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Abstract

Whereas the evolution of the gender pay gap has received much attention from academic researchers and public opinion alike, our understanding of the differences in non-monetary working conditions is substantially scarcer. Exploiting the European Working Conditions Survey and using six composite indicators of job quality, this research aims to enlarge our knowledge on the gap in job attributes by gender across the European Union over the period 2005–2015 in three ways. Firstly, we explore the gender differences in working conditions, showing the distinct patterns identified by dimension of job quality and differences across countries. In the second place, we find that, on average, women's relative position in terms of physical environment and working time quality deteriorate, a result, again, hiding considerable heterogeneity across the countries of the sample. Lastly, we find clear evidence of β-convergence in job quality in working conditions across the European Unions in all the domains.

JEL classification: J16, J24, J71, J81.

Keywords: gender gap, working conditions, job quality, Europe.

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1. Introduction

The study of wage differences between sexes, or gender wage gaps, means definitely a major area of research in Labour Economics (Blau & Kahn, 2017; European Commission, 2018; Weichselbaumer & Winter-Ebmer, 2005). Not only inequality between males a females has become a core concern for the public opinion but also the European citizens believe that the political authorities should consider it as one its principal priorities (European Commission, 2015).

Paradoxically, the analysis of gender differences in other dimensions of working conditions is less abundant, specially from an aggregate perspective covering all sides of working conditions. The neglection of the gender perspective regarding other dimensions of working conditions is inexcusable at least for two different, but complementing reasons.

In the first place, different surveys, such as the International Social Survey Programme, point to the importance of many attributes, besides wages, such as job security, the intrinsic interest of work, opportunities of advancement or working time flexibility, in the definition of what makes a good job (Muñoz de Bustillo et al., 2011b; Nikolova & Cnossen, 2020). In fact, some of them, such as job security, or being able to work independently, are considered by workers in many countries as important or even more relevant than wages. The recent work of Maestas et al. (2018) also shows how workers effectively value non-monetary working conditions and are willing to trade labour income for improvements in other dimensions. Therefore, in order to gauge the position of men and women in the labour market it makes sense to extent the perspective of gender gap to other areas of working conditions.

Secondly, the analysis of the existence of gender gaps in working conditions is interesting because, as argued by the theory of compensating differentials (Kahn, 2008), a lower job quality in one specific dimension of working conditions, such as wage, could be partly or fully compensated by better working conditions in another or other dimensions.[1] Therefore, in order to have a full picture of the relative position of men and women in the labour market, it becomes essential to look at the situation of both genders in all relevant domains of job quality, and not only in one of them, say wages. For instance, there exists the possibility that the negative gaps in one dimension come along positive differentials in others. Alternatively, a situation where gender gaps in different areas of working conditions add to each other widens the gap in the terms of the quality of jobs held by males and females. The absence of perfect competition in European labour markets makes that the theory of compensating differentials not hold in practice (Bonhomme & Jolivet, 2009), which implies that actual job matches do not necessarily and fully reflect workers' preferences and productivity. This makes the study of differences in terms of working conditions even more relevant.

This paper adopts a wider approach to the gender gap by focusing on the relative position of men and women in six dimensions of job quality (physical environment, work intensity, working time quality, social environment, skills and discretion and prospects) across the European Union (EU) over the period 2005–2015. These six dimensions offer a full account of what we could call non-monetary working conditions attributes. The paper aims at improving our knowledge of gender gaps in working conditions in the EU in three ways. Firstly, we map

[1] For the specific application of the theory of compensating differentials to the analysis of the gender wage gap, see, for instance, Filer (1985), Hersch (2011), Palme and Wright (1992) and Redmond and Mcguinness (2019).

the existing gender differentials in the above-mentioned dimensions of working condition for the EU28 (including the United Kingdom). In the second place, we explore whether there has been any relevant changes in the estimated working condition gender gaps in the period 2005-2015. Lastly, we investigate if there has been a process of convergence in gender gaps in these domains in the EU during the mentioned period in the above-mentioned domains. Specifically, we explore whether the change in the gender gap is negatively correlated with its initial level (e.g., countries with a larger gap would tend to experience reductions or smaller increases in the gap than those with lower ones), that is, the existence of what Economic Growth Theory refers as β-convergence.

As mentioned above, the analysis of the gender gap in wages has captured most of the effort devoted to the study of the differences in working conditions from a gender perspective, as well as public attention.[2] In contrast, we find relatively few contributions to the analysis of gender differences in working conditions from a wider perspective, including all or most relevant dimensions of job quality. Among them are worth noticing the different reports produced by the European Foundation on Living and Working Conditions (Eurofound) (see, e.g., Eurofound, 2007, 2012, 2019, 2020), where the information on the job features other than earnings produced by the different waves of the European Working Condition Survey (EWCS) is analysed from a gender perspective.

Beside these reports, different authors have focused on some specific dimensions of working conditions from a gender perspective, although very rarely covering the

[2]For example, the *European Commission 2019 Report on Equality between women and men in the EU* (European Commission, 2019), while broadening the key areas for monitoring gender equality beside the gender pay gap, only focuses its attention on increasing female labour market participation and promoting equality in decision making.

full spectrum of working conditions. For example, Boll and Bublitz (2018), using data from the European Union Labour Force Survey for Germany, Italy and the Netherlands, study the incidence of work-related training from a gender perspective in relation to the earning position of the individual in the household, finding lower training hours for female employees working part-time in Germany (but not in Italy or the Netherlands). The gender gap in firm-provided and on-the-job training also represent the focus of the works of Burgard and Görlitz (2014), Grönlund (2012) and Knoke and Ishio (1998) and O'Halloran (2008), among others. The dimension of working time quality has been explored recently from the gender perspective in a special issue of *Social Indicators Research* (Chung & Van der Lippe, 2018) that focuses in the need to dig in the "small letter" of flexible time arrangements and take into consideration the role of context to grasp the gender implications of different schedules.

Gender differences in non-standard employment, including temporary employment (related to our dimension of prospects) have been addressed by numerous researchers (e.g., Addabbo & Favaro, 2011; International Labour Office, 2017; Petrongolo, 2004). Autonomy at work, another of the important elements of working condition, has been explored, from a gender perspective by Adler (1993), concluding that the gender gap in this domain obeys more to the authority position at work than to the gender composition of occupations.

Another area of concern has been gender inequalities in occupational health (Campos-Serna et al., 2013; European Agency for Safety and Health at Work, 2003). The meta-analysis of Campos-Serna et al. (2013, p. 7) concludes that "women have greater feelings of high job insecurity, worse contractual working conditions and psychosocial work environment", while men, in contrast, are more

"exposed to long working hours, high physical demanding work, noise, effort-reward imbalance". The report of the European Agency for Safety and Health at Work (2003) focuses on the differences in risks and health outcomes of men and women at work, with greater incidence of stress and upper limb disorder in the case of women, and noise/hearing loss or heavy lifting among men. The literature about the relation between stress and gender is somehow contradictory, as we can find studies that do not observe gender differences in this regards (e.g., Nelson & Burke, 2001), others that suggest that men experience higher level of work related stress, while most studies find a higher level of stress among women (Cifre et al., 2015).

Using a more general approach that considers different jobs amenities—non-monetary attributes—and changing continents, Maestas et al. (2018) conclude, based on US data from the American Working Conditions Survey that men and women hold jobs with different mix of attributes, and that considering the willingness-to-pay for most of such amenities, the wage gap by gender narrows, while the pay differential by race and age widens. In short, "accounting for amenities exacerbates measured wage inequality" (Maestas et al., 2018, p. 5).

Summing up, altogether, we can find a large number of papers analysing specific aspects of working conditions from a gender perspective, but very few that aim at looking at such differences in a comprehensive and integrated way. That is precisely the aim of this contribution.

Our results suggest that the gender gap varies quite much across the different dimensions. Particularly, other things being equal, the females face a relevant disadvantage in the domains of skills and discretion and prospects, but they enjoy better conditions in terms of physical environment, working intensity and working-time quality. We do not find any differential in the area of social environment.

Changes over time in the EU as a whole affect physical environment and working-time quality, because the working conditions of women deteriorate. In the rest of dimensions, there is no significant variation on average, but the figures at the EU level hides considerable heterogeneity across countries. These developments result in a clear process of β-convergence, whereas the outcome in terms of σ-convergence is more complex, with variations over time and across domains.

The rest of the paper unfolds as follows. In section 2, we describe the database and the methods employed for measuring the extent and the evolution of gender gaps in non-monetary working conditions and for assessing the existence of convergence in these magnitudes across the European Union during the period 2005–2015. We present the main results of our analyses in the third section, while the last one summarizes the main contributions of the paper.

2. Data and methods

2.1. Data

Our source of information on working conditions is the European Working Conditions Survey (EWCS), carried out on 5-year basis by the European Foundation for the Improvement of Living Conditions (Eurofound) (Eurofound, 2018). Particularly, we make use of the last three waves of this survey, corresponding to the years 2005, 2010 and 2015. We exclude the first three waves because education is not available in those surveys. The sample sizes and the number of variables available in each wave increase over time, with a minimum of 1,000 workers interviewed in each country (500 in Malta, Luxembourg and Estonia). Our database covers the European Union and, irregularly, other countries like Switzerland, Norway or

Turkey. Here, we focus on the 27 countries of the current European Union plus the United Kingdom and restrict our analysis to native employees, which yields a total sample size of 66,030 workers. We make use of 46 variables on 6 domains (physical environment, work intensity, working time quality, social environment, skills and discretion and prospects) in order to construct several composite indicators of job quality following the previous literature on this topic. We outline the process of construction of these measures in the next subsection. Furthermore, we also exploit information on earnings from the EWCS 2015, which is the only wave that codes this variable with enough precision (in previous waves, their availability is mainly limited to intervals or deciles).

