Title: Italian universities do not recruit according to proficiency in scientific production

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Abstract

We analyzed the files regarding the competitions won by 186 professors of selected bibliometric disciplines in Florence between January 2014 and 30 June 2021. An equal number of professors recruited at other Italian universities and of researchers who never attained professorship in Italy were randomly chosen among individuals possessing National Scientific Qualification, a prerequisite for professorship, in the same disciplines of each Florentine professor. The H-indexes at the time of qualification (T1), of the Florence call (T2), and the current (T3) time were obtained from Scopus.

Non-recruited researchers were more likely (Chi-square test) to show a higher H-index than both Florentine (T1 p=0.0005, T2 p=0.0015, T3 p=0.0095) and non-Florentine professors (T1 p=0.0078, T2 p=0.0245, T3 p=0.0500). Fifty-four non-recruited scientists serve in foreign universities, 100 at national/international research centers. The remaining 32 scientists (25 who keep producing despite precarious employment, and 7 who have stopped publishing) were, at any rate, as likely as Florentine (T3 p=0.69) and non-Florentine professors (T3 p=0.14) to show a higher H-index.

This study suggests that Italian academy does not recruit professors according to their qualitative/quantitative capacity of publishing, with a detriment to knowledge for the countrywide system and on a global scale.

Introduction

Malpractice in the system of recruitment of the Italian universities has been reported (Assad, 2016; Rigante, 2016). Academy is plagued by nepotism (Grilli and Allesina, 2017), clientelism and deference to politics (Gallina and Gallo, 2020). Calls are in most cases tailored to favor local candidates, with the consequence of lack of mobility and independence (Gallina and Gallo, 2020). Many worthy scientists, who are not close to influential figures, remain marginalized and either had to leave Italy to continue in their career, or had to give up on their ambitions. An impoverishment in scientific production for Italy is expected to follow. Here, we aimed at demonstrating this issue in a quantitative manner.

Methods

From the archives of the University of Florence (https://www.unifi.it/vp-2456-docenti-e-ricercatori-di-ruolo.html), we retrieved the files regarding recruitment of 186 professors in selected bibliometric disciplines, according to law 240/2010 (Presidente della Repubblica, 2011) since its inception to June 30, 2021.

Search strategy

With reference to Ministerial Decree 29 July 2011 n. 3361 (Ministro della Pubblica Istruzione, 2011) until 2015, and to Ministerial Decree 30 October 2015 n. 8552 (Ministro della Pubblica Istruzione, 2015) thereafter, we identified the competition sectors composed of a single academic discipline in the fields of Social Sciences and Humanities, Physical Sciences and Engineering, and Life Sciences according to the European Research Council (ERC - https://erc.europa.eu). This initial step was undertaken to identify in the subsequent matching phase (see below) researchers belonging, with certainty, to the same academic disciplines.[1] Following a previously described method (Gallina and Gallo, 2020) in the time window April-June 2021 we identified the recruitment procedures in the above selected academic disciplines, according to art. 18, commas 1, 4 and art. 24, commas 5, 6 of law 240/2010 (Presidente della Repubblica, 2011), held in Florence between January 2014 and 30 June 2021; for each competition, the winner was identified. We then looked for the year (the quarter for the 2016-2018 session) when each of the recruited professors in Florence achieved National Scientific Qualification, a pre-requisite for professorship as per art. 16, law 240/2010 (Presidente della Repubblica, 2011), by searching their competition sectors in the *Abilitazione Scientifica Nazionale* website (https://abilitazione.miur.it/public/index.php). Among individuals who achieved the National Scientific Qualification together with each of the recruited Florentine professors, we randomly identified two scientists: one employed at other Italian universities, and another who never achieved an academic position in Italy (https://cercauniversita.cineca.it/php5/docenti/cerca.php). For the 2016-2018 session of National Scientific Qualification, when the quarter in which the Florentine professor achieved qualification did not contain non-recruited researchers, the search was extended to the nearest quarters. When drawing resulted in duplicates, the procedure was repeated. In three instances, a suitable non-recruited researcher was not found, thus the entire data string was omitted. Information about the current work place of non-recruited researchers was obtained from the affiliation stated in their last article as reported on Scopus (https://www.scopus.com/search/form.uri?display=authorLookup#author) and reasonably confirmed by an internet search. The most recent year of publication for the non-recruited researchers was obtained from the same source. For all scientists, H-indexes at the time of their National Scientific Qualification (T1) and at the time of the Florence call (T2) were retrieved from Scopus (https://www.scopus.com/search/form.uri?display=authorLookup#author). The current H-index (T3) was obtained from the same source in the time-window 1 - 31 July 2021. Before combining records, disambiguation among authors was obtained through verification of researcher IDs and/or CVs.

