The Trench Warfare of Gender Discrimination. Evidence from Academic Promotions to Full Professor in Italy

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Abstract

In this paper we aim to understand if gender makes a difference in the path to promotion to full professor in Italian universities, drawing on data from 2013 to 2016. The new promotion system pursuant Gelmini Law (210/2010) in Italy implies to go through two steps. First, they have to obtain the national ASN system (fit-for-the-role national filter), based on merit measured via bibliometric and non-bibliometric indicators. This step does not mean to get a position, it only means to be able to apply for it at institutional level. We believe that discrimination based on gender may happen especially at institutional level as in comparison to ASN there is less transparency and more autonomy at institutional level. It is also hypothesised that discrimination based on gender may differ according to the percentage of women already at full professor rank by disciplinary field. We investigate gender inequality using a binary variable (promoted or not promoted along 2013 until 2016) controlling by scientific productivity, normalised number of available vacancies, result of national research evaluation (VQR – department of candidate's affiliation), age, current rank-and-file position. Multilevel logistic regression demonstrates that among those who obtained the ASN and at parity of other conditions, men have around 24% more probability to be promoted at parity of scientific production, which reveals a relevant gender discrimination. Our findings have implications on theory about inequality regimes and might serve to reflect on how to improve practices at institutional level.

Keywords

Career advancement; promotion rate; scientific productivity; gender gap; universities; Italy.

Introduction

Underrepresentation of women in academic careers is a persistent problem, despite there is an overall parity in the number of women getting a postgraduate degree (EC, 2016). Women are less represented in some disciplinary areas, typically the ones related to hard sciences, technology, mathematics and engineering (Smith, 2011). Moreover, they are underrepresented in the middle and high ranks of academic careers (Morley, 2014). In this paper, we will focus on the second problem: the shortage of women in senior academic positions, which is investigated by focusing on the process of promotion to full professor in Italy. The objective is to understand if there are discriminations based on gender when it comes to appoint a full professor in a university. Focusing on this issue will allow shedding light on if, and to what extent, the new system might hinder women's achievements in academia.

The Italian case is interesting because of the intrinsic features of how the promotion system works. Since 2012, a new process has been introduced, based on two steps. First, academics are expected to go through the *abilitazione scientifica nazionale* (ASN), a national evaluation process aimed at awarding a fit-for-the-role qualification. Second, only candidates who successfully went through the ASN can apply to be promoted at a specific position. In the case of the rank of full professor, usually the promotion is achieved in the same university of affiliation at the time of getting the ASN.

ASN occurs at the national level and is based on an analysis and evaluation of scientific outputs summarized in three indicators: number of journal papers, number of citations and H-index for bibliometric disciplines; number of books, chapters and articles, and articles in "A-class" journals for non-bibliometric disciplines. ASN is conducted by specific committees depending on the disciplinary field (*settore concorsuale*, SC): in total, there are 184 committee disciplines, grouped in 14 areas (as listed in Table 1). Candidates applying to the rank of full professor are not necessarily associate professors.

Table 1 around here

ASN has been introduced to tackle issues of favouritism and nepotism as well (Abramo, D'Angelo, & Rosati, 2014); however, to some extent, these dynamics are still present (Abramo & D'Angelo, 2015a). Fresh literature shows that this new process is helping younger and productive candidates to progress quicker in their careers (Marini, 2016). However, this evidence is related to ASN, and not to actual promotions. Therefore, this paper may shed some light about the lamented long-standing problem of promotion awarded irrespectively of degree of productivity, promoting also research inactive scholars (Abramo, D'Angelo, & Soldatenkova, 2017). This problem of nepotism and lack of actual meritocracy is also at the base of an apparent missing bias against women in Italian universities: often, the foremost victims of unfair promotions are scholars who are more productive, which in turn are more frequently males (Abramo, D'Angelo, & Rosati, 2016). This study also suggests that women may apply less frequently for promotions, whereas to analyse ASN awarded should reduce this factor when checking for gender discriminations because a first selection based on voluntary application occurred.

It is worth stressing that achieving the ASN does not mean to get the promotion or the recruitment to the respective rank of ASN; rather, it means to be eligible to it. Each university has full autonomy to promote anyone who got the ASN for the rank of full professor selecting from that pool, without any further national specification. Also, it is worth noting that the

number of candidates successfully going through the ASN is by far much higher than the number of available academic promotions. We believe that in this institutional process discriminations based on gender might occur, since universities are not strictly required to provide any transparent procedure as for the ASN process (Marzolla, 2016). In other terms, it is hypothesised that less transparency increases the possibilities of discrimination.

In Italy, in 2013, the proportion of women full professors was 21.1%, slightly above the EU average of 20.9% (EC, 2016). Getting a position as a full professor is a matter of prestige and salary increase: it is possible that individuals, to get such a position, heavily rely on networking and other strategies that might interfere with building equality and diversity. Such strategies might be at odds with mere productivity indicators released with the ASN. Previous research conducted in the Netherlands has shown that the process of professorial recruitment is characterised by limited transparency and accountability, hence discriminations emerge (Van den Brink & Benschop, 2012a, 2014; Van den Brink, Benschop, & Jansen, 2010).