2.2. Methods

In order to measure the quality of working conditions, we rely on the set of indicators developed by the Eurofound and their collaborators (see, e.g., Eurofound, 2012, 2015, 2019, Fernández-Macías et al., 2015, Green et al., 2013, Muñoz de Bustillo et al., 2011a and Muñoz de Bustillo et al., 2011b) based on the EWCS. The quality and the number of variables available in the EWCS significantly increases over time, so, when considering the developments in the areas mentioned above, one needs to adapt the construction of the indexes to the availability of the variables in each dimension. Following this literature and carrying out the necessary adaptations, we organize the 46 available variables into 15 sub-dimensions and the 6 dimension mentioned above (see Table 1).[3]

We define all the domains so that a higher value of the indicator means a better

[3]We do not keep into account involuntary part-time work because of two reasons. First of all, this information is only available since the 2010 wave. In the second place, this issue shaped by many factors external to the quality of a specific job (e.g., the personal circumstances or the availability of elderly or child care services) .

job. The score (from 0 to 100) in each dimension comes from the arithmetic mean of the different sub-dimensions, which in turn averages the variables included in it. The final job quality indicator computes the arithmetic mean of each of the 6 domains. [4]

In order to measure the average magnitude of the gender gap during the period 2005–2015, given that our interest does not lie in the detailed decomposition of the unexplained difference between males and females, following the suggestion of Elder et al. (2010), we employ a single equation in the following fashion:[5]

$$Y_i = \beta_0 + \beta_1 \text{female}_i + \beta_2 \text{D}_i^{2010} + \beta_3 \text{D}_i^{2015} + X_i'\theta + \varepsilon_i \tag{1}$$

Y_i denotes the outcome of interest (the score in a certain job quality dimension, in natural logarithms) of individual i, female_i is a dummy variable that takes the value 1 for women and 0 for males, D_i^{2010} and D_i^{2015} are dummies for year 2010 and 2015, respectively, X_i is a vector of control variables that can include demographic and occupational characteristic, and ε_i is a disturbance. Equipped with this equation, we estimate the gender gap in all the six dimensions pooling the three databases of the EWCS. The coefficient of interest is β_1, which informs about the magnitude of the gender gap between males and females, in percent points, in certain dimension that observational characteristics included in the covariates

[4] In other words, as in most of the recent works using these sorts of indexes (see, e.g., Eurostat, 2018), each variable receive the same weight within each sub-dimension and we assign the same importance to each sub-dimension when computing the score for each dimension. .Sensitivity analyses in Muñoz de Bustillo et al. (2011a) suggest that the composite measures of these dimensions are quite robust to the use of different weighting schemes because there is a high positive correlation between the outcomes in different domains.

[5] For a survey of the methods of decomposing wage differentials, see, for instance, Fortin et al. (2011).

do not explain. A positive coefficient indicates that women perform better than males in this domain and vice versa. We first estimate this equation for the 28 countries of our sample as a whole, including country fixed effects, and, then, in order to have a taste of the scope of the gap across Europe, separately for each one of the EU Member States. Among the control variables included in the equation, we consider, first, demographic characteristics such as age, squared age and education (recoded into three levels: low, medium and high) and, second, occupational characteristics (tenure, four occupational groups [three dummies], seven sectors of activities [six dummies] and a binary variable capturing if the employee works in the private or the public sector). We do not aim to introduce a big list of occupational characteristics because of two reasons: firstly, the size of the national samples, particularly in some countries, is limited; secondly, the part of the differences might be driven by occupational characteristics that are endogenous (e.g., one of the main reasons for wage penalties for women are due to occupational segregation).

In order to determine how the gap has changed over time, we augment equation 1 with interactions between the dummy variable and the time fixed effects:

$$\begin{aligned} Y_i = &\beta_0 + \beta_1 \text{female}_i + \beta_2 \text{D}_i^{2010} + \beta_3 \text{D}_i^{2015} + \beta_4 \text{female}_i \text{D}_i^{2010} + \\ &\beta_5 \text{female}_i \text{D}_i^{2015} + X_i'\theta + \varepsilon_i \end{aligned} \tag{2}$$

This equation allow us to recover not only the change in the gender gap from 2005 to 2015 (β_5), but also the changes in the male (β_2) and female ($\beta_2 + \beta_5$) outcomes and the gap in 2005 (β_1), 2010 ($\beta_1 + \beta_4$) and 2015 (($\beta_1 + \beta_5$)). As in the case of the exploration of the magnitude of the gap, we estimate this equation for the whole

European Union (including country dummies) and separately for each country. We provide the main descriptive statistics of the sample used in Table A.1 in the Annex.

Having completed the task of estimating the gender gaps, we proceed to analyse the existence of β-convergence, which, in this context, refers to the degree to which the change in the gap over a certain period of time is negatively related to its initial level. In order to quantify the differences in the gaps across countries, one can adopt two different approaches. The first one consists in considering that the existence of differences in favour of women is a positive situation and a disadvantage, negative. An alternative perspective—hereafter, modified gap—states that what matters is the absence of differences between men and women. In this respect, the modified gap is calculated as the absolute value of the gap obtained in equation 2. We can test the existence of β- convergence through the following framework (Barro & Sala-i-Martin, 1992), regressing the average variation rate of the gap over the period of country c between t_1 and t_2 on the initial level of the gap:

$$\frac{\text{gap}_{ct_2} - \text{gap}_{ct_1}}{t_2 - t_1} = \alpha + \beta \text{gap}_{ct_1} + \mu_{ct_1} \tag{3}$$

In this framework, $\beta < 0$ indicates the existence of convergence. In order to maximize the statistical power of our analysis, we pool 5-year changes. To our knowledge, there is no theoretical background for expecting the convergence or divergence in this domain. In principle, the increasing harmonization of labour market institutions and cultural and institutional frameworks across Europe, jointly with potentially decreasing occupational segregation, could be a factor favouring this process. Furthermore, it is also reasonable to expect that countries with lar-

ger gaps have more room for improvements and affirmative actions, even if solely importing policy measures from other countries.[6]

[6]Another perpective on convergence, also borrowed from the Economics of Growth, has to do with the assessment in the dispersion in the gender gaps, i.e., the notion of σ-convergence, which can explored using a dispersion statistic. We provide evidence on this type of convergence for the interested reader in the supplementary online material.

Table 1. Dimensions, subdimensions and variables of working conditions

Dimension	Subdimension	Variable
D.1. Physical environment	D.1.1. Ambient risks	Vibrations Noise High temperatures Low temperatures
	D.1.2. Biological and chemical risks	Fumes and vapours Chemicals Tobacco Infectious materials
	D.1.3. Posture-relate risks	Tiring positions Heavy loads Moving people Repetitive movements
D.2. Work intensity	D.2.1. Quantitative demands	Pace of work (high speed) Pace of work (tight deadlines) Time pressure Disruptive interruptions
	D.2.2. Pace determinants and interdependency	Colleagues Customer demands Production targets Machine speed Boss
D.3. Working time quality	D.3.1. Duration	Working hours ($\geq$ 10 and $\leq$ 48 per week) Long working days ($\geq$ 10 per month)
	D3.2. Atypical working time	Night work Saturday work Sunday work Shift work
D.4. Social environment	D.4.1. Adverse social behaviour	Physical violence Bullying and harassment
	D.4.2. Social support	Colleagues support Manager help and support
D.5. Skills and discretion	D.5.1. Cognitive dimension	Solving unforeseen problems Carrying out complex tasks Working with computers, smartphones, etc. Ability to apply your own ideas to work
	D.5.2. Decision latitude	Control the order of the tasks Control the speed of work Control the methods of work Control the timing of breaks Choice of your working partners
	D.5.3. Training	Training provided by the employer On-the-job training Possibility of learning new things
D.6. Prospects	D.6.1. Employment status D.6.2. Career prospects D.6.3. Job security	Type of contract Good career prospects Job security prospects

Source: Authors' elaboration from Eurofound (2012, 2015, 2019), Fernández-Macías et al. (2015) and Muñoz de Bustillo et al. (2011a).

3. Results

3.1. Gender gaps in working conditions in the EU and Member States

Table 2 presents the estimated gaps—i.e., the β_1 in equation 1—in the six dimensions of working conditions above mentioned for the period 2005–2015 for the EU, using three different models. The first one corresponds to the raw or unadjusted gender gap, as it includes no controls apart from country and time fixed effects. Model 2 presents a first version of the adjusted gender gap in working conditions considering the following control variables: age, squared age and education and tenure. Last, Model 3 adds to the controls of Model 2 the occupational characteristics of the worker: occupation, sector of activity and a dummy for public sector employees. Two conclusions stand out quite clearly from the results. Firstly, women have better working conditions than men in the dimensions of physical environment, work intensity and working time quality, while they enjoy worse working conditions than men in the areas of prospects and, much less, in skills and discretion. In social environment the differences are marginal. The second one is that the introduction of demographic and occupational controls, especially the latter, produces a markedly differential effect on gender gaps in working conditions by dimension. While in the areas of physical environment and work intensity such controls reduce gender gaps significantly (71 and 60% respectively), in skills and discretion and prospects the effect is quite the opposite, especially in the former case, where the gap jumps from 2 to 9%. This implies differences in occupational characteristics play a large role in explaining the gender gaps across the different dimensions. In the first case, physical environment and working time quality, the

raw (unconditional) wage gap underestimates the size of the advantage of women, whereas in prospects and skills and discretion, the raw gaps offers a rosier picture of the gender gap than it is.

