A Mathematical Investigation of "Concorsi Truccati"

The Italian Way of Hiring University Professors

Quirino Paris
University of California, Davis
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Abstract

Italian universities hire professors in a way that is entirely different from the approach of other European and American universities. In Italy, there are 77 universities. The law states that, when a university announces a job opening in a given discipline, all the professors of that discipline, regardless of their affiliation, must cast a secret ballot to elect the members of the selection committee. Over the years, powerful and scheming professors have used the electoral process to fix the outcome of the hiring process. The scheme begins with the identification of the individual who, according to these scheming professors, should get the job. Then comes the election of the selection committee. In order to match the expectation of the scheming professors with the choice of the selection committee, the members of this committee---elected by law through a secret ballot---must obviously be pre-selected among complacent collaborators and their name notified to all the voters. Every voter receives the information for whom to vote via email, often enclosed in an attachment facetiously called a "holy card." In every election, a large majority of professors vote according to the received instruction because they believe that rebelling against this rigged system is hopeless and dangerous for their career and that of their collaborators. Their only hope is to wait their own turn by offering deference, loyalty and silence ("omertà" in Italian) to the group of scheming professors. It is fair and sad to say that, in Italian universities, mediocrity rather than excellence is the final objective of selection committees in a large majority of job openings. In this paper we analyze the election of 27 selection committees in agricultural economics. Surprisingly, the votes' distribution is rather uniform among the elected members of all the committees. This finding constitutes the fingerprint of the scheming professors in the crime of fixing the hiring process.

Quirino Paris has been a professor of agricultural economics at the University of California, Davis, since 1969. In 2004, he was proudly expelled from the SIDEA, the Italian society of agricultural economics, for denouncing the colonizing activities of some scheming professors who have fixed the hiring process everywhere in Italy.

Introduction

This paper analyzes the hiring process of academic personnel in Italian universities. Two words must be explained to a non-Italian reader: "concorsi" and "truccati." In Italy, a "concorso" ("derby") is the process for hiring government employees. It consists of a selection committee that examines the job applications and declares the winner. When a university announces a job opening for, say, a full professor of agricultural economics, all the full professors of agricultural economics from all the Italian universities cast a secret ballot to elect four members of the selection committee. The university that announces the job opening designates a fifth member. This selection committee has undisputed authority to choose the winning candidate.

"Truccati" means "fixed." In Italian, "trucco" also means "trick." Where is the trick? In university speak, a "concorso truccato" means that the name of the person who will be chosen by a committee elected by secret ballot is known **before the committee is voted in**. That's the trick. Thus, in order to achieve the final goal of matching the pre-selected winner's name with the name of a candidate actually chosen by a selection committee, it is necessary to pre-select the members of that selection committee and to make sure that they will be elected. This is done by a few (sometimes by one) powerful professors who are particularly interested in the concorso's outcome and who will notify the names of the pre-selected members of the committee to each voter. Hence, the secret ballot is a charade orchestrated with all the pomp of the Ministry of Instruction, University and Research (MIUR) in order to transfer---one vote at a time---a piece of information (the names of the selection committee members) that is already in the hands of one or few scheming professors to the MIUR. The MIUR counts the ballots and formally announces the composition of the selection committee. In reality, therefore, the voting full professors act as very expensive mail delivery persons.

In Italy, every university professor knows the truth of the above process. The majority of professors have contributed to maintain this system of "concorsi truccati" with the justification that, in order to further one's career and to allow access to a university career for junior collaborators, one cannot make waves. Since almost everybody has pupils, and these pupils will have their own pupils, there is no realistic possibility to buck the system. The repeated nature of the game constitutes the structure for maintaining an iron discipline among participants. Very few professors have challenged this corrupt system. Even fewer have denounced it to a district attorney.

This hiring process has done immeasurable damage to Italian universities in every discipline and has destroyed uncountable careers. It has swollen the brain drain of young talents and has prevented Italian universities from hiring foreign brains: The Italian university hiring system constitutes a violation of Newton's third law of motion that says "For every action, there is an equal and opposite reaction." That is, to the outflow of Italian researchers there corresponds no comparable inflow of foreign university professors.