Until now literature has especially focused on gender discrimination in ASN committees (Abramo, D'Angelo, & Rosati, 2015b; Manuel Bagues, Sylos-Labini, & Zinovyeva, forthcoming), but not on what happens once the ASN has been achieved, while this is especially relevant since obtaining the ASN does not mean to progress in one's own career.

In this paper, we draw on data about both ASN and actual promotions, from 2013 (when the evaluation of the first cohort of applicants to the ASN was concluded) to the end of 2016. We will focus on how many new full professor positions entered the system, analysing gender differences. The structure of the paper is as follows: in the next section, we will give an overview of the background literature explaining the dynamics slowing down women's academic careers. Afterwards, we will focus on the current literature explaining discriminations in the new ASN system in Italy. Objectives and methods follow. Discussion section aims at understanding the implications for both theory and practice. In the conclusions, we will reflect on the future possible developments out of this study.

Women in academia: an uneasy career path

Gender discrimination along academic careers has been widely documented: despite academic systems and promotion processes greatly vary among countries, there are some common issues. Literature shows that universities are "gendered organisations" (J. Acker, 1990), created on the image of the disembodied worker, a (white and middle-class) man exclusively committed to his work; furthermore, higher education is built around a prestige economy, shaped on the male norm, being hence for women more difficult to break into it (Aiston & Jung, 2015; Coate & Howson, 2014; Fletcher, Boden, Kent, & Tinson, 2007).

Empirical research demonstrates that, because of stereotyping and biases, more often women do not have the opportunity to have their voice listened to and contribute to important decision-making processes (Etzkowitz, Kemelgor, & Uzzi, 2000; Gherardi & Poggio, 2001; Rosser, 2004; Valian, 1999). Women's contribution might be voluntarily hindered, and women might be criticized for futile reasons (Savigny, 2014). Unconscious gender bias might severely affect women career progression (Easterly & Ricard, 2011; Moss-Racusin, Dovidio, Brescoll, Graham, & Handelsman, 2012; Roos & Gatta, 2009; Valian, 2005). Women might be disadvantaged when it comes to work allocation (Barrett & Barrett, 2011; Winslow, 2010): they are more often asked (or expected) to deal with tasks that are not central for their career progression (Babcock, Recalde, Vesterlund, & Weingart, 2017); teaching, pastoral care, or committee work, are exemplar (Coate & Howson, 2014; Guarino & Borden, 2017). Yet, women are highly underrepresented in senior management and high rank leadership positions in academia (Fuchs, von Stebut, & Allmendinger, 2001; Morley, 2013, 2014).

Academic work is renowned for requiring considerable time commitment (Sang, Powell, Finkel, & Richards, 2015): scholars argue that women might have their career chances compromised because, when compared to men, it is more likely that they have to devote their time to take care of others (S. Acker & Armenti, 2004; Bozzon, Murgia, Poggio, & Rapetti, 2017; Lewis & Humbert, 2010; Rafnsdóttir & Heijstra, 2013; Toffoletti & Starr, 2016; Woodward, 2007). The issues of work-life balance and time constraints have been related to women's lower scientific productivity (Aiston & Jung, 2015), hence to their underrepresentation at the professoriate level. However, evidence in relation to this is ambiguous: Stack (2004) and Sax (2002) reject that women produce less because of family-related duties; Fox (2005) shows that the relations between parental and marital status and productivity are especially complex for women, and type of family composition and spouse occupation have an impact as well.

When focusing on career progression and tenure, scholars have shown that the criteria of excellence and meritocracy are gendered at the detriment of women (Deem, 2009; Fassa & Kradolfer, 2013; Van den Brink & Benschop, 2012a; Van den Brink et al., 2010). Perna (2001), in her analysis of US data, shows that women are less likely to be appointed as professors, even when controlling for productivity, at 4-years Colleges. In a subsequent study, the author considers the impact of family ties, and shows that this does not explain the gap in becoming professor (Perna, 2005). Danell and Hjerm (2013), in their analysis of the careers of PhDs in Sweden between 1995 and 2010, show that women have 37% lower chance to become professors than men, and that gender differences in promotion rates have not decreased in time. Heijstra and colleagues (2015) show that the gender gap at the professoriate level in Iceland is partly explained by years of work experience, but not by family-related factors (marital status and number of children) as some literature would suggest. These two studies are remarkable since Sweden and Iceland have top positions in the Global Gender Gap Report. However, the two studies do not consider variables related to productivity. Productivity is considered by Weisshaar (2017): the author conducted a study across a sample of academics in Computer Science, English and Sociology in the US, and shows that neither productivity, nor organisational characteristics (department size, ranking, number of women faculty) explain the gender gap in tenure.

Van den Brink and Benschop (2014) try to dig in-depth into the processes that hinder women to be promoted to professor in the Netherlands. They show the relevance of networks along recruitment processes: they highlight the existence of practices called "mobilising masculinities", in which men in senior positions act as gatekeepers and engage in different micro-processes to favour other men. Because men academics are still the ones who, in most of the cases, cover the positions of power, it might be more difficult for women to enter a network having the power to promote them. When it comes to support more junior academics, men tend to support other men: the authors explain this phenomenon through the concept of *homophily*, i.e. the perceived similarity among the members of a network. The same has been observed by Fletcher et al. (2007) in the UK. This has been defined as the "cloning phenomenon" (Johnson, 2007) as well, and it is negatively impacting on the achievement of diversity at the top of the academic hierarchies.