Table 2. Gender gap in different dimensions of working conditions (European Union countries, 2005–2015)

	(I) Physical environment	(II) Work intensity	(III) Working-time quality	(IV) Social environment	(V) Skills and discretion	(VI) Prospects
Panel A. Model 1	0.090***	0.077***	0.080***	−0.003	−0.020***	−0.042***
	(0.003)	(0.005)	(0.004)	(0.003)	(0.007)	(0.006)
R^2	0.061	0.028	0.047	0.041	0.046	0.033
Panel B. Model 2	0.084***	0.078***	0.079***	−0.003	−0.041***	−0.051***
	(0.003)	(0.005)	(0.004)	(0.003)	(0.007)	(0.006)
R^2	0.123	0.035	0.055	0.045	0.151	0.076
Panel C. Model 3	0.026***	0.031***	0.088***	0.002	−0.088***	−0.056***
	(0.003)	(0.006)	(0.004)	(0.003)	(0.007)	(0.006)
R^2	0.242	0.068	0.065	0.056	0.238	0.130
No. of observations	66,030	66,030	66,030	66,030	66,030	66,030

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. The table shows the estimated coefficient of a binary variable for females from a regression of the log of the score of the dimension on that binary variable, time and country dummies and the demographic controls (age, squared age and education) in Model 2 and occupational characteristics (tenure, occupation, sector of activity and a dummy for public sector employees) in Model 3. Heteroscedasticiy-robust standard errors between parentheses.
Source: Authors' analysis from EWCS.

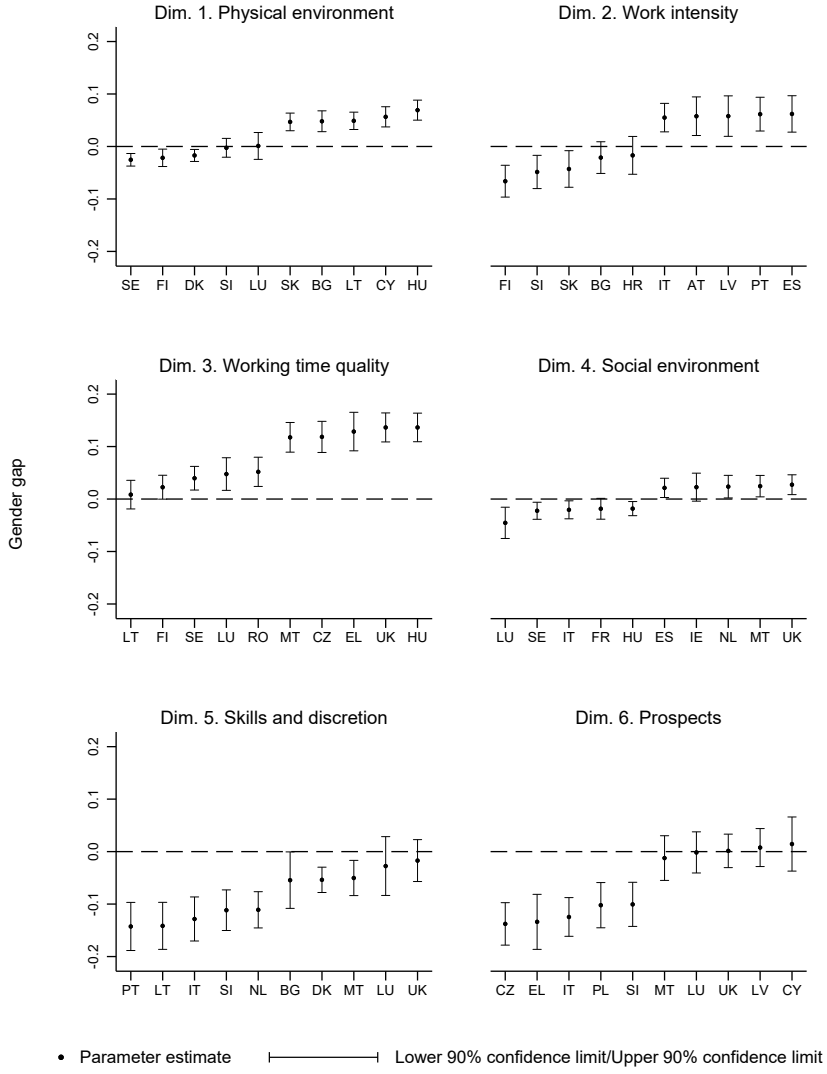
For comparison purposes (as there is only one year with good-quality information on this domain and it refers to net earnings), the gender wage gap estimated from data for year 2015 (Table A.2), gives an adjusted wage gap of 11.6%, higher than the existing gender gaps estimated for the six dimensions of working conditions analysed above. On the whole, we can say that women face a negative working condition gap in skill and discretion (−9%), prospects (−6%) and wages, benefit from a positive gap in working time quality (9%), work intensity (3%) and physical environment (3%) and have similar working conditions regarding social environment to men. This evidence is not at odds with the empirical evidence presented by authors like Goldin (2014, 2015), which highlights how women tend to work under more flexible schedules than men due to the fact that their work activity is far from being limited to their professional career. This might have implications not only on earnings but also on future prospects. It is interesting to highlight that the gaps in gender conditions used to be of comparatively smaller size than those in earnings, in line with the evidence presented by Muñoz de Bustillo et al. (2011a) and Green et al. (2013), who report substantially lower levels in inequality of job amenities than in the dispersion of labour income. There are several reasons for that, going from the measurement error inherent to the calculation of these composite indexes and the formulation of the questions to institutional features. For instance, the set of regulations of working conditions other than wages is usually more comprehensive than those affecting the monetary dimension of the job. Furthermore, information concerning colleagues' wages is often less public than that affecting working conditions, which can make difficult the assessment of the gap.

Unsurprisingly, these results in terms of gender gaps in working conditions in

the EU hide very different situations across countries. This is coherent with previous findings on specific domains, like job-related training (Boll & Bublitz, 2018). To give a taste of the behaviour of gender gaps in working conditions across the 28 EU Member State, without being too messy due to the large number of countries and variables considered in the analysis (28×6 estimates), in Figure 1 we present the raw gender gaps (Model 1) for the six dimensions of working conditions and for the five countries with the lowest and highest gender gaps in each domain. Figure 2 shows the adjusted gender gaps obtained when controlling for demographic and occupational characteristics (Model 3). The results of Model 2, which do not differ substantially from the ones presented in the main text, are available in the Annex (Figure A.2).

As we can see, focusing on the adjusted gender gap for economy of space, if we leave aside the dimension of social environment, were the gender gaps are quite small across all countries, there seems to be two different country patterns. In the dimensions of physical environment, skills and discretion and working time quality, countries differentiate from each other in terms of the intensity of the gender gap and not so much in terms of the its direction. In the rest of the dimensions, work intensity and prospects, countries differentiate both in sign and intensity of the gender gap. The dimension of work intensity represents a good example of it, with countries such as Finland or Slovenia showing comparatively large negative gender gaps in the dimensions and others, such as Spain or Portugal, with comparatively large positive differentials by sex.

Figure 1. Gender gaps in working conditions by country and dimension with occupational controls (top 5 and bottom 5 countries according to the gender gap, 2005–2015)



Note: The graph shows the estimated coefficient of a binary variable for females from a country-specific regression of the log of the score of the dimension on that binary variable, demographic and occupational characteristics and time dummies. Confidence intervals computed from heteroscedasticiy-robust standard errors between parentheses. Observations are weighted according to country population.
Source: Authors' analysis from EWCS.

3.2. The evolution of gender gaps in the EU from 2005 to 2015

The second question we address consist in whether there have been changes in the gender gaps in working conditions during the period 2005–2015 (the focus of equation 2). In other words, we aim knowing if the EU is going through a "gender normalization" of the labour market, understood in terms of a reduction of the differences in working conditions between sexes, or whether, alternatively, gender gaps in working conditions have increased or remained stagnant during the period. The evolution of the gender gap in the different dimensions of working conditions (Table 3) highlights at the same time the role played in these by the changes in the working conditions in each group. As above, we report the changes in the raw or unadjusted gender gaps and in the adjusted gaps after controlling for demographic variables (Model 2) and demographic and occupational variables (Model 3).

The overall picture revealed by this chart reflects certain stability in gender gaps during the period, although this general picture of stability hides more nuance dynamics. Firstly, there is a statistically significant reduction in physical environment gender gap, driven by the minor, but statistically significant, deterioration of this dimension of working conditions among women, in a context of stability regarding men's working physical environment. Thus, we could talk of "regressive" convergence in gender working conditions in this area, driven by the deterioration of job quality of the gender enjoying a better physical working environment. Secondly, something similar happens regarding working-time quality, with a reduction in the gender gap of nearly 3% during the period, produced by the deterioration of conditions in this domain among women. A potential driver of these results could be a process of reduction in occupational segregation bey-

ond the detail captured by our covariates. [7] The destruction of male-dominated jobs with particularly poor working conditions in these domains by phenomena like globalization and automation or taken by foreign-born workers. Thirdly, there does not seem to be any statistically significant changes in the working intensity gender gap, although women experienced a small deterioration of their working conditions in this domain. Fourthly, the remaining dimensions of working conditions, namely social environment, skills and discretion and prospects, show no statistically significant change in the corresponding gender gaps. In all cases, the stability of the gender gaps is explained by the improvement of working conditions for both men and women, leaving the estimated differentials unchanged.

[7] For instance, women are over-represented in the social residential and non-residental care activities, a sector that has experienced a remarkable relative—and often absolute—growth during the last 20 years and where there seems to exist a large margin for improving working conditions (Schulz, 2013).