Italian authorities fake ignorance that the hiring system is corrupt. Yet, every few years they debate the need of reforming it. In a recent report titled *"State of the Italian Universities, 2005"* (September 20, 2005), professor Piero Tosi, chancellor of the University of Siena and president of the conference of Italian chancellors (CRUI), wrote that the "concorsi truccati" are only a few events in the life of the Italian universities (pages 10-11).

He repeated this assertion in a radio program held on September 21, 2005 (see http://repubblicaradio.repubblica.it/, *Università, concorsi truccati*). In the same program, I contradicted professor Tosi and argued that the "concorsi truccati" are a general phenomenon of the hiring process in Italian universities. In order to demonstrate my assertion, I present a mathematical analysis of all the elections of committee members in "concorsi" for full professors of agricultural economics held between 1999 and 2003. In Italy, the official MIUR classification has given this discipline the code of AGR/01.

Concorsi for Full Professors in Agricultural Economics (AGR/01)

The voting results for all the selection committees in AGR/01 that were held between 1999 and 2003 exhibit a shocking pattern. As shown in Table A1 of the appendix, the number of voters has fluctuated around 100 during these years. In all 27 elections, only the four elected members have received a significant number of votes according to an almost uniform distribution. These uniform results suggest the hypothesis that the voting procedure may have been rigged, fixed, piloted: The hypothesis implies that, not only might there have been a "pilot" (a professor highly interested in the concorso's outcome) who communicated the names of the four members to be elected to all 100 full professors of agricultural economics, but also that all 100 professors---who did not exchange any information among themselves because of the obvious difficulty---have voted in full discipline according to the "pilot's" recommendations and have distributed the 100 votes almost evenly among the four selection committee members.

It must be understood that the ultimate reason for "piloting" the votes in all the concorsi's elections is to have the selection committee declare, as concorso's winners, individuals who have often been pre-determined as such even before the particular job opening was announced. In many cases, sons, daughters, nephews, wives, lovers, and close associates have been among the pre-determined winners. The members of a committee so "elected" constitute what is called an "armored" committee because they will faithfully execute the wishes of those people who have a personal interest in the concorso's outcome and have promoted their election. All this has happened and still happens in Italy.

The mathematical demonstration of the existence of a "piloting" scheme of the voting process hypothesized above will be done according to three distinct lines of argument:

1. Histograms of all 27 elections' results. This discussion provides an informal measure of the improbable nature of the 27 events (elections).
2. A second line of argument is based upon the Gini index. Gini was a famous Italian statistician who worked during the first decades of the past century. The Gini index is a measure of concentration (dispersion) of an empirical distribution such as, for example, the distribution of votes in an election.
3. The third discussion is more formal from a mathematical viewpoint. We will compute the probability that a number N of votes will be distributed evenly among four candidates. The only admissible condition is that the four names to be voted in have been announced to all voters. We also assume that voters cannot communicate among themselves for the extreme difficulty of reaching every individual when $N = 100$.