To address the gendering of promotion criteria, universities often try to form gender-balanced appointment committees, because this seems to create a more favourable environment for women. Van den Brink, Benschop and Jansen (2010) find that gender-balanced committees tend to appoint more women; however, along the recruitment process, the concept of excellence is more often applied to men candidates, and without any substantial ground. The authors highlight that the lack of a clear definition of "excellence" and "merit" leaves the terrain open to gender micro-politics disadvantaging women.

Gender dynamics in the Italian ASN system

Research focused on gender differences in promotion processes in Italy presents mixed findings. Abramo et al. (2016) analyse the 2008 competition for associate professors, finding no gender difference in relation to positive bias (i.e. favouritism), whereas there is a discrimination against highly performing men. However, a previous study shows that the gender of the president of the evaluating committee has an impact: overall, women in committees are more inclined to evaluate according to pure merit in comparison to men in the same function (Abramo et al., 2015b). Importantly, the authors found differences among disciplines: in the hard sciences, there is a positive association between having a woman as the president of the committee, as well as having more women among the successful applicants. In addition, women presidents tend to favour applicants who have been their co-authors, while men tend to favour applicants who have spent many years in their same university; the latter finding is confirmed by Abramo, D'Angelo, and Rosati (2015a); it could be inferred that the concept of homophily plays a role in this process. De Paola and Scoppa (2015) focus on chemistry and economics, and show that a mixed-gender committee helps, while women are likely to be less promoted when the committee is composed exclusively by men. This conclusion echoes van den Brink and colleagues' (2010) study on professorial appointments in the Netherlands cited above.

A recent study by Bagues, Sylos-Labini, and Zinovyeva (2017) on the first round of the ASN (2012-2014) shows that having women in the selection committee does not favour women's applicants and women's promotion rates do not increase: having women in the committee means that men evaluators become more severe towards women's applicants. They calculated that each additional woman evaluator in the committee decreases by 2% the chance of women applicants to be promoted at parity of scientific productivity. They propose two possible explanations: a *backlash effect*, i.e. men co-opt and become more severe towards women because they feel their role is threatened; a *licensing effect*, i.e. men do not feel responsible anymore of ensuring equal opportunities and unconsciously do not engage in a fair evaluation because of the presence of a woman in the committee.

Evidence suggests that women tend to be less productive (Abramo, D'Angelo, & Caprasecca, 2009a, 2009b). Nevertheless, the gap becomes smaller with career progression. Differences are also less pronounced when criteria like impact factor are considered. In some disciplines (such as physical and chemical sciences), women full professors tend to outperform men. However, women are less likely than men to maintain the status of top performers (Abramo et al., 2017). Overall, literature shows that gender plays a role in the promotion process: even if women tend to be less productive, the evidence provided by Bagues and colleagues (2017) shows that women might be discriminated independently of their productivity.

Looking at aggregated and stock data about the number of full professors in Italy, it is evident that there is a progression in the representation of women. Table 1 provides an overview of the evolution of the proportion of women professors, for each of the 14 disciplinary areas of the ASN: between 2012 and 2016, a slight increase occurred across all the disciplines. However, this increase is not necessarily a sign that the system is changing towards a fairer promotion procedure in terms of gender equality. Other contextual factors might influence that: for instance, the increase could represent only a small proportion of the women that deserved a promotion in comparison to men. In fact, when we look at how many achieved a promotion among the ones who got the ASN, it seems that women are left behind. Table 2 shows that in the ASN process there is a substantial gender balance (despite the literature above found instances of discrimination). However, when we look at promotions to full professor, much more men than women were promoted, across all disciplinary areas. We will focus on this point and try to understand if such a difference is justified by scientific

production, which is considered to represent the main promotion criterion (data available about other possible individual credits, such as managerial duties, are not available). We are considering also further confounding variables as next section illustrates.

Table 2 around here

Research question, variables and methods

This paper aims to understand if there is any gender discrimination in the path to obtain a full professor position in Italian universities by focusing on the promotion process once candidates have achieved the ASN. The time period to be considered when analysing the number of promotions to full professor goes from 2013, when the first outcomes of the first wave of the new ASN system have been released, to 2016 (4 years of observations). It is worth noting that some committees took more months to release the outcome, this meaning that scholars who participated in ASN in 2012 might have obtained it in 2014, and consequently obtained a promotion to full professor only later on.