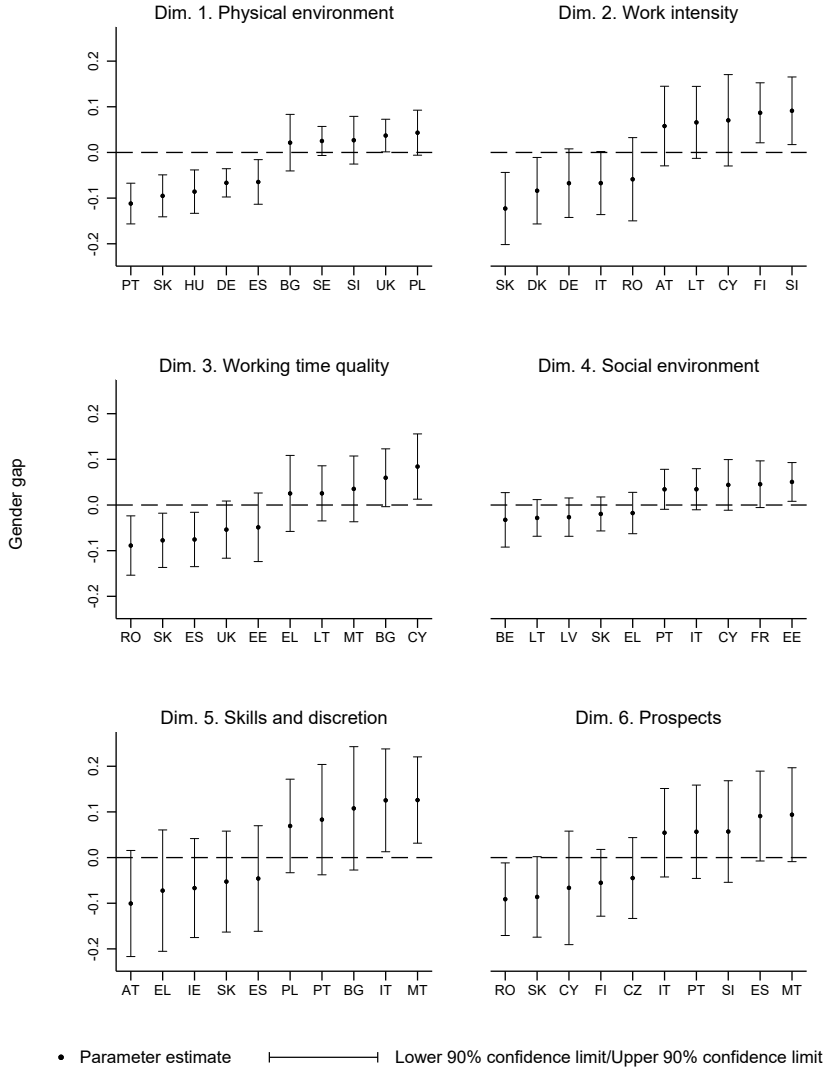
Table 3. The evolution of the gender gap in working conditions (European Union countries, 2005–2015)

	(I) Physical environment	(II) Work intensity	(III) Working-time quality	(IV) Social environment	(V) Skills and discretion	(VI) Prospects
Panel A. Model 1						
Change for males	0.021***	0.011	0.013*	0.014***	0.094***	0.073***
	(0.006)	(0.010)	(0.007)	(0.006)	(0.012)	(0.010)
Change for females	0.006	−0.005	−0.008	0.022***	0.121***	0.072***
	(0.004)	(0.009)	(0.006)	(0.006)	(0.013)	(0.010)
Change in the gap	−0.015**	−0.016	−0.022**	0.007	0.027	−0.001
	(0.007)	(0.013)	(0.009)	(0.008)	(0.018)	(0.014)
Panel B. Model 2						
Change for males	0.011**	0.002	0.005	0.014**	0.070***	0.055***
	(0.006)	(0.010)	(0.007)	(0.006)	(0.011)	(0.009)
Change for females	−0.006*	−0.015*	−0.018***	0.022***	0.092***	0.052***
	(0.004)	(0.009)	(0.006)	(0.006)	(0.012)	(0.010)
Change in the gap	−0.017***	−0.017	−0.023**	0.007	0.022	−0.004
	(0.007)	(0.013)	(0.009)	(0.008)	(0.017)	(0.014)
Panel C. Model 3						
Change for males	0.005	−0.004	0.011	0.016***	0.083***	0.068***
	(0.005)	(0.010)	(0.007)	(0.005)	(0.011)	(0.009)
Change for females	−0.014***	−0.018**	−0.015***	0.021***	0.089***	0.055***
	(0.004)	(0.009)	(0.006)	(0.006)	(0.011)	(0.010)
Change in the gap	−0.019***	−0.014	−0.026***	0.005	0.006	−0.014
	(0.006)	(0.013)	(0.009)	(0.008)	(0.016)	(0.013)

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. The results comes from a regression of the log of the score of the dimension on a dummy for females, a dummy for year 2015, an interaction between the gender dummy and the year dummy, country dummies and the demographic controls in Model 2 and occupational characteristics in Model 3. The change for males, is the coefficient of the year dummy; the change for females, the addition of the coefficient of the year dummy and the coefficient of the interaction and the change in the gap, the coefficient of the interaction. Heteroscedasticiy-robust standard errors between parentheses. Observations are weighted according to country population.
Source: Authors' analysis from EWCS.

This stability of gender gaps in working conditions when looking at the EU as a wole might come as a result of the existence of countervailing movements of the gender gaps at the national level. In order to test whether that is the case, we study the evolution of gender gaps in the six dimensions of working conditions. In this respect, Figure 3 shows the evolution of the adjusted gender gaps (after controlling for demographic, occupational and activity variables). With the aim of facilitating visualization of the results, as above, we display only the five countries at both ends of the distribution of change in the gender gap. The most salient finding is that the relative stability of gender gaps in working conditions at the EU level does not necessarily replicates at the national level. We can see relevant differences in the evolution of the gender gaps between countries not only in terms of the size of the change, but also in its direction. For example, in terms of adjusted gaps, while in the dimension of skills and discretion we can see a reduction in the gender gap in Austria or Greece, the opposite happens in Italy or Portugal. Similar dynamics are found in other areas of working conditions, e.g., Portugal and the United Kingdom in the dimension of physical environment, with a reduction of the gender gap in the former case and increase in the latter, or work intensity (e.g., Slovakia and Denmark *versus* Bulgaria). The results for the evolution of the differentials under Model 1 (unadjusted gaps) and Model 2 (controlling only for demographic characteristics) are qualitative the same as the ones reported here, so we confine them to the Annex (Figures A.2 and A.3).

Figure 2. The evolution of gender gaps in working conditions by country and dimension without controls (top 5 and bottom 5 countries according to the change in the gender gap, 2005–2015)



Note: The graph shows the estimated coefficient of the interaction between a binary variable for females and a dummy for year 2015 from a country-specific regression of the log of the score of the dimension on that sex dummy, time fixed effects and the interaction between the female dummy and the year dummies. Confidence intervals computed from heteroscedasticiy-robust standard errors between parentheses. Observations are weighted according to country population.
Source: Authors' analysis from EWCS.

3.3. Convergence in gender gaps across the EU

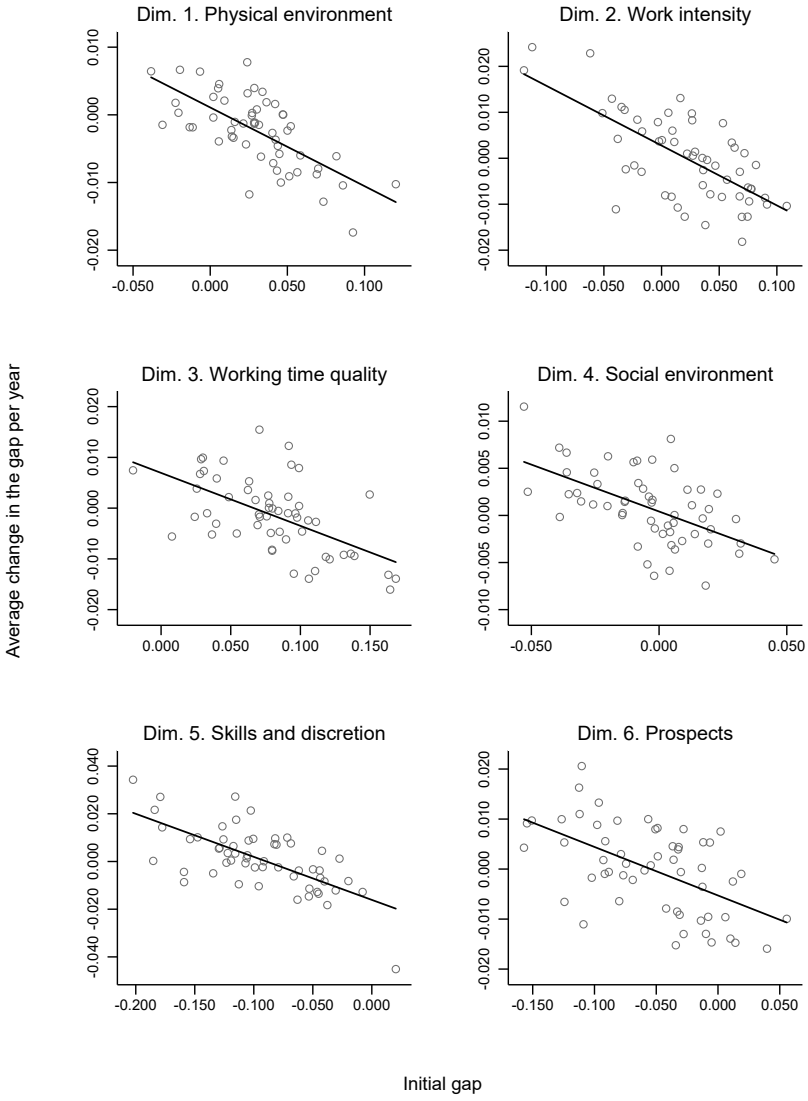
The differences found in the evolution of gender gaps in working conditions among the 28 EU countries in previous section raise the question of whether such differences are leading to convergence in gender gaps in working conditions in the EU, or, alternatively, whether we are moving towards a more diverse and disperse scenario regarding gender gaps in the EU. In order to answer this question, we assess the existence of β-convergence, making use of the gender gaps computed by the three different econometric models and adopting both the conventional and alternative definition of the gender gap. The plot of the change in the gap against its initial level suggests a clear negative relationship that points out to the existence of convergence (see Figures 3 and 4, respectively, for results with controls and Figures A.3–A.6 in the Annex for similar results without control variables and only including demographic characteristics). The results of the econometric analysis (Table 4) formally confirms the existence of convergence in all the six areas of job quality and under the two definitions of the gender gap. The only difference among the different dimensions is the intensity of the relation (the speed of convergence), higher in the dimensions of work intensity, skills and discretion and social and physical environment, and slower in prospects or working-time quality (focusing on the results with controls).

