

## **Unveiling the Evolution of Gender Gap of PhD holders: A Regional Perspective in Italy**

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### **Abstract**

The topic of gender gap increasingly attracts the attention of both scholars and policy makers, but it has been scantily addressed in the regional studies literature. This paper aims at filling this gap, by addressing a specific category of high-skilled individual, i.e. Ph.D. holders. Specifically, this paper aims at exploring how gender inequalities among PhD holders have evolved in the recent past and across Italian regions, considering not only the wage gap but also the general working conditions, taking account in particular of the job satisfaction and the degree of education-job (mis)match. To achieve this research objective, two waves of a Retrospective Survey on the Professional Placement of Ph.Ds. (4 and 6 years respectively after graduation), conducted by the Italian National Statistical Institute of Italy (ISTAT) are used. From a methodological point of view, the (Double-Robust) Inverse Probability Weighted Regression Adjustment (IPW-RA) estimator is applied. Our preliminary results highlight that: i) the gender wage gap is confirmed and appears to be widening over time; ii) the wage gap is observed in all Italian macro-regions, but, while it tends to narrow in the north of Italy, it has increased in the center and south of the country and iii) besides wage differences, our analysis documents a growing gap in the education-job mismatch, in terms of over-education and over-skilling.

**Keywords:** Ph.D. holders; gender gap; Italy

**JEL Classification:** C23, J16, R12,

### **Extended Abstract**

This paper aims at exploring how gender inequalities among PhD holders have evolved in the recent past and across Italian regions, considering not only the wage gap but also the general working conditions, taking account in particular of the job satisfaction and the degree of education-job (mis)match.

This topic is relevant for two sets of reason.

First, although PhD holders have been scantily addressed by the extant literature, the topic is highly relevant for various reasons. From a policy perspective, this is a hot topic particularly due to the evidences that, for some cohorts, it is increasingly hard to find an academic job, which leads to an imbalance between demand and supply (Mewburn et al, 2020; Ermini et al., 2017; Ballarino and Colombo, 2010) and, at the same time, because recently academia is not the unique reference labor market for Ph.D. holders, who started to work also in the private sector (Ermini et al., 2017). Moreover, doctoral students, with their highest level of education, are expected to produce more general and transferable skills in the place where they work and live favoring, as often happens in case of selective migration (Fratesi and Percoco, 2014), the socio-economic development of the destination places (Di Cintio and Grassi, 2017; Ermini et al, 2017).

Second, although the topic of gender gap is relevant in policy discourses as demonstrated by, for example, the EU Gender Equality Strategy 2020-2025, it has been mainly neglected in regional studies. According to the human capital theory, gender (wage) gap occurs because of gender differences in qualifications, which in turn are due to other factors, such as differences in investment in education; women's preference for less career-oriented fields of study; impact of family duties (Alfano et al., 2021). One possible way to reduce the effect of such an unobserved variable is to focus on homogeneous groups, such as PhD holders; they are, in fact, homogeneous, at least in terms of investment in education (Alfano et al., 2021).

Moreover, when studying Ph.D. graduates, Italy is a peculiar case for different reasons, like the recent increase in the number of Ph.D. programs (Aronica et al., 2023), the growing difficulties to enter the academia job market, particularly for women (Carriero et al., 2023; Carriero and Naldini, 2022; Checchi and Cicero, 2022), relevant Gender Wage Gap (GWG) among Italian graduates (Alfano et al., 2021) and the education-job mismatch and job dissatisfaction among Italian Ph.D. holders (Parenti et al., 2020; Ermini et al., 2017).

In order to achieve the stated research objective, we use two waves of a Retrospective Survey on the Professional Placement of Ph.Ds. (4 and 6 years respectively after graduation), conducted by the Italian National Statistical Institute of Italy (ISTAT). The first survey is conducted in 2014 among Ph.Ds. who graduated in 2008 or 2010 (providing 16.322 observations), while the second was carried out in 2018 among Ph.Ds. who graduated in 2012 or 2014 (16.057 observations). From a methodological point of view, and to deal with the endogeneity issue, we propose the (Double-Robust) Inverse Probability Weighted Regression Adjustment (IPW-RA) estimator (see, among the others, Narita et al., 2023, for a discussion of this technique). IPW-RA is an approach to estimate unbiased treatment effects when there is confounding and it is often used with observational data – we observe some treatment but no randomization of assignment to treatment.

Our preliminary results highlight that: *i*) the gender wage gap is confirmed and appears to be widening over time; *ii*) the wage gap is observed in all Italian macro-regions, but, while it tends to narrow in the north of Italy, it has increased in the center and south of the country; and *iii*) besides wage differences, our analysis documents a growing gap in the education-job mismatch, in terms of over-education and over-skilling.

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