Starting from the data presented in Tables 1 and 2, we are aware that, despite the general increase in the number of women full professors, a remarkable gender gap exists when looking more closely at the proportion of candidates getting a promotion after achieving the ASN. Drawing on the literature commented beforehand, we aim at understanding if a discrimination based on gender occurred in this process. The research question states as follows:

RQ: *Is there any significant gender difference in the selection of promotion to full professor that cannot be explained by scientific productivity?*

To proceed with this analysis, it is important not only to check by productivity indicators and by some other variables (summarised in Table 3), but, in addition, to approach data considering the structure of the academic system and its promotion procedure. For the latter purpose, a multilevel analysis is adopted, this to consider the institutional level where the promotions are decided. The justification of the choice of the institutional multilevel analysis is supported by the institutional autonomy introduced by the last reform, which makes the situation by institution not directly comparable and easy to be collected or observed.

Table 3 around here

Variables

Prom_or1316. This dummy variable is the dependent variable which refers to the ones who got the promotion ("1") and those who did not ("0") albeit having obtained the ASN. The total number of observations displayed in table 3 is 9714 instead of the lower number (8826) that can be derived from Table 2 (totals of "b", all the people who got the ASN for the rank of full professor). This happens because promoted staff since 2013 until 2016 includes all academics who became full professor along these four years, included those academics who became full professor pursuant the precedent system. These latter observations are automatically dropped as for them there is not any information about indicators of scientific productivity from ASN source. The lower limit of 2013 was chosen to be sure to include eventual early promotions after the first publications of results of ASN 2012 wave.

Indicators of scientific productivity. For both bibliometric (from area 1 to area 9 in Table 1) and non-bibliometric disciplines (from area 10 to area 14 in Table 1[1]), three indicators have been collected by candidates to ASN. These data are retained into the dataset as they represent some measure of scientific productivity at the moment of application. These three indicators are: "ind1", number of articles and number of books respectively for bibliometric and non-bibliometric disciplines; "ind2", number of citations and number of both articles and chapters in books; "ind3", H-index and number of articles in "A Class" Journals. In comparison to many other studies based on international repositories, this source has the advantage to include all the disciplines with some normalisation. These indicators are by the way imperfect, as they do not take into account the *fractioning* nested in the very concept of productivity (Abramo & D'Angelo, 2014). As table 3 shows, the total valid observations are less than 8000. These three indicators have been all normalised by the respective "thresholds" ("*mediane*" in Italian parlance) stipulated for the achievement of the ASN: according to each disciplinary field (SC), all the three indicators might have a specific value to be equalised or overcome. Although not being compulsory to be achieved for the sake of obtaining ASN, these thresholds serve as a referral by disciplinary field. For example, two persons with the same H-index might have a slightly different productivity if they belong to different communities with different averages of H-index by age. Consequently, normalising the three productivity indicators is essential to make epistemic communities comparable. Computing the difference between one's value and this threshold over the threshold itself, gives a normalised number whose range is -1 and ∞. The minimum refers to a null value for that indicator, or indicator being equal to 0; 0 means to stay perfectly on the threshold target. Any above value indicates the number of times the candidate is above the threshold for his/her SC. Considering the number of candidates to the full professor rank obtaining the ASN, and at the same time those who were already employees in the Italian academic system, we totalise almost 8000 observations (see Table 3). For ind3 a lower number of observations is explained by the lack of "A Class" journals indicators in Law SCs. These observations have been recovered computing the average score of the first two indicators by each observation. Overall, the missing values from the first two waves of ASN is below 5%.

Age refers to age at the time of application to ASN2012 or ASN2013 and is derived by the public profiles uploaded to the ASN website. Age is kept constant in order to have a reasonable proxy of the years of activity in accruing publications or citations. The average is 48, with a standard deviation of almost 7 (Table 3).

Gender has already been discussed in Table 2. In Table 3 and 4, "1" means men; "2" women.

Punti organico (PO). PO is a checking variable that is set at the institutional level. It refers to *punti organico*, which is an annually value released by the Minister for each Italian university on the basis of both size of institutions and institutional performance-based indicators. This value is basically a measure for budgeting the promotions or new personnel to be recruited. The number of PO indicates how much money can be spent for the recruitment of assistant professors and/or promotion/recruitment of associate professors and/or promotion/recruitment of full professors. The choice to spend these POs for any combination of these ranks is up to the institutions. In the Italian system the majority of progressions are promotions within the same university once a person becomes a permanent employee in a certain university. The value adopted is the sum by institutions of the PO published from the year 2013 until 2016 (both included), normalised by the average number of associate professors in years 2014 and 2016, when promotions occurred. This normalised value hence

[1] Some disciplines in "area 10" are bibliometric such as some in "area 8" are not bibliometric. This detail has no great relevance as some normalisation has been pursued.

is able to represent the probability to get promoted by institutions as it measures the theoretical fractions of available slots in the institution. This measure is unweighted by merit of individuals, as it is not linked to individual indicators of performance. There are no missing values for this variable.