Table 4. β-convergence in the gender gap in working conditions (European countries, 2005–2015)

	(I) Physical environment	(II) Work intensity	(III) Working-time quality	(IV) Social environment	(V) Skills and discretion	(VI) Prospects
Panel A. Conventional gap						
Model 1	−0.067***	−0.110***	−0.098***	−0.128***	−0.199***	−0.084***
	(0.011)	(0.016)	(0.018)	(0.022)	(0.046)	(0.018)
Model 2	−0.068***	−0.110***	−0.087***	−0.130***	−0.162***	−0.088***
	(0.013)	(0.017)	(0.020)	(0.023)	(0.028)	(0.019)
Model 3	−0.114***	−0.130***	−0.097***	−0.096***	−0.181***	−0.097***
	(0.018)	(0.018)	(0.019)	(0.021)	(0.033)	(0.020)
Panel B. Modified gap						
Model 1	−0.067***	−0.097***	−0.098***	−0.181***	−0.169***	−0.102***
	(0.011)	(0.017)	(0.018)	(0.025)	(0.038)	(0.022)
Model 2	−0.068***	−0.105***	−0.094***	−0.183***	−0.198***	−0.106***
	(0.013)	(0.018)	(0.017)	(0.024)	(0.032)	(0.025)
Model 3	−0.156***	−0.191***	−0.104***	−0.168***	−0.171***	−0.104***
	(0.020)	(0.015)	(0.018)	(0.029)	(0.028)	(0.025)
No. of observations	56	56	56	56	56	56

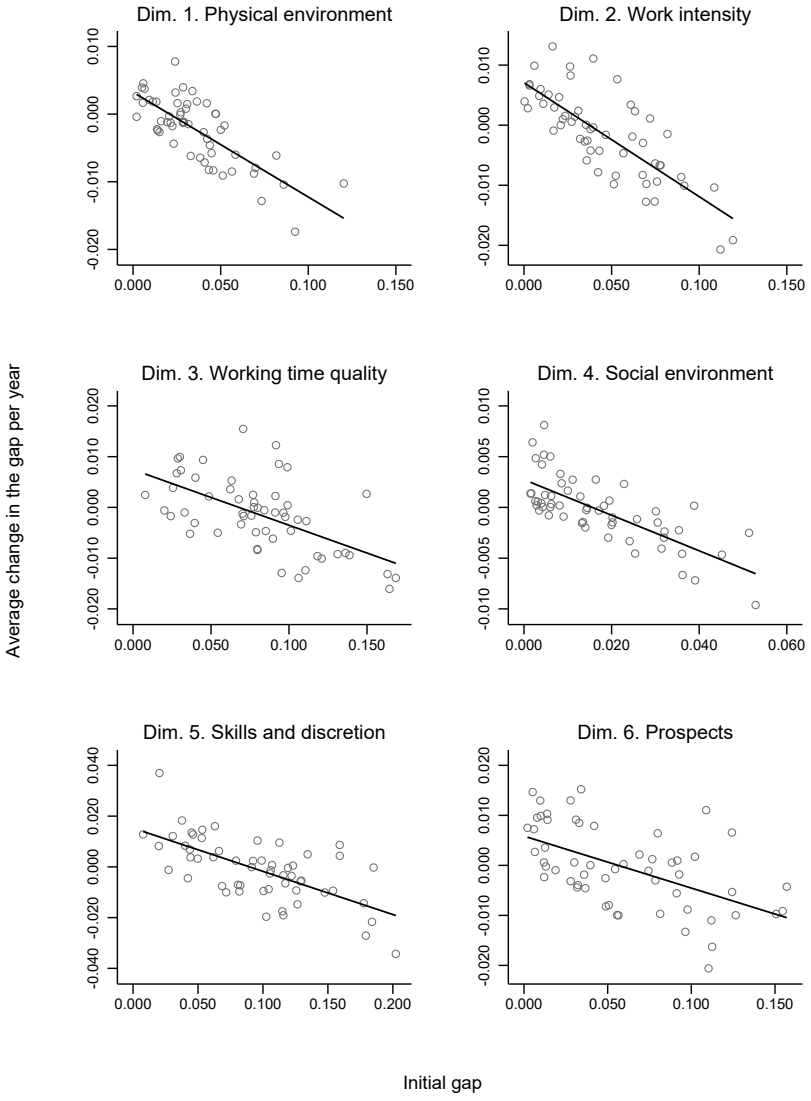
Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. The table shows the coefficient of the initial gender gap from a regression of the average change per year in the gender gap on the initial level of the gender gap and time dummy for the period 2010–2015. The gap in Model 1 only controls for time fixed effects; Model 2 adds demographic endowments and Model 3, occupational characteristics. Standard errors clustered at the country level between parentheses.
Source: Authors' analysis from EWCS.

Figure 3. β-convergence in the gender gap (with demographic and occupational controls) in working conditions dimension (European Union countries, 2005–2015)



Note: Each graph plots the average change in the gap per year using 5-year periods (2005–2010 and 2010–2015) against the initial value of the gap in each period. *Source*: Authors' analysis from EWCS.

Figure 4. β-convergence in the modified gender gap (with demographic and occupational controls) in working conditions dimension (European Union countries, 2005–2015)



Note: Each graph plots the average change in the gap per year using 5-year periods (2005–2010 and 2010–2015) against the initial value of the gap in each period. *Source*: Authors' analysis from EWCS.

4. Conclusions

The increasing and sustained interest of academic researchers and citizenship on gender issues has resulted in a relevant body of literature studying the earnings differentials between males and females. Nevertheless, the evidence on how men and women perform differently in terms of non-monetary working conditions is much limited. This is important, not only because workers are able to trade wages for better job amenities but also because markets do not always reward non-monetary working conditions according to workers preferences. In this work, exploiting the EWCS 2005–2015, we have studied the magnitude of the gender gap in six different domains of job quality. For the EU as a whole, on the one side, we have found that women enjoy better working conditions in terms of physical environment, work intensity and working time quality. This keeps in line with the types of jobs held by female workers and with the fact that women tend to give priority to work schedules that allows them to conciliate their professional career with other activities (e.g., care work). On the other side, on average, women face disadvantages in the dimensions of skills and discretion and prospects, which is not at odds with the previous findings: More working-time quality and less work intensity can come at the expense of disadvantages for developing a better professional assuming higher roles.

Regarding the evolution of the gender gap over time, for the EU as a whole, we have documented that the gap tends to decrease in those domains where women perform better than men. This might be associated to the fact that women increasingly assume jobs more and more similar to those held by males, in line with the higher level of equality by gender in terms of human capital among the younger

cohorts. Nevertheless, in spite of the stability observed for the EU as a whole, there are differences in the evolution of the gap across countries. Because of this reason, we have assessed whether there is a process convergence of those differentials over time. Our results have suggested that there is a clear evidence for β-convergence, which refers to the process where the change in the gap is negatively correlated to its initial level.

