bound to remain, and no funding system will eliminate it: even in the US system, every department takes a risk in granting tenure to a young researcher, and different departments make different assessments of the research potentials of the same person.

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[61] The experience of Chile in the eighties is instructive in this regard (see Guerin [1997], on which the following account is based). In 1981, a voucher system was enacted that would fund a large part of the tuition costs of the top 20,000 scorers in the national college entry exam. Vouchers were differentiated by subjects, with medicine having the highest voucher; however, the differentiation was rather crude. A very generous credit system also was started. As a result of the voucher system, a large number of private universities sprang up, mostly offering cheap courses in each of the funding categories. For instance, enrollment in engineering increased by 100 percent between 1981 and 1984, a large part of it in new institutions or in new departments of old institutions, of very dubious quality; in fact, the dropout rate was 72 percent in 1984. The large availability of loans also pushed all prices up, towards the limit of the available loan.

At best, all this amounts to saying that output-based funding is based on noisy signals of quality: but this must still be better than no signal at all. The Research Assessment Exercise in the UK (see Box 4) is a good example of a system that, by trial and error, has worked remarkably well by almost unanimous consent: "The survey of heads of departments and research council revealed that the vast majority suggested fairly minor changes to the conduct of the exercise, with only very few proposing its abolition" (HEFCE [1997], p. 7). A National Academies Policies Advisory Group report says that "We have not found any practical alternative which would attract anything like the same degree of general support" (reported in HEFCE [1997], p. 7).

Such an exercise is useful only if it is meaningful, i.e. selective. It is interesting to note that, in the 1996 RAE exercise, about 25 percent of departments received a rating that did not entitle them to any research fund; in 1998-99, 75 percent of the funds were allocated to 26 of the 135 HEIs evaluated. Koelman and Vanniker [2001] report that almost 30 percent of funds change departments due to RAE, although the final effect might be even larger, as much of external financing is nor indirectly linked to the RAE evaluation.

Box 4: the Research Assessment Exercise in the UK

The RAE exercise is carried out approximately every five years. For each institution, funding is proportional to volume times quality. Volume is determined as follows. In each HEI, each department indicates its research active academic staff, i.e. those members whose research the department wishes to be evaluated;[62] these receive a weight of 1 in the computation of volume. Other members, like research assistants or postgraduate research students, receive a weight less than 1, typically between .1 and .15.

Quality is determined by the RAE exercise, by evaluating the research output of the research active staff.[63] The RAE exercise assigns each department a rating, from 1 to 5*. Ratings 1 and 2 attract no research funding, while rating 3b attracts about ¼ of total research funding of rating 5*, given the volume of research activity.

Thus, there is a trade off for a department in its designation of the research active academic staff: more designated members increase quantity, but this might decrease average quality.

In practice, all research output is divided in 68 units of assessment, covering all subjects evaluated. There are 60 assessment panels, approximately 1 per unit of assessment (a few units of assessment share an assessment panel). Panel members are nominated by a large number of organizations, and are selected by the funding agencies.

The RAEs have been subject to many internal and external evaluations. While obviously hard quantitative evidence is hard to come by, interviews with administrators and researchers and focus groups have revealed all the standard worries about output –

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[62] Before 1992, all members of the department were evaluated.
[63] Starting with the 1996 RAE, only four pieces of work per research active staff are evaluated. The innovation was introduced to incentivize quality rather than quantity in publications.

based funding: bias against multidisciplinary research, negative effects on "collegiality", bias towards large universities, and negative effects on teaching effort. While as we have seen criticism is limited, worries about teaching were indeed quite widespread. But attempts at detecting the effects of RAE on teaching has had mixed results. (see Jenkins [1995] and IPB [2000]). A focus group exercise conducted in 8 UK universities provides arguments in both directions. (see RAE [1998]). But KM Consulting Ltd [2000] could not find any evidence of damaging effect of RAE on teaching quality.

A similar system could be applied in Italy.[64] Currently, output-based funding of HEIs in the UK is about 8 percent of all state funding. To send the right (and strong) signals, and to allow the diversification in costs that excellence in research needs, this share should probably be increased.

This type of funding is based on professional integrity: there is a legitimate question of whether it is feasible in Italy. One can easily envision a powerful group of unworthy researchers that steer the decisions of the evaluation committee to their advantage, exactly as they did (and do) when it comes to appointments. To avoid this, the system is only viable if a considerable part, perhaps a majority, of evaluators is chosen randomly from a pool of foreign researchers.