VQR_2010. VQR is the normalised score by department in the research evaluation exercise "VQR 2004-2010" released by ANVUR Agency. For each observation, there is the associated score of the candidate's department, which informs about the quality of the department of affiliation at the time of application to ASN. According to literature, other factors being equal, people coming from a better department could be able to obtain the promotion on the basis of the prestige derived by the affiliation (Burris, 2004). This variable does not necessarily represent the score of the department at the current moment of possible promotion. In fact, along 2013 and 2016 many persons might have changed department affiliation because of the implementation of Gelmini Law (210/2010), which imposed merging and establishment of new departments (respecting the minimum size of 40 members by department). In fact, this variable represents the national score of quality of the "origin" affiliation of each person, assuming as scarce the probability of mobility for personnel who look after promotion to full professor. According to Table 3, this variable let pay a small price in terms of missing values. It is to be considered that other studies highlight some relevant limitations of this research exercise in pretending to accurately and scientifically measure the quality of a Department (Abramo, Cicero, & D'Angelo, 2013; Abramo & D'Angelo, 2015b; Abramo, D'Angelo, & Viel, 2010; Abramo & D'Angelo, 2016; Franceschini & Maisano, 2017). Part of these limitations might be caused by political constraints (i.e. option to include peer review instead of just secondary data). Nevertheless, we include this variable, and the following one, on the ground that it is possible to hypothesize that the better the outcome of a department within each university, the more the chances to acquire the limited resources of PO, winning the game of competition for (usually scarce) slots of promotions. In this way, it is possible to control if promotions can be predicted by this official, though imperfect, measure of quality of research at department level.

VQR_2014. This variable is the analogous to the previous one, but refers to the following research evaluation exercise which covered the period from 2011 to 2014 (both years included). This control variable is interesting as it describes the recipient department, or "destination" affiliation. Although the evaluation exercise is limited until 2014, basically they cover the newly established Departments and hence substantially it measures a possible relative strength of different disciplines within a same university. This variable is constructed on data released on 22nd of February 2017 and it causes around one thousand missing values. Missing values are more likely to happen for those Departments that are small in numbers and for which VQR caused the most forceful national public criticism.

Position. Position refers to the rank-and-file position of the person at the moment of application to ASN 2012 or 2013. In this case, the list of the ranks is sorted by its hierarchy. Considering the promotions to full professors, the main part of the set of people with the ASN who concretely could achieve the promotions are those under the different categories of "associate professors". "Confermato" and "non confermato" (respectively "confirmed" and "not confirmed") refer to a sort of senior and junior ranks respectively (formally this may be considered also a sort of probation), for which seniority is more important than productivity. This variable makes lose some observations, especially for those cases where the numbers of scholars with an ASN obtained in a lower rank are few.

Findings

Table 2 shows that the proportion of men being promoted to full professor is slightly higher in all the disciplinary areas. Among all the men who obtained the ASN, 19% was promoted to full professor, while 15% of the women was promoted. This means that in comparison, less women than men (among all the women and all the men who have the ASN) could become full professor. This is especially striking in areas such as earth sciences (17% of the men becoming full professor, against 7% of the women), chemistry (19% of men against 12% of women), and law (29% of men against 24% of women). In general, there is not a single discipline in which the proportion of women being promoted equals or outnumbers those of men.

Factors affecting promotion

As mentioned above, the gender gap in promotion to full professor might be due to other factors, such as scientific production or the number of available positions. Table 4 reports the results from a logistic regression. The missing values from the real number showed in table 2 are a derivation of what showed in table 3 plus the restrictions due to a certain number of small institutions. Among all the three indicators of scientific productivity, ind2 (the number of citations for bibliometric disciplines and number of both articles and chapters in books for non-bibliometric disciplines) does not play a role. The other two variables, ind1 (the number of articles for bibliometric disciplines, and books for non-bibliometric disciplines), and ind3 (H-index for bibliometric disciplines and number of articles in "A Class" Journals for non-bibliometric disciplines) are good predictors in individuating those who achieve the promotion. This is not surprising since, for bibliometric disciplines, number of articles and H-index are a more robust signs of productivity than the number of citations, while, for non-bibliometric disciplines, the number of articles in "top journals" is especially important. PO, the value referring to the amount of resources annually available to each institution to recruit or promote academic staff, has not any impact. Age has an impact (at the disadvantage of older candidates). Gender shows to have the strongest coefficient, which clearly demonstrate that at parity of scientific productivity, men are more likely to get the promotion to full professors if compared to women in similar conditions of academic productivity. Considering the model presented in Table 4[2], it can be stated that gender, along with two out of three indicators of productivity, are able to predict the promotion to full professor. In addition, the ordinal variable of "position" indicates that seniority based on rank-and-file plays an important role in the decision to bestow a promotion to the highest rank. Both the quality of "origin" and "destination" department are not associated with the promotion. In particular, the coefficients explain that gender only is the strongest predictor. In other words, keeping productivity constant and controlling by the theoretical available slots for promotions (PO), women have around 24% less probability to get promoted. This analysis checks also by the level of institution, where different sort of procedures can occur (e.g. with or without a public call or competition) or passing through institutional bodies whose gender composition is hard to be retrieved. Other relevant factors such as same affiliation between committee members and candidate or also kinships cannot be observed, although literature about the Italian academic system shows to be relevant to understand how competitions do not respect the meritocracy principle (Abramo & D'Angelo, 2015).

Table 4 around here

[2] At the current stage, we omit variable VQR_14 as it would lose around 1000 observations. Running the same analysis with this variable does not change the main findings.