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Annex

Table A.1. Descriptive statistics

	Means (standard deviations) Men	Women	Differences [standard errors]
Dim. 1. Physical environment	79.444	85.779	−6.336***
	(16.762)	(12.560)	[0.188]
Dim. 2. Work intensity	59.416	63.398	−3.982***
	(20.316)	(19.697)	[0.257]
Dim. 3. Working time	64.372	69.480	−5.108***
	(16.722)	(14.997)	[0.201]
Dim. 4. Social environment	83.471	83.515	−0.044
	(15.021)	(15.520)	[0.199]
Dim. 5. Skills and discretion	56.673	56.398	0.275
	(22.340)	(22.025)	[0.282]
Dim. 6. Prospects	67.150	66.022	1.128***
	(21.575)	(22.002)	[0.274]
Age	39.810	39.962	−0.152
	(11.694)	(11.440)	[0.150]
Tenure	10.080	8.935	1.145***
	(9.576)	(8.642)	[0.116]
Low education	0.224	0.181	0.043***
	(0.417)	(0.385)	[0.005]
Middle education	0.508	0.499	0.009
	(0.500)	(0.500)	[0.006]
High education	0.269	0.320	−0.052***
	(0.443)	(0.467)	[0.006]
Public sector	0.258	0.376	−0.118***
	(0.437)	(0.484)	[0.006]
High-skilled white collar	0.339	0.429	−0.089***
	(0.473)	(0.495)	[0.006]
Low-skilled white collar	0.189	0.391	−0.202***
	(0.391)	(0.488)	[0.006]
High-skilled blue collar	0.229	0.041	0.188***
	(0.420)	(0.198)	[0.004]
Low-skilled blue collar	0.243	0.139	0.104***
	(0.429)	(0.346)	[0.005]
Primary sector	0.038	0.018	0.020***
	(0.191)	(0.132)	[0.002]
High-tech industry	0.083	0.030	0.053***
	(0.276)	(0.171)	[0.003]
Low-tech industry	0.149	0.094	0.055***
	(0.356)	(0.291)	[0.004]
Non-manufacturing industry	0.024	0.007	0.017***
	(0.154)	(0.083)	[0.002]
Construction	0.109	0.017	0.092***
	(0.312)	(0.131)	[0.003]
Knowledge-intensive services	0.253	0.480	−0.227***
	(0.435)	(0.500)	[0.006]
Less knowledge-intensive services	0.343	0.354	−0.011*
	(0.475)	(0.478)	[0.006]
No. of observations	34,358	37,964	

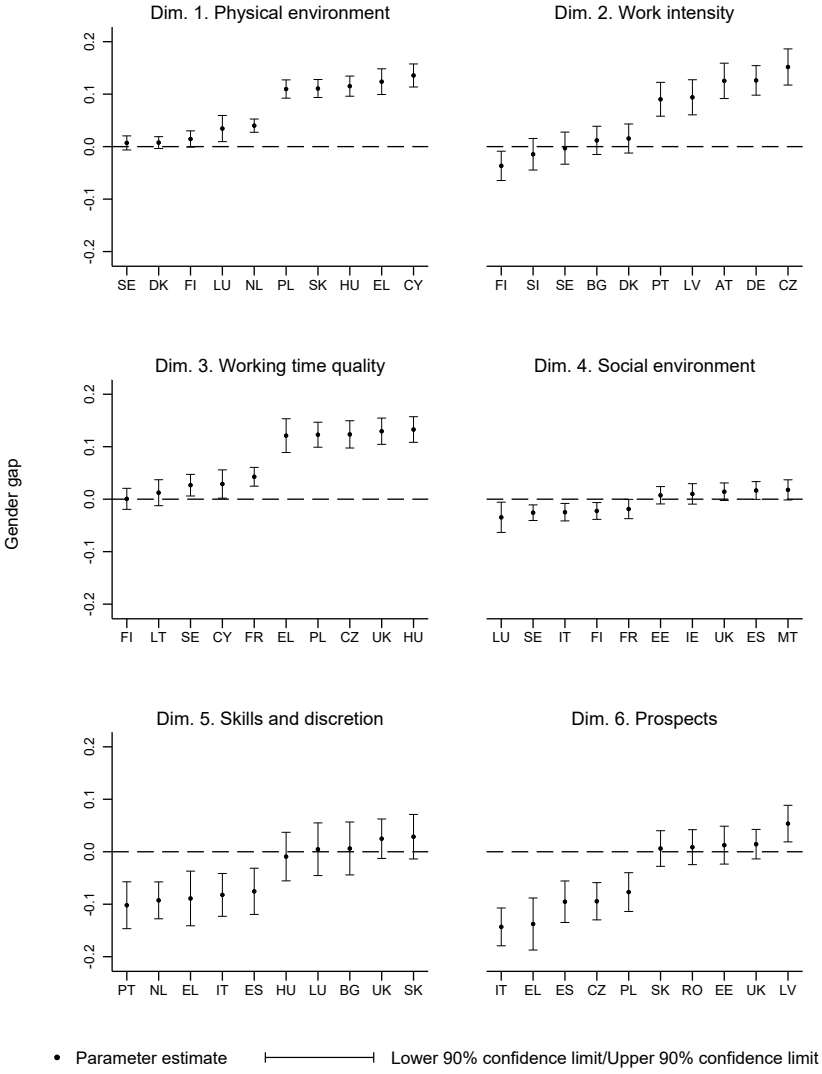
Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level.
Source: Authors' analysis from EWCS.

Table A.2. Gender wage gap (European Union countries, 2015)

	(I) Model 1	(II) Model 2	(III) Model 3
Gender pay gap	−0.102***	−0.124***	−0.116***
	(0.012)	(0.011)	(0.011)
R^2	0.271	0.377	0.409
Mean of dependent variable	2.147	2.147	2.147
Mean of independent variable	0.504	0.504	0.504
No. of observations	20,298	20,298	20,298

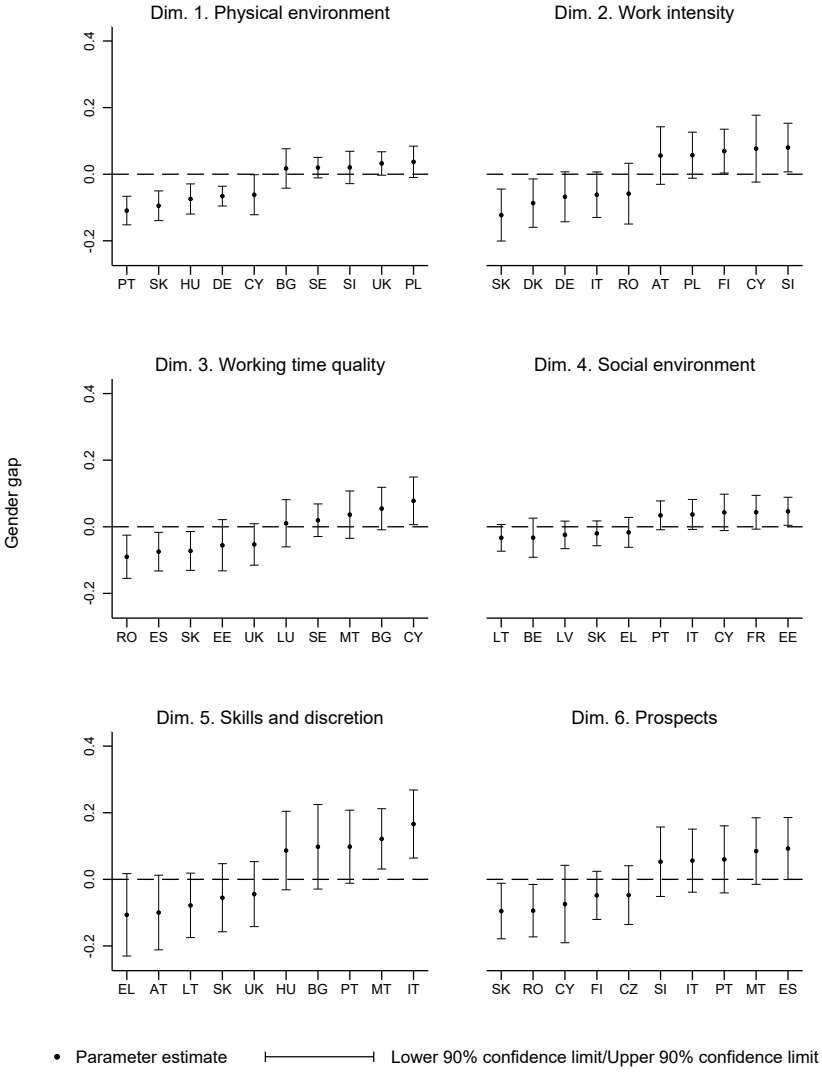
Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. The table shows the estimated coefficient of a binary variable for females from a regression of the log of the score of the dimension on that binary variable, time and country dummies and the demographic controls (age, squared age and education) in Model 2 and occupational characteristics (tenure, occupation, sector of activity and a dummy for public sector employees) in Model 3. Heteroscedasticiy-robust standard errors between parentheses. Observations are weighted according to country population.
Source: Authors' analysis from EULFS.

Figure A.1. Gender gaps in working conditions by country and dimension with demographic controls (top 5 and bottom 5 countries according to the gender gap, 2005–2015)



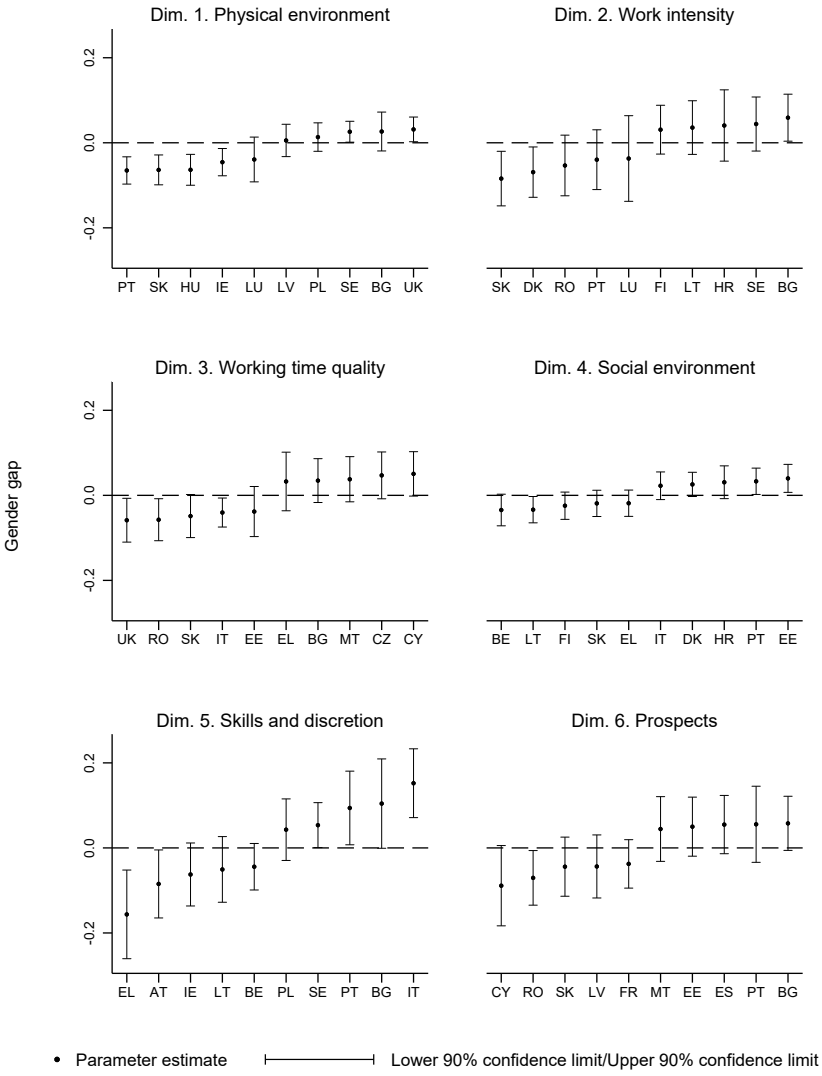
Note: The graph shows the estimated coefficient of a binary variable for females from a country-specific regression of the log of the score of the dimension on that binary variable, demographic characteristics and time dummies. Confidence intervals computed from heteroscedasticiy-robust standard errors between parentheses. Observations are weighted according to country population. *Source*: Authors' analysis from EWCS.