Different fields have very different fixed costs; this should be recognized in the allocation of funds. The present financing system does so, but as we have seen its approach at calculating benchmark costs is flawed. Several countries have conducted in-depth studies to benchmark the fixed costs of different fields: these studies should be used in determining the costs for the Italian funding system.

6.4.3 Tuition differentiation with support schemes

Realistic levels of state output-based funding are unlikely to be sufficient to cover the "optimal" price differential among universities. In addition, there is something to be said for the "market" to be able to send its signals in a more direct way. Finally, state output-based funding by itself will not take care of leveling the playing filed for private HEIs.

Hence, a considerable part of funding should be left "to the market", i.e. to differentiated student fees. There is nothing unusual in letting even state HEIs decide their fees: this is currently the case for instance in Australia. But obviously this is not the end of the story if there are capital market imperfections, and this both for equity and for efficiency reasons. Roughly speaking, there are four possible alternatives:
- (i)   differentiated vouchers
- (ii)   loans to students
- (iii)   income-contingent loans

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[64] Notice that this system would be used to allocate funds among universities, and is therefore based exclusively on ex-post evaluation of recent research. Therefore, it is distinct from the system that allocates funds to individual projects (like NSF in the US, or PRIN in Italy).

(iv)   graduate tax: loan + subsidy to poorer individuals + successful graduates repay a higher portion of the debt incurred by the government to finance the subsidy (check).

Differentiated vouchers. Although more transparent than direct subsidies to universities, simple vouchers still imply reverse redistribution from the general taxpayer to the households of university students; in addition, they do not address well the problem of price differentiation, and as a result to not provide the correct incentives. One could think of differentiated vouchers, depending on the assessed quality of a HEI. Thus, the state would subsidize a maximum of € x for a student admitted to a HEI in the top category, € x-y for a HEI in the next category, and so on.

This system is dangerous. By effectively setting prices administratively, it takes government intervention to a higher level than just assessing quality through a research assessment exercise. But even if price bands could be determined impartially on the basis of an objective criterion, the moment some meaningful price differentiation emerges the system will fall prey to the claims by the state that "universities charge too much", and that "the best universities are taking advantage of the government subsidies".

Loans. Loans to student have a fundamental advantage over vouchers: they are better at addressing the issue of price differentiation. We have seen that under a flat voucher system that covers the costs of the best university, the market would not provide the signals for the price of HEIs to reflect their quality: the individual demand for the services of each university, conditional on not being admitted to a better quality university, is vertical up to the voucher value, regardless of quality. A "race to the top" of prices is likely to follow, as the case of Chile illustrates. Contrary to vouchers, loans must be repaid, hence a university will face a negatively sloped demand for its services, and the equilibrium price of a university will better reflect its quality.[65] Also, (unsubsidized) loans to student do not involve reverse redistribution.

However, a loan system still has problems in terms of equity of access and of efficiency, for two orders of reasons: (i) the effect of education on human capital and earnings is uncertain; because this risk is largely uninsurable, the amount of investment in higher education by risk averse individuals will still depend on their wealth; (ii) in the Italian labor market, where networking is important, wealthier individuals are still likely to have higher *average* return from university education.[66]

Income contingent loans. To overcome these problems, one can think of income contingent loans (more precisely, loans with income contingent repayments), whereby the speed and/or the present discounted value of the repayment is conditional on income after graduation. This system is currently applied in Australia (see Box 5) and marginally in the Netherlands. As it is effectively a subsidized loan scheme, it still implies reverse redistribution.

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[65] For the US, Dale and Krueger [1995] provide evidence of a tight positive relationship between the academic rank of a university and its tuition price.

[66] Checchi [2001] provides evidence consistent with networking effects in Italian HE. He shows that students from wealthier families tend to complete the curriculum quicker, and attributes this finding to the better prospects they have after graduation, controlling for the degree obtained and the academic performance.