The findings echo Danell and Hjerm's (2013) contribution about the presence of a gender gap in academic promotions in Sweden, and they are especially remarkable since we controlled for scientific productivity. Moreover, despite the different epistemological positioning, the presence of an unjustified gender discrimination in the promotion to full professor provides further grounding to the studies by van den Brink and colleagues (2014; 2010). Finally, the quality of the candidate's department of origin (VQR_2010) does not have an impact on the promotion process to full professor, although existing literature shows the opposite (Burris, 2004). This latter point can be probably explained by differences between the US and the Italian contexts.

Discussion

This paper provides a notable contribution when considered together with previous studies looking at the achievement of ASN (M. Bagues et al., 2017; Marini, 2016; Marzolla, 2016): it is paramount to shed light on what happens in the career trajectories of those scholars achieving the ASN, since successfully going through the ASN does not mean to get a position. Findings on the contrary show that a gender gap exists in accessing a position as full professor in Italy, and this cannot be explained by scientific productivity; this is remarkable since our analysis considers the entire population and all disciplines.

Two points are especially worth of attention. First, the discrimination based on gender is *transversal*, since discrimination can be found across different disciplinary areas and universities. This means that discrimination happens independently of disciplinary or institutional contexts. Second, the phenomenon is *persistent*. Where more transparency is present (the ASN), discriminations exist (according to previous literature), but are more marginal. However, the presence of a transparent process does not erase discriminations completely. It seems that discriminations are always laying on the background of a process, and emerge at other points of the process itself, or through different practices. These two points may help to understand that fact that ASN was substantially equal because at that stage concrete resources were not yet at stake whereas when to ensure real resources is at stake (promotions), discrimination resurfaces quite predominantly.

Regarding the *transversal* nature of the phenomenon, there are three factors that might have an influence in an environment where women full professors still represent a minority: networking, homophily, and, more generally, unconscious gender bias. The exclusion of women from important networks, as analysed by van den Brink and Beschop (2014), might apply in this case as well. Scholars at full professor level, mostly men, might be in charge for years at the same institution, this meaning that networks among professors might be quite strong. Especially in an academic system like the Italian one, that has been classified as oligarchic (Clark, 1998) or dominated by the academic oligarchy (Clark 1983), networks are paramount to become a full professor, and it is very likely that these networks are based on homophily. To this regard, it is also interesting to consider our findings about the impact of the quality of one's own department (VQR). This does not play a role in the promotion process: the "official quality" of the department and its associated prestige are not usually among the main criteria when the consumption of resources ("PO") is at stake at institutional level. Following the literature stating that VQR is not accurate enough, we cannot state whether academics would like to allocate promotions on the base of some reliable research evaluation results but they cannot, or if at institutional levels other factors may play a major role. Further investigation about the role of networks as a source of bargaining power would be helpful.

Homophily is another issue deserving further attention, since it might play a role in the final decision-making process. We might hypothesise that, being promotion committees (or

however the set of peers at full professor rank who might be entitled to take decisions about promotions) more likely to be composed of men, they might privilege other men only because the committee's members (or the decision takers in question) better identify themselves with men. This important question would require further investigation. Homophily might become especially strong when associated to a broader gender bias: gender bias might operate even in presence of facts and data explicitly dismantling this belief (Van den Brink et al., 2010). This might also be the case in our study: achievements of the candidates in terms of scientific productivity are publicly available in the case of the ASN, but still women might be reputed to miss some milestones in their CVs.

In relation to the *persistency* of the phenomenon, the fact that actual promotions are left to the individual universities is limiting the potential beneficial effects that a transparent process, such as the ASN, might have in terms of ensuring more equality and meritocracy. Literature stresses that transparency in recruitment and promotion procedures is a key for avoiding biases and ensuring equality (Ledwith & Manfredi, 2000; Roos & Gatta, 2009; van den Brink & Benschop, 2012b; Van den Brink et al., 2010). The introduction of ASN as a transparent process helped; however, this process represents only the initial step in the path towards promotion, and it still leaves an opaque system in place at institutional level. Furthermore, it seems that the introduction of a transparent process has not any knock-on effect in raising awareness or making promotion decisions more engaged towards merit or equality, at least not going beyond the very specific evaluation in question. In this case, evidence tells there is less gender discrimination at ASN level, and substantially more gender discrimination at the promotion level.

Additionally, our study is interesting in front of the debate on the gender pay gap in academia (Umbach, 2007): being women relegated to the lowest positions inside academia, they will not be able to access the highest salary scales, as the Italian system does not include pay increase according to productivity. This shows how different types of disadvantages affect women's careers, and make discriminations more difficult to tackle. Actually, inequalities might become more persistent when more disadvantages cumulate. This issue relates to the broader topic of how committed an entire higher education system is in promoting diversity.

The fact that gender discriminations are transversal and persistent is at the base of our contribution. These two points underline that gender inequality is strongly rooted in the higher education sector – this echoing an older contribution from Bagilhole and Goode (2001) about the existence of a patriarchal system in academic careers. The second is upon the more general argument that organisations are structured around inequality regimes at the disadvantage of specific gender, class, and ethnicity groups (J. Acker, 2006). We especially stress the persistency, meaning that discriminations in a system tend to survive, taking new forms, inhabiting new practices, or getting even more rooted in old practices.