Figure A.2. The evolution of gender gaps in working conditions by country and dimension with demographic controls (European Union 15 countries, 2005–2015)



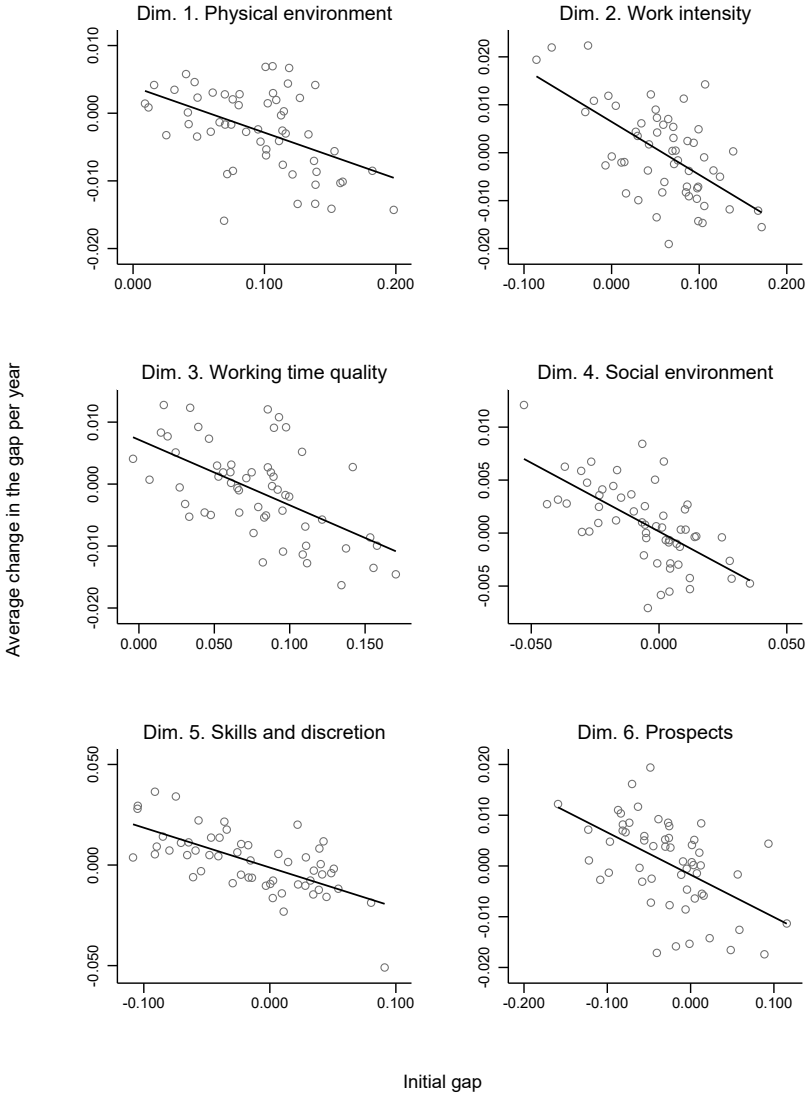
Note: The graph shows the estimated coefficient of the interaction between a binary variable for females and a dummy for year 2015 from a country-speficic regression of the log of the score of the dimension on that sex dummy, time fixed effects, the interaction between the female dummy and the year dummies and demographic characteristics. Confidence intervals computed from heteroscedasticiy-robust standard errors between parentheses. Observations are weighted according to country population. *Source*: Authors' analysis from EWCS.

Figure A.3. The evolution of gender gaps in working conditions by country and dimension with occupational controls (top 5 and bottom 5 countries according to the change in the gender gap, 2005–2015)



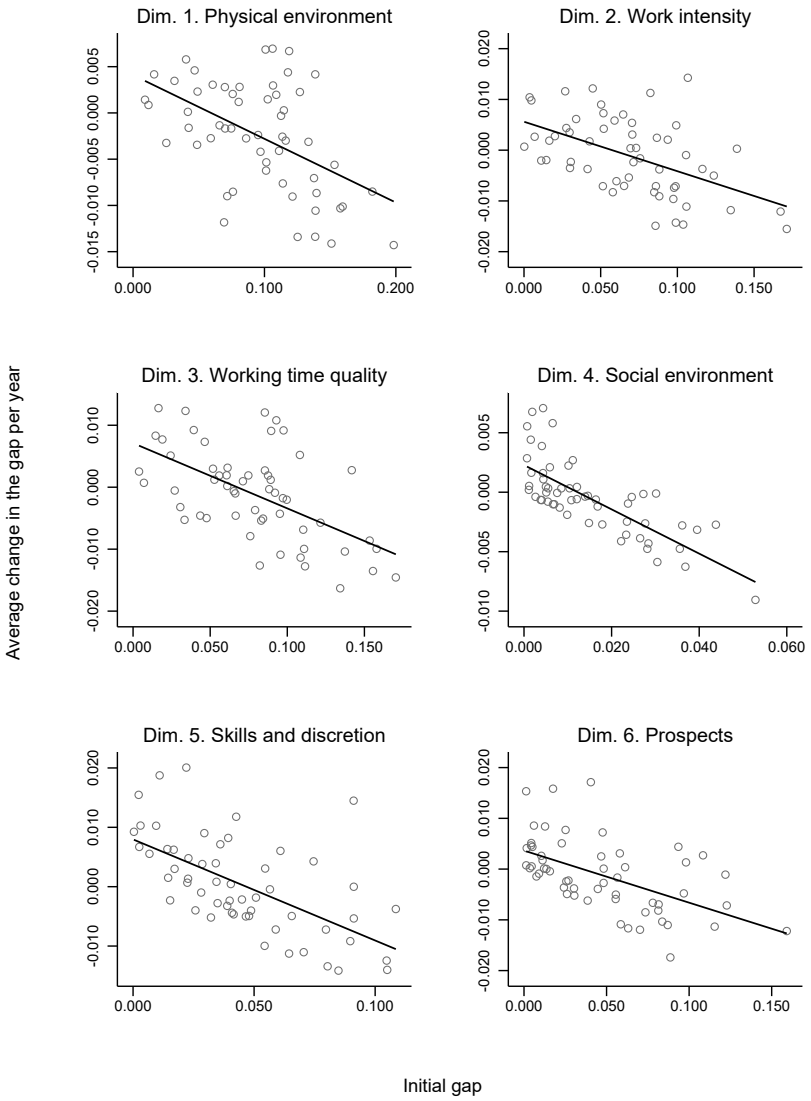
Note: The graph shows the estimated coefficient of the interaction between a binary variable for females and a dummy for year 2015 from a regression of the log of the score of the dimension on that sex dummy, time fixed effects, the interaction between the female dummy and the year dummies and demographic and occupational characteristics. Confidence intervals computed from heteroscedasticiy-robust standard errors between parentheses. Observations are weighted according to country population. *Source*: Authors' analysis from EWCS.