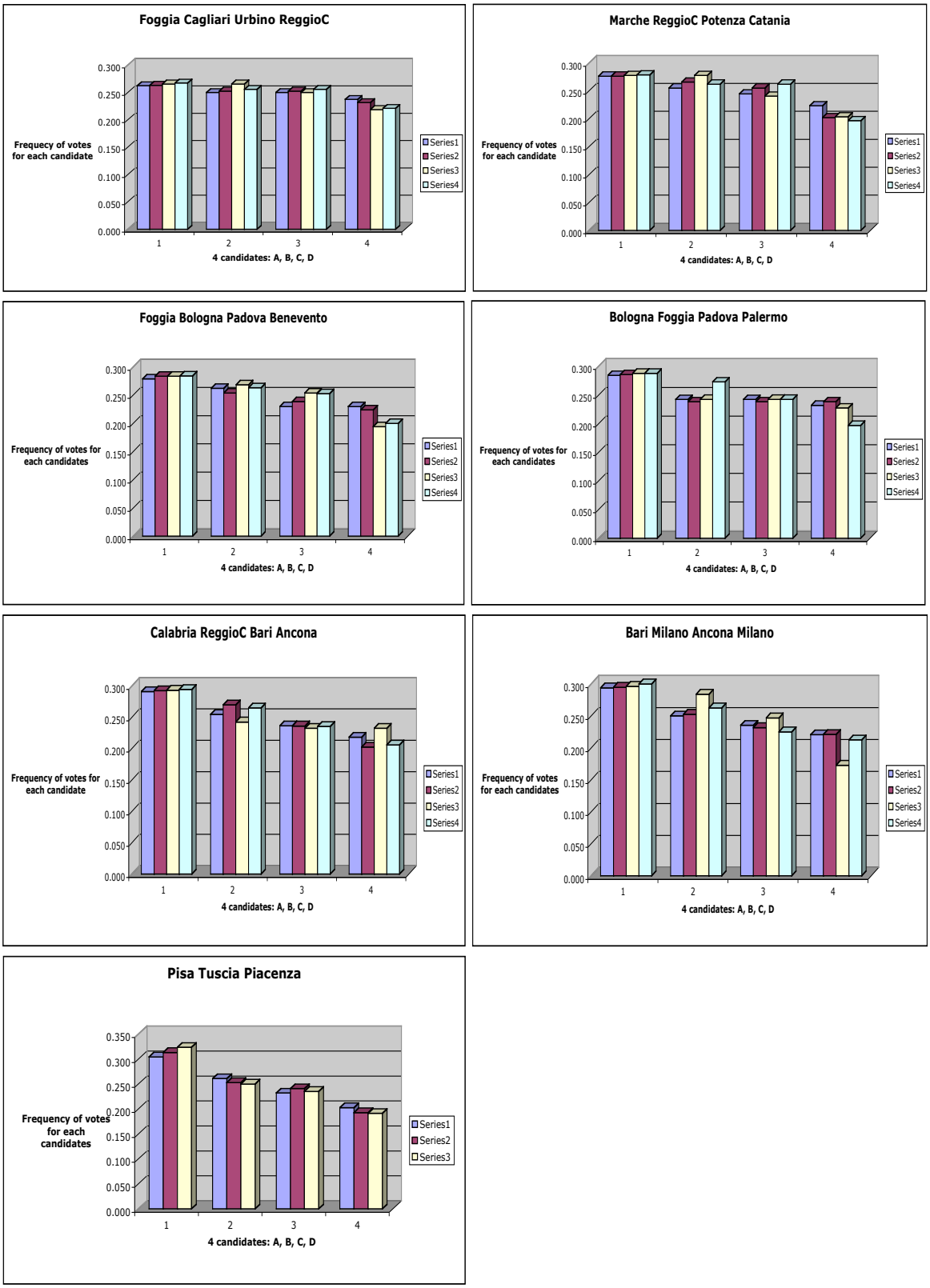
1. Histograms of 27 elections for concorsi of full professor in AGR/01, 1999-2003

Figure 1 shows 7 histograms. Each histogram (except the last one) deals with four elections for concorsi of full professor in agricultural economics held in four different universities. The histograms' height measures the frequency (ratio between the number of votes received by an elected member and the total number of voters) of votes received by the four elected members of the selection committee. Table A2 of the appendix exhibits all the frequencies used in the construction of the histograms.

The first histogram of Figure 1 deals with the concorsi held at the universities of Foggia, Cagliari, Urbino and Reggio Calabria. The four elected members of the selection committee (A, B, C, and D) received almost the same number of votes, in spite of the fact that the concorsi are spatially and temporally independent and that voters cannot enter into agreements among themselves about how many votes should be given each candidate.