Graduate tax. A graduate tax can be seen as an income – contingent loan, which is self financed by university graduates.[67] Hence, the debt incurred by the government to finance the scheme is repaid by levying a tax on university graduates, with a higher rate on more successful individuals. Hence, this system does not imply a redistribution to university students and their households, but only a redistribution within this group. Like income contingent loans, it also addresses the issue of risk, because it reduces the variance of income for individuals who invest in HE. In fact, under some conditions, it could even outperform a contingent loan system in terms of efficiency, i.e. in terms of total human capital investment.[68] Unlike income contingent loans, this scheme, if entirely self-financed, does not entail any reverse redistribution.

Box 5: income contingent loans in Australia

The HECS (Higer Education Contribution Scheme) has been in effect in Australia since 1989. This scheme was created under budgetary pressure, to raise the average contribution by families to higher education costs. Students can either pay ¼ of tuition (with a discount) or take a loan, with income contingent repayments; about 70 percent of the students typically choose the latter. Since 1997, fees have been differentiated by field, taking into account their costs but also the expected earnings in each field. Thus, the top and middle bands include low-cost fields, like Law and Economics, respectively. In 2000, the individual's contribution in the top band was about € 3,500, and € 2,100 in the bottom band. The evidence so far does not indicate detectable effects on the enrollment rates of low-income individuals (see Vossensteyn and Cantor [19XX], Chapman [1997] and Andrews [1999]); the debt recovery rates have also been quite high.

Thus, both an income contingent loan and a graduate tax address the issue of price differentiation and individual risk. The choice between the two ultimately boils down to whether human capital spillovers are important: if yes, a system of state-contingent loans is appropriate; if no, a graduate tax is conceptually preferable.

While both proposals are politically irksome, a graduate tax is particularly so. Purpose-specific taxes are infrequent, and a graduate tax would be perceived (or purposefully interpreted) as a "hateful tax on education" that would fall particularly on low-income individuals that have succeeded. Therefore, the more realistic proposal probably involves an income contingent loan, possibly coupled with a basic voucher to

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[67] Friedman [1962] is usually credited with the idea of a graduate tax, although he envisioned it only for the case of vocational training, which in his view did not entail any externality and therefore did not warrant a subsidy.

[68] See García-Penalosa and Wälde [2000] for a comparison of the two schemes.

all students if it is believed that some subsidy should be provided to all students, regardless of their income.[69]

To minimize deadweight costs, both vouchers and loans should be merit-based: at least part of them should be based on some college entry exam at the end of high school. They should also be need-based.[70]

Of course, it is also important to preserve incentives for performance after they have been granted. Both the voucher and the loan should be conditional on satisfying some academic performance criteria; to allow for different backgrounds and adaptation, these conditions should be relatively lax in the first year, stricter in the second; if they are not satisfied by the end of the second year, the voucher and the loan should be terminated. To provide incentives for graduation, the voucher and the loan should be terminated one year after the statutory graduation time. Finally, both the voucher and the contingent loan scheme or graduation tax should make sure that, at the margin, the individual pays a substantial part of the education costs.

6.5 Career incentives for professors

Financial incentives are not the only possible form of incentives for researchers: career incentives are also of fundamental importance. On this score too the present Italian system needs a considerable dose of competition.

6.5.1 Recruitment and promotion

The present system whereby a group of representatives of the whole national body of researchers interferes with the appointment decisions of a university does not work. The system is designed so that too many contrasting goals can collide. Each university

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[69] Note that this system is akin to that proposed by the West committee in Australia. It is also not too different from the present system in the Netherlands. There, all students have access to: a basic grant (initially a loan, which is transformed into a grant if the borrower displays satisfactory academic performance in the first year); a further grant for low – income individuals; and a loan with income contingent repayment. It is also readily seen that the basic voucher in the present proposal cannot be too large: based on US data, a basic voucher that covers all the costs of the worst university can cover perhaps 20% to 40% of the costs of the best university. One could differentiate the basic voucher by university, but this would require an evaluation system.

[70] On purely theoretical grounds, it is not obvious that subsidies to HE should be need – based. Positive human capital spillovers call for subsidies to all income and asset classes; in fact, the argument might require higher subsides to richer individuals, in so far as they have higher opportunity costs of education. To convince the son of a businessman to give up four years of income from running the family business, a larger subsidy might be required than to convince a prospective student from a household with no assets. On the other hand, one can argue that positive spillovers effects from education – in terms for instance of preventing participation in illegal activities – are stronger for low income individuals. Uncertainty is a further argument for need based subsidies to HE.

should be free to make the appointments it wishes. With a system of financing whereby money follows quality, a bad appointment imposes a negative externality on all current members of the university: this is the best check against cronyism, a plague of the Italian system that no rule or regulation has so far managed to curb.

