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Gender effects in research evaluation

Tullio Jappelli[a,*], Carmela Anna Nappi[b], Roberto Torrini[c]

[a] University of Naples Federico II, Italy
[b] Anvur, Italy
[c] Bank of Italy, Italy

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ABSTRACT

The paper contributes to the literature on gender gap in research investigating whether there is a gender gap in research evaluation. We use detailed data on 180,000 research papers evaluated during the Italian national research assessment (VQR 2004–2010) conducted by the Agency for the Evaluation of Universities and Research Institutes (Anvur). The data are merged with information on individual researchers and characteristics of referees. The most important empirical finding is that there is a significant gender gap in research evaluation. The gap is reduced once we control for researchers' characteristics, such as age and academic rank, but is almost unaffected by the characteristics of the research output (monographs, journal articles, book chapters, etc.), co-authorships, international collaborations. Childbearing and maternity leaves do not account for the remaining gap in research evaluation. The evaluation method (peer review or bibliometric analysis) and the referee mix (whether men or women) do not disadvantage women. Analysis of a random sample of papers evaluated using bibliometric indicators and peer review reveals that bibliometric evaluation proves to be more favourable to women than peer review evaluation.
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1. Introduction

Gender gaps in the labour market are a key policy issue in European countries. Despite EU adoption in 2000 of workplace legislation which prohibits discrimination on the basis of racial or ethnic origin, religion or belief, disability, age, or sexual orientation, labour economists observe persistent gaps in labour market participation and wages. Academic and research profession is no exception. Academic rankings show a persistent gender gap, particularly large in scientific fields, with a consistent pattern across different countries (European Commission, She Figures 2015 and OECD, Education at a Glance 2015). Although the gap might be narrowing over time (Ceci et al., 2014), glass ceiling is a clear concern for the research profession.

A large literature has investigated gender differences in research and academic career, studying factors affecting the career opportunity of women with respect to men: research productivity; discrimination in peer reviewing of papers, citation patterns, grant allocations and hiring practices; genetic characteristics that could affect the success opportunities in some scientific fields; preferences and family responsibility affecting time allocation and career choice and productivity. Ceci et al. (2014) provide a comprehensive survey of the many dimensions of the gap, from early-child differences to careers in academic science.

Studies of the gender gap have recently raised concerns about the gender neutrality of research evaluation promoted by public authorities and often used for public funding allocation to universities (Brooks et al., 2014). Large-scale research assessment is in place in many countries. The best known experience is the British Research Assessment Exercise (RAE), now revised and renamed Research Excellence Framework (REF), but research assessments with similar characteristics are now conducted in New Zealand, Australia, Hong Kong and Italy (Ancaiani et al., 2015), whereas in other countries universities funding is partly based on research performance indicators, for instance in Norway (Schneider, 2009), Denmark (Wright, 2014), and Czech Republic (Good et al., 2015).[1] Clearly, if the methodologies adopted in these research assessments are not gender neutral, they could provide negative feedback to academic institutions, with the unintended consequence of reinforcing the existing gender gap. Therefore, it is of paramount importance to verify whether this is actually the case, by analyzing results and methods used in these exercises.

* Corresponding author.
E-mail address: tullio.jappelli@unina.it (T. Jappelli).

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[1] See http://www.arc.gov.au/era-reports for Australia, http://www.ugc.edu.hk/eng/ugc/rae/rae2014 for Hong Kong, and http://www.tec.govt.nz/Funding/Fund-finder/Performance-Based-Research-Fund-PBRF-/#Quality for New Zealand.

Moreover, research assessment provides an evaluation of the quality of a large sample of the research output of researchers of countries where they are conducted. Therefore, these exercises offer new data opportunities for studies on gender gap in research evaluation, especially if research output can be matched with researchers' characteristics and information on the evaluation process. In particular, evaluation exercises allow to investigate an important dimension of academic research, namely the judgment of peers on research quality, which is arguably one of the most important (and controversial) factor in determining career prospects.

In the British case, micro data are not available. Indeed, studies on RAE rely on department level information, matching aggregate RAE evaluations with department characteristics (Brooks et al., 2014; Taylor, 2011). In contrast, the Italian Agency for the Evaluation of Universities and Research (Anvur, the State Agency in charge of organizing the exercise) has direct access to micro level information on all researchers involved in the evaluation, research output as well as referees engaged in the peer review process. Moreover, the Italian evaluation of research (named VQR) provides an experimental environment to compare peer review and bibliometric evaluation, a key issue considering existing concerns about possible sources of discrimination against women in the evaluation process.[2]

Our analysis is based on this unique data set, and investigates the existence and magnitude of a gender gap in the quality of the research output, analyzing the evaluation results of all journal articles, monographs, book chapters and other research output ("research papers" for brevity) submitted to the evaluation. The dataset includes the best three research papers written between 2004 and 2010 by all Italian university professors and by all researchers employed by Italian public research institutes.