Statistics

We posited that, among the population of those who achieved National Scientific Qualification, the probability a random draw within a certain competition sector (i.e. within a single academic discipline) would result in a person with an H-index higher (or lower) than that of the Florentine winner is 50%. We determined this probability assuming that the National Scientific Qualification is fair, i.e. "heads and tails" are equally likely once ties are removed. The null hypothesis that for a researcher who obtained National Scientific Qualification having an H-index higher (or lower) than that of another person drawn from the same pool is alike, was tested using the Chi-squared distribution with 1 degree of freedom according to the formula $(H-L)^2/(H+L)$, where H and L are the number of higher and, respectively, lower outcomes. P-values <0.05 were considered evidence of biased deviation from the expected H=L.

Sensitivity analyses

Contrary to the criteria used in the primary analysis where people employed at other Italian universities as assistant, associate or full professors were matched with the Florentine professors, we performed a second series of drawings to check the robustness of the results in which only associate and full professors were considered. This assumes that those who were appointed as associate or full professors would perform better (on average) than assistant professors, thus providing a more stringent scenario when comparing their H-indexes with those of both the Florentine professors and the non-recruited individuals.

We sorted out to use Scopus because it offers a more extensive list of modern sources, which seemed best suited to our investigation. However, we retrieved the H-indexes for each of the 186 triplets at each of the three measurement times also from Web of Science (https://www.webofscience.com/wos/author/search) to ascertain whether different sources and way to collect information in highly heterogeneous fields may affect results.

Results

Chi-square test showed that the probability for a Florentine professor to have an H-index higher than that of a non-Florentine counterpart was not different from 50% (T1: 87 *vs* 86, 13 ties, p=0.94; T2: 78 *vs* 93, 15 ties, p=0.25; T3: 81 *vs* 90, 15 ties, p=0.49). On the other hand, non-recruited researchers were more likely to show a higher H-index than both Florentine (T1: 109 *vs* 63, 14 ties, p=0.0005; T2: 108 *vs* 66, 12 ties, p=0.0015; T3: 103 *vs* 69, 14 ties, p=0.0095) and non-Florentine professors (T1: 104 *vs* 69, 13 ties, p=0.0078; T2: 104 *vs* 74, 8 ties, p=0.0245; T3: 101 *vs* 75, 10 ties, p=0.0500). Most non-recruited researchers serve in foreign universities (n=54) or national/international research centers (n=100). Some others (n=25) keep producing despite precarious employment, whereas 7

scientists have stopped publishing, as at least three years of inactivity suggests. Notwithstanding, this subset of 32 non-recruited researchers were, at any rate, as likely as Florentine (T3: 12 *vs* 14, 6 ties, p=0.69) and non-Florentine professors (T3: 11 *vs* 19, 2 ties, p=0.14) to show a higher H-index. Sensitivity analyses confirmed the above results.

Discussion

The aim of the present study was to demonstrate if, within a same discipline, professors recruited in Italy performed better or worse in terms of scientific production, as compared to scientists who had not access to Italian academy. The H-index represents the most straightforward metric tool because of its combination of productivity and impact indicators, although the value of bibliometric data in exhaustively indicating the merits of a researcher is debated (Gasparyan et al., 2018; Braithwaite et al., 2019) and it is undisputed that teaching and managerial abilities are also required to hold academic positions.

With these premises, this study suggests that the Italian academy does not recruit professors according to their qualitative and quantitative capacity of publishing. Since non-recruited researchers are more likely to perform better in bibliometric terms, a detriment to the countrywide system is expected to follow (Abramo and D'Angelo, 2018), if only because they were educated with public resources. Studies should quantify the amount of knowledge generated by Italian education and lost by our academic system in terms of GDP reduction. Fortunately, this human capital is not completely vanished. Almost 83% is serving foreign universities or national/international research centers. However, in giving up academic aspiration, a not negligible proportion of valued, rejected researchers deprive science on a global scale of their potential contribution.

It is essential for the Italian ministerial authorities to investigate the aberrant mechanism that leads to the exclusion of qualified researchers from universities. However, a real change cannot ignore the crucial role of three actors: the Italian academic establishment must carry out a profound self-criticism on its work so far; the world scientific community, impoverished by this malpractice, must operate a moral suasion on Italian universities and support the efforts of people who fight against this cancer in our country; Italian researchers at the beginning of their careers must embrace the call to create a more equitable, collaborative and healthy academy (Aguilar, 2021) and avoid complicity.

Notes

1. Competition macro areas (*macro settori*) correspond to ERC search domains. These are subdivided in competition sectors (*settori concorsuali*), which correspond to ERC panels. The latter, can involve

a single academic discipline (*settore scientifico disciplinare*), corresponding to ERC panel descriptors, or are split into more than one of these last.

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