6.5.2 Eliminating job guarantees

Eliminating job security for non-tenured faculty is another important component of a well-designed package of incentives to research effort. Abilities are observed with noise, which diminishes with time; not all individuals that start a career of research turn out to be suitable for this career. Thus, on both incentive and efficiency grounds, it is important to guarantee universities the right to terminate the employment of researchers before tenure.[71]

This right must be meaningful: as we have seen, currently all researchers could be denied tenure; in practice, this is not the case.

6.6 Incentives for teaching

Research is not the only possible criterion for allocating funds: teaching also is. In fact, several countries in Europe allocate funds more on the basis of teaching proxies than on the basis of research. There are two problems with these approaches: (i) teaching performance is even more difficult to measure than research; (ii) this system has built-in obvious perverse incentives to lower teaching and graduation standards.

An inordinate amount of intellectual resources is currently spent in Italy on collecting data on student evaluations and on devising ways to tie funds to teaching quality.

Some indicators, like "Quota di studenti che abbandonano dopo il I anno", have a very ambiguous relation with teaching quality: it is usually assumed that it is negatively related to the quality of teaching. Yet one could argue exactly the opposite: that the most serious and selective courses are those that shred a larger number of students at the beginning. The use of these indicators can determine obvious perverse incentives in teaching, notably to relax academic standards. Other indicators, like "Indice di attrazione degli studenti migliori", is of dubious utility given the low mobility of Italian students and the lack of uniformity in the distribution of final grades in "Maturita'".

One indicator did try to evaluate teaching quality more directly: "Punteggio valutazione della didattica" defined as the "Risultato sintetico derivante dalla valutazione della didattica da parte degli studenti". It is not clear exactly how one would go from the student evaluations to a single measure of teaching quality comparable across universities and individuals. Perhaps not surprisingly, this variable has been "suspended" in the 2000 list, and replaced by "Tasso di partecipazione alla valutazione della didattica", i.e. the percentage of completed questionnaires over all possible questionnaires.

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[71] The notion of tenure is also hotly debated: abolishing tenure would only reinforce my argument.

In turn, it is not clear how this variable can even remotely proxy for teaching quality. In fact, it might even be negatively related to satisfaction with teaching: based on my personal observation of the US academia both as a student and as a professor, it is probably the case that unhappy students have a stronger motivation to fill out a questionnaire.

An attempt at evaluating teaching has been done in the context of the allocation rules for the funds to incentivate innovation in teaching (Law 370/99 art. 4). The implementation of that law carefully avoids stating clearly any verifiable criterion for allocating the funds to *individuals* based on their teaching *performance*. It does not say how the evaluation of individual students can be combined to obtain an indicator of performance of each teacher, that can be compared for allocating funds to teachers. It states that MURST and CNVSU will monitor the implementation of the evaluation, but it does not say how.

Of course, there are good reasons for this: even if objective criteria of teaching performance were available, a centralized system of comparison of teaching performance at the individual level is a bizarre idea. It is a fact that teaching performance is inherently difficult to evaluate. Student evaluations can at most be useful for individual departments to reallocate teaching assignments, to assess specific weaknesses in some courses, and to individual professors to review their own teaching performance. This is indeed the way student evaluations are used in the US; nobody would even dream of a centralized system at the University level, let alone at the national level.

Teaching quality could be inferred from more objectively measurable variables, like labor market performance of university graduates. But any such measure is inevitably polluted by the initial input (students' quality) and local labor market conditions. Ideally, one would want a measure of the value added of a university: the "difference" between the performance of graduates and their initial quality, taking into account differences in labor demand.[72]

None of this would be relevant if there were a relationship between good research and good teaching. Based on their individual experience, most researchers would answer positively; but, given the large noise in measuring these variables, it should come as no surprise that this relationship, if it exists, has been extremely difficult to detect (see e.g. Brew [1995], Gibbs [1995], and Koshal and Koshal [1999].)