For clarity, we repeat the assumption that is admitted and accepted in this analysis. We admit and accept that "somebody" decides and announces who are the four members of the selection committee to be voted in. In spite of this condition, the results of an almost uniform distribution among the four elected members of the commission are very surprising events. These results suggest the existence of a "piloting" scheme with a "pilot" capable of communicating with all the voters, either one at a time or through complacent collaborators. During this communication the voter is instructed to cast the vote for one of the 4 pre-selected individuals. Furthermore, such a "pilot" must have the ability to convince (compel) all the voters to vote according to the "pilot's" wishes. These events, repeated in each concorso, are an indication that something is terribly wrong with the Italian hiring process of academic personnel. These events seem to violate the principles of fairness and good administration in the hiring of public servants. The other six histograms of Figure 1 can be read in a similar fashion.

Figure 1. Histograms of 27 concorsi for full professor in AGR/01



2. The index of concentration-dispersion of Gini for the 27 elections in AGR/01

The second logical approach for gauging whether the results of the 27 elections in AGR/01 might support the existence of a "piloting" scheme of voters and votes is based upon the index of concentration-dispersion of Gini. The Gini index measures the degree of concentration (or the opposite notion called dispersion) of an empirical distribution such as the distribution of votes in the AGR/01 elections.

Let f_1 be the frequency (ratio between the number of votes received by an elected member of the selection committee and the total number of voters) of the committee member with the highest number of votes, f_2 the frequency of the second elected member, and f_3 and f_4 the frequencies of the third and fourth committee member. These frequencies are presented in Table A2 of the appendix for all 27 concorsi. Thus, the Gini index, G, is defined as

$$G = 1 - (f_1^2 + f_2^2 + f_3^2 + f_4^2)$$

where f_1^2 is the frequency f_1 multiplied by itself, and so forth. If all the votes were concentrated on a given candidate, say the third one, the values of the frequencies would be $f_1 = 0, f_2 = 0, f_3 = 1, f_4 = 0$, and the highest concentration of votes would be associated with a Gini index of zero value. If, on the contrary, each elected member of the selection committee were to receive the same number of votes, we would observe the maximal dispersion of votes and the frequencies of the four elected members would be all equal, with a value of 1/4 = 0.25. In this case, the Gini index measures the maximal dispersion of votes with a value of 0.75 because, by applying the above formula,

$$\begin{aligned} G &= 1 - (0.25^2 + 0.25^2 + 0.25^2 + 0.25^2) \\ &= 1 - (0.0625 + 0.0625 + 0.0625 + 0.0625) \\ &= 1 - 0.25 = 0.75. \end{aligned}$$

For a convenient reference, it is customary to normalize the Gini index with the value of the maximal dispersion, in this case, 0.75. Thus, the normalized Gini index, GN, is defined as

$$GN = G / 0.75$$

which exhibits the extreme value of 0, corresponding with the maximal concentration, and 1, corresponding with the maximal dispersion. Table E1 presents the values of the normalized Gini index for all 27 elections in AGR/01 between 1999 and 2003. From column 4 of Table E1, the normalized Gini index shows values that are all very close to 1. Hence, these results confirm the hypothesis of a "piloting" scheme and a control of voters and their votes.

Table E1. The normalized Gini index of 27 concorsi for full professor in AGR/01

University	Year	Session	Normalized Gini index
Foggia	2004	I	0.99955
Cagliari	2002	II	0.99935
Urbino	1999	I	0.99808
Reggio Calabria	2002	IV	0.99840
Marche	2004	I	0.99799
Reggio Calabria	2002	II	0.99558
Potenza	2000	II	0.99505
Catania	1999	I	0.99475
Foggia	2000	II	0.99770
Bologna	1999	I	0.99746
Padova	1999	II	0.99386
Benevento	2003	I	0.99489
Bologna	2002	II	0.99786
Foggia	2003	III	0.99770
Padova	1999	I	0.99726
Palermo	1999	II	0.99354
Calabria	1999	I	0.99610
Reggio Calabria	2002	IV	0.99378
Bari	2002	II	0.99663
Ancona	1999	I	0.99424
Bari	2000	II	0.99600
Milano	2003	II	0.99566
Ancona	2000	III	0.98772
Milano Bicocca	2002	I	0.99368
Pisa	1999	I	0.99257
Tuscia	2001	IV	0.99026
Piacenza Cattolica	2001	II	0.98776