Our findings have implications for policy as well. When going through the more recent data provided by *She Figures* 2015 (EC, 2016), Italy is below the European average concerning the adoption of gender equality plans, and specifically in relation to the measures for supporting career development and ensuring appropriate representation of women in recruitment committees. The introduction of gender equality plans has been advocated at the European level as a strategy aiming at a structural change of science, this being necessary to make research institutions more oriented toward gender equality (EC, 2012). Although the data reported in *She Figures* show that gender equality plans might not be enough, because a change at both institutional and individual level is necessary, equality plans represent an important step to raise awareness and call for more transparency. This case about Italy shows clearly that whenever transparency is missing, specific equality policies are sparse, and the general culture is not sensitive to gender equality, the overall situation in terms of gender

discriminations is worrying. In addition, the general scarcity of resources is not helping the path towards equality. The overall policy message hence informs that an imperfect and slow process, such as the ASN, achieves nevertheless equality targets more effectively in comparison to contexts where these policies are not put in place and transparency is missing.

Conclusion

This study shows that between 2013 and 2016, when a new institutional system of promotions entered in place in all its phases, women concurring to the rank of full professors suffered discrimination not explained by poorer scientific productivity. We could only try to infer the reasons of this discrimination – this is terrain for future research – but it is remarkable how it emerges across discipline and institutions and how different it is from transparent awarding fit-for-the-role step.

As the title of this paper shows, we are confronted to a situation that resembles that of trench warfare in the First World War: gaining a few steps of terrain (a small increase in the number of women in full professor rank) does not change the overall pattern and does not imply a victory (discriminations are still there). Our metaphor also refers to the evidence that small "aggregated gain" (the increments in the percentage of women in the higher rank showed in table 2) comes at a high cost in terms of "lives" (the women who did not get the promotion although having the same requisites in productivity of many men who got it). Nevertheless, some caveat are to be mentioned. First, the measures of productivity might be improved, connecting candidates to their Web of Science (or Scopus) indicators, especially for bibliometric disciplines. Second, being the mechanisms of promotions at institutional level some sort of black boxes, we maintain that future research could aim at understanding which actual patterns may cause the discrimination found in this research. It is possible that seniority in the school or department, but also affiliation in streams of research played a major role, being all these factors that are not necessarily linked to gender in one way or another. Kinship also ought to be checked. These analyses cannot enter this study because the names of the committees' members at institutional level are not known.

This finding calls not only for more research to further understand on which base this discrimination is built and how it happens, but, also, it calls for dedicated adoptions of gender equality policies, or at least more transparency, to bridge a gap that is not going to solve by itself.

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Tables

Table 1: Proportion of women at the full professor level, evolution 2012 - 2016

		2012		2016		
Disciplinary areas		**tot full professors**	**% Women**	**tot full professors**	**% Women**	**Marginal increase of women in full professor rank**
A1	Mathematics and Informatics	833	18.0	799	19.1	6.3
A2	Physics	471	9.8	475	11.2	14.2
A3	Chemistry	563	19.2	534	22.8	19.1
A4	Earth Sciences	202	16.8	192	17.7	5.2
A5	Biology	1,037	29.7	931	32.2	8.5
A6	Medicine	1,831	12.8	1,811	14.6	14.0
A7	Agricultural and Veterinary Sciences	691	16.4	675	17.5	6.9
A8	Civil Engineering and Architecture	800	15.1	724	18.2	20.5
A9	Industrial Engineering and Information Systems	1,358	6.6	1,406	8.7	33.5
A10	Classical Studies, Philology, Arts and Literature	1,204	41.3	1,041	42.1	1.9
A11	History, Philosophy and Psychology	1,148	30.6	1,063	34.8	13.8
A12	Law	1,388	20.6	1,429	23.0	11.4
A13	Economics and Statistics	1,351	19.8	1,383	22.1	11.5
A14	Political and Social Sciences	365	24.1	336	26.2	8.6
Total		13,242	20.3	12,799	22.1	8.6

Source: MIUR Ministry and ASN repository

Table 2: ASN and promotion by gender and disciplinary area, absolute numbers and percentages (italic)