6.7 Incentives for students

6.7.1 Student selection

The above mechanisms would not work if universities were not allowed to choose their students. A university is a customer – input technology, i.e. customers are also

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[72] Ironically, one measure used in the much-derided (in Europe) *U.S. News* ranking of US universities is probably the best existing attempt at measuring teaching performance: it measures the difference between the actual graduation rate of a given class and the predicted graduation rate, after controlling for spending and student aptitude.

inputs in the production function (see Rotschild and White [1995]). The quality and reputation of a university are a function of the quality of their researchers but also of their students. This suggests at least two reasons why universities should be able to select their own students:

      (i)   to attract good researchers: better researchers prefer to teach good students

      (ii)   to generate positive spillovers among students

Clearly, with a system of loan support in place a system of tuition fee differentiation could not work if student selection were not allowed: all students would have an incentive to go to the best, and most expensive, universities, and the only obstacle would be the payment they have to incur at the margin. Note that student selection can work even if tuition fees differentiation is not allowed, as in UK and Denmark.

Whether or not HEIs are allowed to set their own tuition fees, viewing a HEI as a customer – input technology offers also a rationale for price discriminating among students: HEIs should be allowed to offer discounts to the students they regard as most deserving.

6.7.2 Student mobility

Higher education decisions typically involve large costs in terms of information gathering, settling down in a new city, and learning about a previously unknown field. These decisions are taken under very limited information about the HEI of destination. To encourage competition among HEIs, and avoid situations of local monopoly ex post, it is therefore important to encourage student mobility. This can be done in two ways. First, by subsidizing relocation and mobility costs for those deserving students that want to switch after the first year in a HEI; second, by promoting a nationwide entry exam, of the type of SAT in the US, that facilitates information gathering by the HEIs.

At present, universities that try to screen students rely at least in parts on the high-school graduation (*maturita'*) score of their applicants; CNVSU has data on the *maturita'* grades of entrant, by university. This must be a very distorted signal, because standards vary enormously among different types of schools (a given score in a vocational school does not convey the same information as the same score in a *Liceo classico*), among schools of the same type in a given area, and among different areas.

6.7.3 Incentives for completion

It is well known that the rates of late and non completion in Italy are among the highest in the world. At present, studenti fuori corso face no or minimal penalties. If it is believed that studenti fuori corso have negative externalities (for instance, by clogging the administration of HEIs), the price of non completion should be increased. This could be done by raising tuition fee, or by cutting vouchers and loans to studenti fuori corso.

For instance, since 1996 in the Netherlands HEIs are allowed to raise tuition for studenti fuori corso.[73]

7 CONCLUSIONS

Despite years of reform and rhetoric, it is not clear that the Italian higher education system has made progress in the last decades. Among OECD countries, its relative position is almost uniformly at the bottom of research output in virtually all disciplines, hence it is unlikely to have improved much in the last twenty or thirty years; the exceptions to this statement, like organic chemistry, were star disciplines even in the past. Accusations – and evidence – of cronyism and favoritism are as rampant today as they were in the past.

Why have all the reforms failed? It might be that the cause is genetic: the university system is not the only example of a public institution used as a power base rather than to pursue its institutional goals. More likely, the reforms have failed because they have chosen to impose new and ever more complicated rules instead of opening the system to a meaningful competition: of individuals between them, and of Italian universities with each other and with the rest of the world.

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[73] Interestingly, the opposite proposal has been made to solve the problem of studenti fuori corso: the price of HE after the regular years should be brought to zero, instead of increased, on the ground that HEIs in Italy benefit disproportionately from students that pay tuition but do not attend. To discourage the phenomenon, therefore, the benefit to universities should be eliminated. More than anything, this argument is a telling example of the distrust and lack of understanding of the basic market forces that still permeates the discussion of HE in Italy.