3. Probability of voting results in 27 concorsi of AGR/01

The third and most rigorous analysis is based upon a probability calculation. We will demonstrate that, without a "piloting" scheme, the probability of obtaining results as those given in Table A1 is very small. This is true even when allowing for the possibility that "somebody" will announce the name of the four members to be voted in. Furthermore, the joint probability that these results will be repeated for all 27 elections is essentially equal to zero.

In other words, the existence of a "piloting" scheme is not based upon the fact that "somebody" announces the names of the four members to be elected. This aspect of the election is accepted as part of an informed process. Rather, the existence of a "piloting" scheme is based upon the fact that, given four names, the probability that N voters will distribute their votes according to a uniform distribution is very small and, hence, the results of Table A1 are highly improbable.

Now, we state the first question to be answered with a probability calculation. For ease of reference, we assume that the total number of voters is equal to *N=100* and that all voters can be elected to the selection committee. Hence, let us assume that "somebody" will choose 4 names among the 100 individuals. The probability that a group of 4 names will be randomly chosen is equal to

$$\text{Probability of a group of 4 names } = \frac{1}{\binom{100}{4}} = \frac{1}{\frac{100!}{4!(100-4)!}} = 0.000000255$$

where the parenthesis is read as "4 names chosen among 100 individuals." This term is computed by means of a combinatorial approach that uses factorial calculus. The symbol 4! implies the multiplication of all the successive numbers from 1 to 4. For example, $4! = 1 \cdot 2 \cdot 3 \cdot 4 = 24$. Analogously, $100! = 1 \cdot 2 \cdot 3 ... 98 \cdot 99 \cdot 100 = 9.3326215444^{157}$, a very large number and where 157 is called exponent. From the above formula, the probability of a group of 4 names chosen from a universe of *N=100* is very small. But this is not the most interesting answer.

The relevant question can be stated as follows. **Given the choice of 4 names, and given that each of these 4 individuals casts a vote for him/herself, what is the probability that the remaining 96 voters will distribute their votes among the 4 individuals according to a uniform distribution?** In other words, given that the members of the selection committee to be elected are chosen by "somebody" and that each of these 4 members votes for him/herself, what is the probability that the remaining 96 voters will divide their votes evenly among the 4 members when there is no possibility to exchange information among the 96 voters?

This probability can be computed as follows. Let x_1, x_2, x_3, and x_4 be the number of votes received by each of the 4 individuals elected to be members of the selection committee. Hence, given the remaining 96 voters, the number of all possible voting decisions is equal to

$$\text{Number of all possible voting decisions} = \frac{96!}{x_1! x_2! x_3! x_4!}$$

in such a way that $x_1 + x_2 + x_3 + x_4 = 96$. As a consequence, solving for $x_4 = 96 - x_1 - x_2 - x_3$, we can rewrite the number of all possible voting decisions as

$$\text{Number of all possible voting decisions} = \sum_{x_1} \sum_{x_2} \sum_{x_3} \frac{96!}{x_1! x_2! x_3! (96 - x_1 - x_2 - x_3)!} = 4^{96}. \quad [1]$$

The summation symbols $\sum$ with respect to x_1, x_2 and x_3 indicate that the summation is carried out for all the values that x_1, x_2 and x_3 can take on.

When the 4 elected individuals receive exactly the same number of votes, we have that 96/4 = 24 and the number of all possible voting decisions simplifies to

$$\text{Number of possible voting decisions when } (x_1 = x_2 = x_3 = x_4 = 24) = \frac{96!}{(24!)^4}.$$

Therefore, the answer to the previous question (what is the probability of a uniform distribution of 96 votes among 4 elected members?) is equal to

$$\text{Probability of a uniform distribution of votes} = \left[\frac{96!}{(24!)^4}\right] / 4^{96} = 0.001066 \qquad [2]$$

that is, a very small probability.