In the paper, we address four research questions. Our first hypothesis, given previous evidence on other dimensions of the gender gap, is that there is a gap also in research evaluation of published research. After measuring the gender gap, we discuss possible explanations for the measured gap, exploiting the rich amount of information available in the data set, and matching information on researchers and papers characteristics. The hypothesis is that the gap is lower or even disappears once we control for the professional rank of researchers. The reason is that the academic career and the quality of research output should be correlated, because scholars whose research is more appreciated by their peers should also be more likely to be associate or full professor, regardless of gender. The gap should also depend on number of co-authors and international collaborations because previous literature has shown that women have a disadvantage at networking as compared to men. One should also expect that the gap depends at least in part on gender differences in time and effort devoted to childcare. Moreover, we investigate if the evaluation method (bibliometric versus peer review) affects gender differences in measured research quality, and if the referees' gender affects the evaluation of women's research.

The Italian VQR is particularly suitable for this analysis in that it is a compulsory evaluation involving *all* staff with a permanent or temporary position in the universities and research institutes. Therefore, the analysis is not affected by self-selection or selection of researchers by the institutions involved in the assessment program. Moreover, the analysis applies to a large country with an homogeneous research environment: in Italy there is no distinction between research and teaching universities, and the hiring of academic staff is regulated at the national level, so that the average quality of the academic and research institutes is more homogeneous than in other countries (Abramo et al., 2012; Montanaro and Torrini, 2014). These features limit the scope for research staff selection and segregation according to the attitude towards research or teaching activities.[3]

The paper is organized as follows. Section 2 details the research questions and our contribution to literature. Section 3 describes the VQR exercise and the data used in the empirical analysis. Section 4 presents the main results, and reports evidence for the existence of a gender quality gap; it also investigate if the gap is related to observed characteristics of researchers, characteristics of research papers (i.e. journal article vs. books, book chapters, etc.), and other characteristics that could reveal a women disadvantage (i.e. the number of authors as a proxy for networking capacity). Section 5 further analyzes if the gap is affected by childcare and Section 6 if referee's gender affects the peer review process. Section 7 uses a random sample of papers evaluated by bibliometric analysis and peer review to detect the presence of gender bias in the evaluation method. Section 8 concludes.

2. Research questions

Glass ceiling is a major concern for academic career and a large body of research analyses the mechanisms that can explain the low presence of women in academic rankings, especially in the scientific fields. There is no general consensus on the relevance of the different factors at play. In particular, it is not clear if the gap can be explained by lack of a level playing field (for instance in terms of manuscript reviewing or grant funding) or by other factors that can affect women career choices or productivity.[4]

Many contributions have documented a gender productivity gap in research both in terms of number of published papers and citations.[5] Most of these studies, however, are restricted to specific scientific fields (Mauleón and Bordons, 2006) or research areas where research output is mainly in the form of papers published in English in indexed journals, where citation data are available (Abramo et al., 2009). Much less research covers areas such as humanities, law studies and social sciences where monographs and book chapters play an important role and where national language still prevails (Larivière et al., 2004; Larivière et al., 2006). Furthermore, research available in these fields tends to focus on journal articles, disregarding other research outputs (for instance West et al., 2013; Maliniak et al., 2013).

[2] HEFCE (2011), in a pilot exercise in preparation of the REF 2014 exercise, warns against the risk that the exclusive use of metrics to evaluate research could disadvantage women. The warning is based on a study that shows that papers authored by women are less cited. The pilot study does not investigate if fewer citations reflect the intrinsic quality of the papers and does not imply that women would attain higher evaluations with peer review. In contrast, Taylor (2011), based on results of the British RAE, expresses concerns about the exclusive use of peer review in that it could bias the evaluation in favor of some departments, when compared with bibliometric evaluations.

[3] In more heterogeneous university environments, women could be overrepresented in institutions with lower research intensity and research opportunities (Xie and Shauman, 1998).

[4] A recent comprehensive study on women in academic science (Ceci et al., 2014) concludes that gender discrimination is not a plausible explanation for the observed evidence and recent trends, and that more attention should be devoted to those factors affecting women choices before and after graduation. Larivière et al. (2013) express concern about the lack of a level playing field, calling for specific action aimed at improving the relative strength of women in research.

[5] See for instance, Larivière et al. (2013), Larivière et al. (2011) and West et al. (2013). Although the gap in terms of total citations is generally confirmed by a number of studies, the evidence on citations per work does not generally confirm the existence of a generalized gap (Ceci et al., 2014). Beaudry and Larivière (2016) argue that the citation rate may depend on productivity, so that in the fields where productivity is almost the same women show citation rates which are similar to those of men; however they would suffer from a negative gap in the fields where they are less productive.

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