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APPENDIX A

Classification of publications

J1	Articoli pubblicati in una rivista straniera con ranking 1-10	See list of journals below (source: Kalaitzidakis et al. [2001])
J2	Articoli pubblicati in riviste straniere con ranking 11-25	See list of journals below (source: Kalaitzidakis et al. [2001])
J3	Articoli pubblicati in riviste straniere con ranking 26-70	See list of journals below (source: Kalaitzidakis et al. [2001])
J4	Articoli pubblicati in riviste straniere con ranking 71-115	See list of journals below (source: Kalaitzidakis et al. [2001])
J5	Articoli pubblicati in riviste straniere con ranking 116-159	See list of journals below (source: Kalaitzidakis et al. [2001])
J6	Articoli pubblicati in una rivista italiana con ranking 1-5	Economia Politica, Economic notes, Giornale degli Economisti, Politica Economica, Ricerche Economiche (source: Checchi [1999])
J7	Articoli pubblicati in una rivista italiana con ranking 6-20	BNL Quarterly Review, Economia Politica Industriale, Economia e Lavoro, economia Internazionale, Economia Pubblica, Labour, Lavoro e Relaz.Industriale, L'Industria, Metroeconomica, Moneta e Credito, Note Economiche, Rivista Internazionale Scienze economiche e Commerciali, Rivista Internazionale di scienze Sociali, Rivista di Politica economica, Studi economici (source: Checchi [1999])
J8	Articoli pubblicati in qualsiasi altra rivista italiana	
J9	Articoli pubblicati in qualsiasi altra rivista english speaking	
J10	Articoli pubblicati in qualsiasi altra rivista ne' inglese ne' italiana	
V1	Contributi a volumi collettivi pubblicati in inglese	
V2	Contributi a volumi collettivi pubblicati all'estero, non in inglese	
V3	Contributi a volumi collettivi pubblicati in Italia	
V4	Curatore di un volume in inglese	

V5	Curatore di un volume in italiano	
V6	Volume pubblicato da un famoso editore straniero	Basic Blackwell, Cambridge University Press, Oxford University Press, MIT Press, NorthHolland (source: Checchi [1999])
V7	Volume pubblicato da un famoso editore italiano o da qualsiasi altro editore straniero	CLUEB, Laterza, Mulino, NIS, Hoepli Elgar, McmIllan, McGraw Hill (source: Checchi [1999])
V8	Altri volume	

Definition of publication variables:
Refereed journal publications: J1 + J2 + J3 + J4 + J5
      Top refereed journal publications: J1
      Mid refereed journal publications: J2 + J3
      Bottom refereed journal publications: J4 + J5
Italian journal publications: J6 + J7
Other journal publications: J8 + J9 + J10
Volume contributions: V1 + V2 + V3 + V8
Volume editor: V4 + V5
Volume author: V6 + V7

List of top 160 journals

AMERICAN ECONOMIC REVIEW	I
AMERICAN JOURNAL OF AGRICULTURAL ECONOMICS	III
AMERICAN JOURNAL OF ECONOMICS AND SOCIOLOGY	V
APPLIED ECONOMIC LETTERS	V
APPLIED ECONOMICS	III
AUSTRALIAN ECONOMIC HISTORY REVIEW	IV
AUSTRALIAN JOURNAL OF AGRICULTURE	V
BETRIEBSWIRTSCHAFTLICHE FORSCHUNG UND PRAXIS	V
BROOKINGS PAPERS ON ECONOMIC ACTIVITY	IV
BULLETTIN OF INDONESIAN ECONOMIC STUDIES	V
CAMBRIDGE JOURNAL OF ECONOMICS	IV
CANADIAN JOURNAL OF AGRICULTURAL ECONOMICS	IV
CANADIAN JOURNAL OF ECONOMICS	III
CHINA ECONOMIC REVIEW	V
COMMUNIST ECONOMIES AND ECONOMIC TRANSITION	IV
CONTEMPORARY ECONOMIC POLICY	III
DEFENCE AND PEACE ECONOMICS	V
DESAROLLO ECONOMICO- REVISTA DE	V
DEVELOPING ECONOMIES	IV
EASTERN EUROPEAN ECONOMICS	V
ECOLOGICAL ECONOMICS	IV

ECONOMETRIC THEORY	I
ECONOMETRICA	I
ECONOMIC AND SOCIAL REVIEW	V
ECONOMIC DEVELOPMENT AND CULTURAL CHANGE	IV
ECONOMIC DEVELOPMENT QUARTERLY	V
ECONOMIC GEOGRAPHY	V
ECONOMIC HISTORY REVIEW	IV
ECONOMIC INQUIRY	III
ECONOMIC JOURNAL	II
ECONOMIC MODELLING	IV
ECONOMIC RECORD	III
ECONOMIC THEORY	II
ECONOMICA	III
ECONOMICS AND PHILOSOPHY	IV
ECONOMICS LETTERS	II
ECONOMICS OF EDUCATION REVIEW	IV
ECONOMICS OF PLANNING	V
ECONOMY AND SOCIETY	V
EKONOMICKY CASOPIS	V
ENERGY ECONOMICS	V
ENERGY JOURNAL	IV
EUROPEAN ECONOMIC REVIEW	II
EUROPEAN REVIEW OF AGRICULTURAL ECONOMICS	III
EUROPE-ASIA STUDIES	III
EXPLORATIONS IN ECONOMIC HISTORY	III
FOOD POLICY	V
FUTURES	V
GAMES AND ECONOMIC BEHAVIOR	II
GENEVA PAPERS ON RISK AND INSURANCE	IV
HEALTH ECONOMICS	V
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APPENDIX B