Furthermore, the joint probability that, in all the 27 elections, the votes are distributed uniformly is essentially zero, that is, something of the order of 10^{-71}, a number that contains 70 zeros after the decimal point: 0.(70 zeros)1.

The probability in equation [2] is based upon the assumption that the 4 elected individuals receive precisely the same number of votes. In reality, the results given in Table A1 of the appendix vary somewhat from this assumption. Thus, it is worthwhile to compute the exact probability for each of the 27 elections using the general formula given in [1] above. Table E2 present these probabilities. All the probabilities are very small; on average of the order of 1 over 1000. These results confirm that these events (elections) cannot be interpreted as resulting from the free choice of the voters.

In a slightly more technical language, if there had been no "piloting" scheme, we would have expected to observe results such as those given in Table E2---generated exclusively as purely random events---only in a proportion of times equal to 0.001 (that is 1 time over 1000 repetitions). Since this proportion is very small and yet we have observed uniform results in all the elections, we are authorized to argue that these results depend upon a "piloting" scheme. Even more compelling is the fact that the proportion associated with the complex event of a uniform distribution in all 27 elections (for purely random reasons) is equal to 0.(70 zeros)1; a proportion practically equal to zero. Hence, the fact that such a complex event was actually observed demonstrates conclusively the existence of a "piloting" scheme.

The conclusion of this rigorous line of thought constitutes serious evidence of "concorsi truccati" that cannot be easily dismissed. We recall, once again, that the ultimate goal of "piloting" elections is related to the choice of individuals who, as members of "armored" selection committees, will play according to the rule and wishes of the "pilot" and, therefore, will declare winners those candidates that have been selected by the "pilot" even before the elections were held.

Table E2. Probability of results in 27 elections of AGR/01,

University	Year	Session	Probability
Bari	2000	II	0.00006049
Foggia	2004	I	0.00013312
Ancona	2000	III	0.00029249
Potenza	2000	II	0.00035145
Tuscia	2001	IV	0.00040218
Benevento	2003	I	0.00051638
Reggio Calabria	2002	IV	0.00052643
Piacenza Cattolica	2001	II	0.00054657
Milano	2003	II	0.00055589
Reggio Calabria	2002	II	0.00058705
Milano Bicocca	2002	I	0.00067837
Bologna	2002	II	0.00080475
Pisa	1999	I	0.00082310
Marche	2004	I	0.00083864
Padova	1999	II	0.00097083
Cagliari	2002	II	0.00098079
Palermo	1999	II	0.00098532
Foggia	2003	III	0.00099144
Ancona	1999	I	0.00100203
Reggio Calabria	2002	IV	0.00101863
Bari	2002	II	0.00120245
Catania	1999	I	0.00127997
Bologna	1999	I	0.00141464
Padova	1999	I	0.00143577
Urbino	1999	I	0.00161589
Foggia	2000	II	0.00166470
Calabria	1999	I	0.00178482

Conclusion

The mathematical evidence presented in this paper confirms the existence of a precise design and a "piloting" scheme of voters and votes in the Italian disciplinary sector of agricultural economics (AGR/01) with the goal of declaring concorso's winners pre-selected individuals. Among these elections there are also those that have seen concorso's winners relatives and close collaborators of selection committee members who, in turn, have appeared in these committees a disproportionate number of times.

The results of this analysis seem to demonstrate that the "piloting" scheme was clearly executed to give privileged collaborators and family members an unjust advantage in their academic career. The mathematical evidence, the histogram and the formulae that were presented above corroborate the intention of those individuals who have maneuvered the entire system in order to obtain well orchestrated selection committees capable of playing a musical score without a single note out of tune. The scientific demonstration is useful for identifying the instruments of the abuse in the election of the selection committees that are a "means" to the "end." Therefore, it seems possible to conclude with a high level of confidence, and beyond any reasonable doubt, that the "pilot" and the group of his complacent collaborators in AGR/01 have procured unjust advantages for themselves and have caused unjust damage to many people, for a long time and on all the territory of the Italian Republic.