		ASN						Promotions			
		M			F			M		F	
Disciplinary areas		**a**	**b**	**c**	**a**	**b**	**c**	**d**	**e**	**d**	**e**
A1	Mathematics and Informatics	725	309	*42.6*	261	111	*42.5*	63	*20.4*	18	*16.2*
A2	Physics	1,063	635	*59.7*	255	154	*60.4*	68	*10.7*	11	*7.1*
A3	Chemistry	430	253	*58.8*	249	163	*65.5*	49	*19.4*	19	*11.7*
A4	Earth Sciences	327	141	*43.1*	98	30	*30.6*	24	*17.0*	2	*6.7*
A5	Biology	821	449	*54.7*	591	270	*45.7*	72	*16.0*	33	*12.2*
A6	Medicine	2,427	1,185	*48.8*	735	318	*43.3*	219	*18.5*	48	*15.1*
A7	Agricultural and Veterinary Sciences	513	324	*63.2*	237	138	*58.2*	58	*17.9*	22	*15.9*
A8	Civil Engineering and Architecture	801	323	*40.3*	310	116	*37.4*	75	*23.2*	22	*19.0*
A9	Industrial Engineering and Information Systems	1,338	690	*51.6*	282	138	*48.9*	153	*22.2*	27	*19.6*
A10	Classical Studies, Philology, Arts and Literature	961	484	*50.4*	1,010	525	*52.0*	78	*16.1*	63	*12.0*
A11	History, Philosophy and Psychology	920	355	*38.6*	571	261	*45.7*	66	*18.6*	48	*18.4*
A12	Law	688	299	*43.5*	326	165	*50.6*	86	*28.8*	39	*23.6*
A13	Economics and Statistics	911	532	*58.4*	457	247	*54.0*	114	*21.4*	47	*19.0*
A14	Political and Social Sciences	331	138	*41.7*	164	73	*44.5*	36	*26.1*	16	*21.9*
Total		12,256	6,117	*49.9*	5,546	2,709	*48.9*	1,161	*19.0*	415	*15.3*

Legend:
a) Number of applicants
b) Number of winners
c) Percentage of success (b/a [%])
d) Number of promoted
e) Percentage of promoted (d/b [%])

Source: MIUR Ministry and ASN repository

Table 3: Summary of variables to predict promotion to full professor

VARIABLE	OBS.	MEAN	STD. DEV.	MIN	MAX
PROM_OR1316	9,714	.2536545	.4351246	0	1
IND1	7,678	.9058766	1.670424	-1	53.76577
IND2	7,935	1.819094	5.917959	-1	178.8
IND3	7,584	.8518571	2.171892	-1	43.44
AGE	8,778	48.45033	6.979624	28	70
SEX	9,714	1.3042	.4600915	1	2
VQR_R (2010)	7,656	1.084919	.3499847	-.44	2.83
VQR_R (2014)	6,415	1.083772	.2621625	0	2.97
PO	9,714	.1300439	.2742291	0	7.986667
POSITION:					
0 NOT EMPLOYEES (1)	*1,590*				
1 FIXED TERM R10	18				
2 FIXED TERM R05	24				
3 RESEARCHER NOT CONF	88				
4 RESEARCHER	1,112				
5 ASSOCIATE NOT CONF	856				
6 ASSOCIATE CONF	4,771				
7 ASSOCIATE	172				
TOTAL ("0" NOT INCLUDED)	7,041				

(1) These scholars do not enter the analysis

Source: MIUR Ministry, ASN and ANVUR repositories

Table 4: Multilevel logistic regression at institutional level to predict promotion to full professor

```
Mixed-effects GLM                               Number of obs     =      5,903
Family:                  ordinal
Link:                      logit
Group variable:           ateneo                Number of groups  =         82

                                                Obs per group:
                                                              min =          1
                                                              avg =       72.0
                                                              max =        390

Integration method: mvaghermite                 Integration pts.  =          7

                                                Wald chi2(13)     =     308.63
Log likelihood = -2746.2767                     Prob > chi2       =     0.0000
------------------------------------------------------------------------------
          prom_or1316 |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
----------------------+-------------------------------------------------------
               ind1_I |   .0922759   .0226209     4.08   0.000     .0479398     .136612
               ind2_I |  -.0030649   .0070215    -0.44   0.662    -.0168267    .0106969
               ind3_I |   .0509832   .0176204     2.89   0.004     .0164479    .0855185
                   PO |   .0728028   .1823269     0.40   0.690    -.2845514     .430157
                  sex |  -.3489822   .0801067    -4.36   0.000    -.5059884    -.191976
                  age |  -.0450636   .0061254    -7.36   0.000    -.0570692   -.0330581
                      |
             position |
      fixed term r10  |  -18.71327   3271.707    -0.01   0.995     -6431.14    6393.714
      fixed term r05  |  -19.26216   7038.527    -0.00   0.998    -13814.52       13776
 researcher not conf  |  -2.595677   .5355862    -4.85   0.000    -3.645407   -1.545948
          researcher  |  -2.490001   .1684825   -14.78   0.000    -2.820221   -2.159781
  associate not conf  |  -.5661263   .1157997    -4.89   0.000    -.7930897    -.339163
           associate  |   -.745418    .259752    -2.87   0.004    -1.254523   -.2363134
                      |
                vqr_r |  -.0251122   .1205649    -0.21   0.835    -.2614152    .2111907
----------------------+-------------------------------------------------------
                /cut1 |  -1.478513   .3686905    -4.01   0.000    -2.201133   -.7558925
----------------------+-------------------------------------------------------
ateneo                |
            var(_cons)|   .8635369   .2192591                      .5249934    1.420391
----------------------+-------------------------------------------------------
ateneo>bib_Ateneo     |
            var(_cons)|    .089024   .0565129                      .0256543    .3089259
------------------------------------------------------------------------------
LR test vs. ologit model: chi2(2) = 313.36                Prob > chi2 = 0.0000
```

Source: MIUR Ministry, ASN and ANVUR repositories