This appendix reproduces the criteria for research evaluation proposed by CRUI [1999].

A) Risultati dell'attività di ricerca

Prodotti della ricerca (pubblicazioni, ecc.), pesati con i coefficienti elencati nel seguito, avendo <u>preventivamente normalizzato ciascun prodotto della ricerca rispetto al rapporto tra il numero di coautori afferenti alla struttura (sulla base della affiliazione indicata nella pubblicazionA) e il numero complessivo di coautori della pubblicazione stessa</u>. Se almeno uno dei coautori non afferisce alla struttura, conteggiare il relativo prodotto della ricerca anche al punto B) seguente.

	Pesi	
Libro di ricerca originale	p_1 x 4	= P_1
	p_2 x 6	= P_2
Altri libri scientifici o di alta divulgazione	p_3 x 2	= P_3
	p_4 x 3	= P_4
Cura di libri, edizioni di testi con traduzione e introduzione	p_5 x 1.5	= P_5
	p_6 x 2	= P_6
Articoli e studi originali in riviste e volumi	p_7 x 1	= P_7
	p_8 x 1.5	= P_8
Relazioni in atti di congressi	p_9 x 0.5	= P_9
	p_{10} x 1	= P_{10}
Rassegne, recensioni critiche e interventi in atti di congresso	p_{11} x 0.2	= P_{11}
	p_{12} x 0.5	= P_{12}
Realizzazione di prodotti multimediali di interesse scientifico	p_{13} x 0.5	= P_{13}
Pubblicazioni interne e rapporti di ricerca	p_{14} x 0.2	= P_{14}

Totali: $p = p_1 + p_2 + p_3 + p_4 + p_5 + p_6 + p_7 + p_8 + p_9 + p_{10} + p_{11} + p_{12} + p_{13} + p_{14}$
$P = P_1 + P_2 + P_3 + P_4 + P_5 + P_6 + P_7 + P_8 + P_9 + P_{10} + P_{11} + P_{12} + P_{13} + P_{14}$

Note: I: Pubblicato in Italia.
            E: Pubblicato all'estero in lingua straniera.

B) *Descrittori di collaborazione*

Si prendano in considerazione solo quei prodotti normalizzati e pesati della ricerca, considerati al paragrafo A) precedente, dei quali almeno un coautore <u>non</u> sia affiliato alla struttura. In altri termini, <u>eliminare</u> dai prodotti normalizzati e pesati della ricerca considerati nel paragrafo A) precedente quelli i cui coautori siano tutti <u>affiliati</u> alla struttura. Sia qi il numero normalizzato e Qi il numero pesato risultante per ogni categoria considerata nel paragrafo A). Per ciascuna categoria sarà pertanto qi $\leq$ pi e Qi $\leq$ Pi. Sommare tutti i numeri Qi così ottenuti e sia Q il totale, che dovrà risultare inferiore o uguale a P.

INDICATORI PER VALUTARE L'EFFICIENZA, L'EFFICACIA E LA QUALITÀ DELLA RICERCA

Tutti i descrittori impiegati negli indicatori sono valutati, in fase di prima applicazione, come <u>media triennale</u> (successivamente <u>quadriennale</u> e a regime <u>quinquennalA</u>). Gli indicatori proposti non sono esaustivi e possono risultare ridondanti. Si prevede la loro revisione e semplificazione alla luce dei dati che verranno acquisiti dalla CRUI.