References

Piero Tosi, "*L'Università vive il Paese, Relazione sullo Stato delle Universita' Italiane, 2005*", CRUI, Conferenza dei Rettori delle Università Italiane, Roma, 20 Settembre 2005.

APPENDIX

Table A1. Results of the election of committee members in concorsi for full professor in agricultural economics, AGR/01, 1999-2003

	University	Year	Session	Total voters ABCD	Elected A	Elected B	Elected C	Elected D
1	Bari	2002	II	99	29	24	23	23
2	Benevento	2003	I	95	27	25	24	19
3	Bologna	2002	II	95	27	23	23	22
4	Cagliari	2002	II	95	25	24	24	22
5	Milano	2003	II	95	28	24	22	21
6	Marche	2004	I	94	26	24	23	21
7	Reggio Calabria	2002	II	94	26	25	24	19
8	Reggio Calabria	2002	IV	89	26	24	21	18
9	Reggio Calabria	2002	IV	86	23	22	22	19
10	Foggia	2003	III	84	24	20	20	20
11	Tuscia	2001	IV	83	26	21	20	16
12	Ancona	2000	III	81	24	23	20	14
13	Foggia	2004	I	80	21	20	20	19
14	Milano Bicocca	2002	I	80	24	21	18	17
15	Pisa	1999	I	69	21	18	16	14
16	Ancona	1999	II	68	20	18	16	14
17	Bari	2000	II	68	20	17	16	15
18	Piacenza Cattolica	2001	II	68	22	17	16	13
19	Bologna	1999	I	67	19	17	16	15
20	Padova	1999	II	67	19	18	17	13
21	Padova	1999	I	66	19	16	16	15
22	Palermo	1999	II	66	19	18	16	13
23	Urbino	1999	I	64	17	17	16	14
24	Catania	1999	I	61	17	16	16	12
25	Foggia	2000	II	61	17	16	14	14
26	Calabria	1999	I	55	16	14	13	12
27	Potenza	2000	II	54	15	15	13	11

Table A2. Frequencies of votes received by the four elected members in AGR/01

University	Year	Session	Elected A	Elected B	Elected C	Elected D
Foggia	2004	I	0.263	0.250	0.250	0.238
Cagliari	2002	II	0.263	0.253	0.253	0.232
Urbino	1999	I	0.266	0.266	0.250	0.219
Reggio Calabria	2002	IV	0.267	0.256	0.256	0.221
Marche	2004	I	0.277	0.255	0.245	0.223
Reggio Calabria	2002	II	0.277	0.266	0.255	0.202
Potenza	2000	II	0.278	0.278	0.241	0.204
Catania	1999	I	0.279	0.262	0.262	0.197
Foggia	2000	II	0.279	0.262	0.230	0.230
Bologna	1999	I	0.284	0.254	0.239	0.224
Padova	1999	II	0.284	0.269	0.254	0.194
Benevento	2003	I	0.284	0.263	0.253	0.200
Bologna	2002	II	0.284	0.242	0.242	0.232
Foggia	2003	III	0.286	0.238	0.238	0.238
Padova	1999	I	0.288	0.242	0.242	0.227
Palermo	1999	II	0.288	0.273	0.242	0.197
Calabria	1999	I	0.291	0.255	0.236	0.218
Reggio Calabria	2002	IV	0.292	0.270	0.236	0.202
Bari	2002	II	0.293	0.242	0.232	0.232
Ancona	1999	I	0.294	0.265	0.235	0.206
Bari	2000	II	0.294	0.250	0.235	0.221
Milano	2003	II	0.295	0.253	0.232	0.221
Ancona	2000	III	0.296	0.284	0.247	0.173
Milano Bicocca	2002	I	0.300	0.263	0.225	0.213
Pisa	1999	I	0.304	0.261	0.232	0.203
Tuscia	2001	IV	0.313	0.253	0.241	0.193
Piacenza Cattolica	2001	II	0.324	0.250	0.235	0.191