2.1 R_1: rapporto tra numero totale di prodotti della ricerca normalizzati e pesati P e numero pesato N di addetti alla ricerca di cui al punto 1A);

2.2 R_2 : rapporto tra i prodotti pesati della ricerca svolti in collaborazione Q e il numero totale di prodotti pesati della ricerca P;

2.3 R_3: rapporto tra ammontare totale dei fondi annuali di ricerca (entratA) F e il numero pesato di professori e ricercatori universitari più tecnici di qualifica maggiore o uguale al VII° livello ($N_1+N_2+N_3+N_4+N_8$);

2.4 R_4: rapporto tra ammontare dei finanziamenti per ricerca libera ($F_1+F_2+F_3$) e numero pesato di professori e ricercatori universitari più tecnici di qualifica maggiore o uguale al VII° livello ($N_1+N_2+N_3+N_4+N_8$);

2.5 R_5: rapporto tra ammontare dei finanziamenti per ricerca orientata ($F_4+F_6+F_7$) e numero pesato di professori e ricercatori universitari più tecnici di qualifica maggiore o uguale al VII° livello ($N_1+N_2+N_3+N_4+N_8$);

2.6 R_6: rapporto tra ammontare dei finanziamenti per ricerca commissionata (F_5+F_8) e numero pesato di professori e ricercatori universitari più tecnici di qualifica maggiore o uguale al VII° livello ($N_1+N_2+N_3+N_4+N_8$);

2.7 R_7: somma $R_5 + R_6$;

2.8 R_8: rapporto tra ammontare dei finanziamenti internazionali per ricerca ($F_6+F_7+F_8$) e numero pesato di professori e ricercatori universitari più tecnici di qualifica maggiore o uguale al VII° livello ($N_1+N_2+N_3+N_4+N_8$);

2.9 R_9: rapporto tra i finanziamenti per ricerca amministrati da altri enti F_9 e quelli complessivamente disponibili per il personale della struttura ($F+F_9$);

2.10 R_{10}: rapporto tra numero di contratti e convenzioni ($C_1+C_2+C_3$) e numero pesato di professori e ricercatori universitari più tecnici di qualifica maggiore o uguale al VII° livello ($N_1+N_2+N_3+N_4+N_8$);

2.11 R_{11}: rapporto tra numero pesato totale di personale addetto alla ricerca N e numero pesato di professori e ricercatori più tecnici di qualifica maggiore o uguale al VII° livello ($N_1+N_2+N_3+N_4+N_8$);

2.12 R_{12}: rapporto tra numero pesato di unità di personale amministrativo-contabile più tecnici e ausiliari di qualifica minore o uguale al VI° livello N_{10} e numero pesato di professori e ricercatori universitari più tecnici di qualifica maggiore o uguale al VII° livello ($N_1+N_2+N_3+N_4+N_8$);

2.13 R_{13}: rapporto tra totale spese annuali per ricerca S_2 ed entrate per ricerca F;

2.14 R_{14}: rapporto tra spese annuali per attrezzature e materiale bibliotecario (A_1+A_2) e spese annuali per ricerca S_2;

2.15 R_{15}: rapporto tra dottori di ricerca M_7 che hanno conseguito il titolo in un anno e il numero pesato di professori e ricercatori universitari più tecnici di qualifica maggiore o uguale al VII° livello ($N_1+N_2+N_3+N_4+N_8$);

2.16 R_{16}: rapporto tra numero di esami M_2 e numero pesato di professori e ricercatori universitari ($N_1+N_2+N_3+N_4$);

2.17 R_{17}: rapporto tra numero di insegnamenti M_1 e numero pesato di professori e ricercatori universitari ($N_1+N_2+N_3+N_4$);

2.18 R_{18}: rapporto tra numero di tesi di laurea M_3 e numero pesato di professori e ricercatori universitari ($N_1+N_2+N_3+N_4$);

2.19 R_{19}: rapporto tra numero di tesi di diploma e di specialità ($M_4+M_{5)}$ e numero pesato di professori e ricercatori universitari ($N_1+N_2+N_3+N_4$);

2.20 R_{20}: rapporto tra ammontare totale dei fondi annuali di ricerca F e numero totale di prodotti della ricerca pesati P;

2.21 R_{21}: rapporto tra le spese annuali per ricerca S_2 e quelle complessive $S_{1;}$

2.22 R_{22}: rapporto tra le spese per ricerca S_3 effettuate su fondi amministrati da altri Enti e le spese complessivamente ordinate dal personale della struttura ($S_2 + S_3$);