Figure A.4. β-convergence in the gender gap (without controls) in working conditions dimension (European Union countries, 2005–2015)



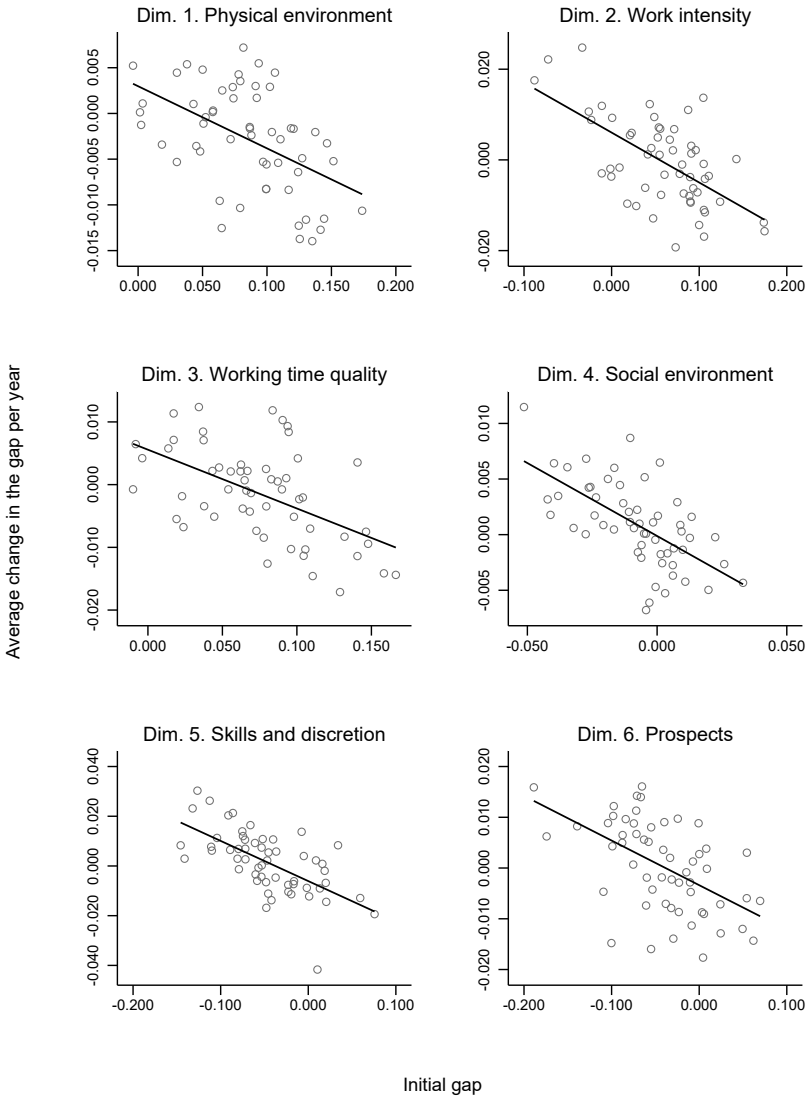
Note: Each graph plots the average change in the gap per year using 5-year periods (2005–2010 and 2010–2015) against the initial value of the gap in each period. *Source*: Authors' analysis from EWCS.

Figure A.5. β-convergence in the modified gender gap (without controls) in working conditions dimension (European Union countries, 2005–2015)



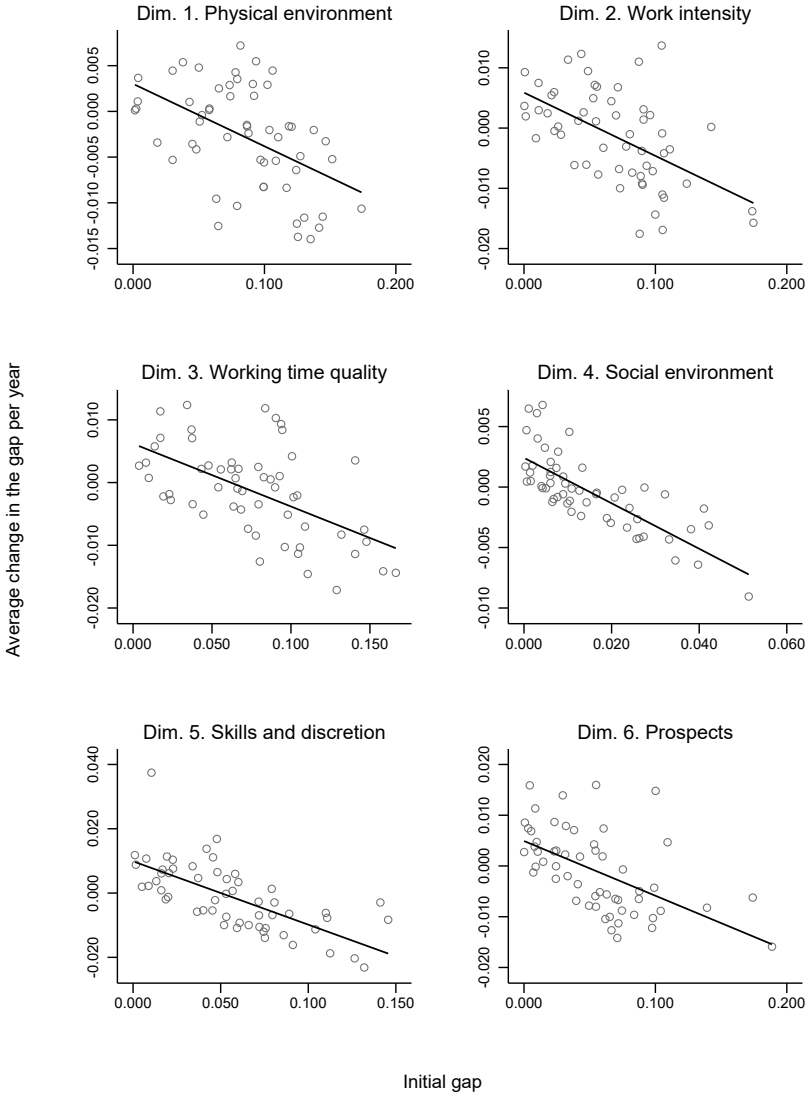
Note: Each graph plots the average change in the gap per year using 5-year periods (2005–2010 and 2010–2015) against the initial value of the gap in each period. *Source*: Authors' analysis from EWCS.

Figure A.6. β-convergence in the gender gap (with demographic controls) in working conditions dimension (European Union countries, 2005–2015)



Note: Each graph plots the average change in the gap per year using 5-year periods (2005–2010 and 2010–2015) against the initial value of the gap in each period. *Source*: Authors' analysis from EWCS.

Figure A.7. β-convergence in the modified gender gap (with demographic controls) in working conditions dimension (European Union countries, 2005–2015)



Note: Each graph plots the average change in the gap per year using 5-year periods (2005–2010 and 2010–2015) against the initial value of the gap in each period. *Source*: Authors' analysis from EWCS.

Supplementary material. Evidence on σ-convergence of gender gaps

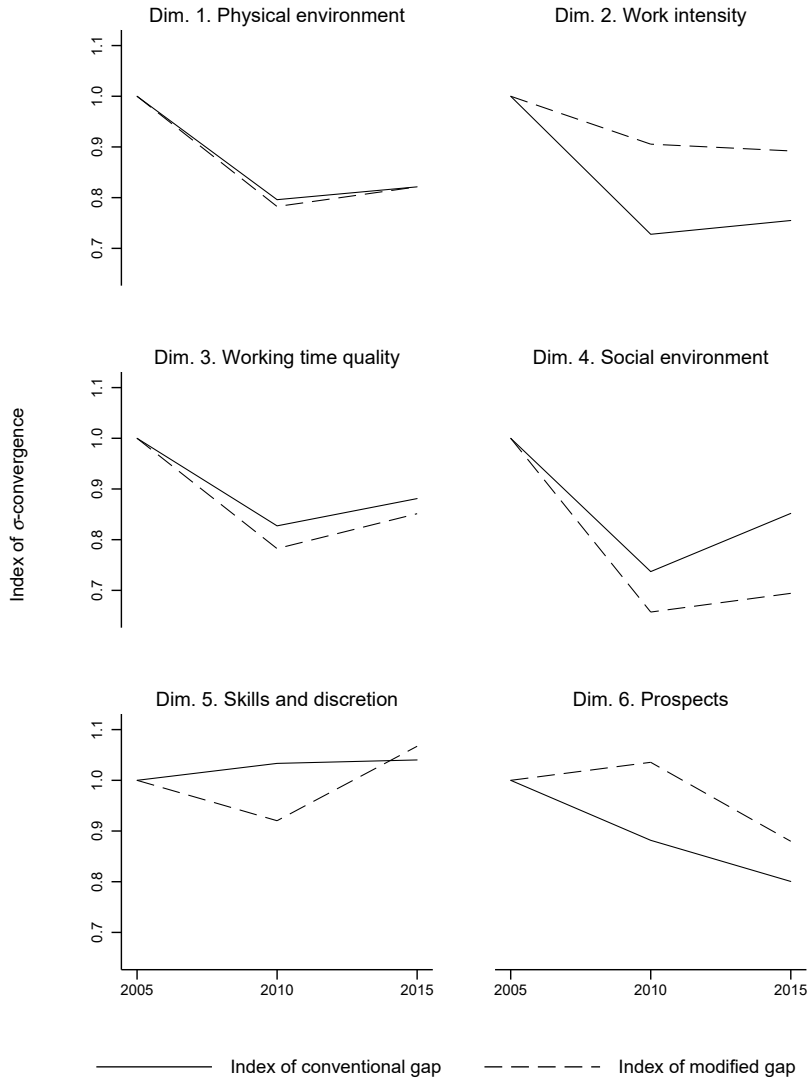
In this pages, we present some results on σ-convergence, linked to the dispersion of the gender gaps, for the interest reader. This approach allows us to test whether the evolution of gender gaps in working condition is similar throughout all the period, or whether there is a change in the trend.

In our case, the gender gap can present negative and null values, which makes the coefficient of deviation inappropriate and can make results obtained with statistics admitting negative and zero values very difficult to interpret (e.g., the Gini index). Because of these reasons, and bearing in mind that results should interpreted with caution, we employ the standard deviation of the gaps. Furthermore, we change the scale the gap adding 1 (i.e., we calculate $1 + gap$), which is a sensible choice given that we compare the outcome of two groups, and we calculate the standard deviation of such a measure. The results are essentially the same to those obtained using the standard deviation. Alternatively, we compute the coefficient of variation of the expression $1 + gap$, which means a change in the scale, a sensible choice given that we measure the outcome of a group with respect to another, obtaining qualitatively similar results.

We show the evolution of the conventional and modified gender gap under the three models in Figures S.1– S.3. Taking the period as a whole there is evidence for σ-convergence in all dimensions of working conditions (with the exception of skills and discretion, which exhibit almost no change when taking the period as a whole). In four dimensions, working time quality, social environment, physical environment and work intensity, and especially in the former two, convergence follows a clear

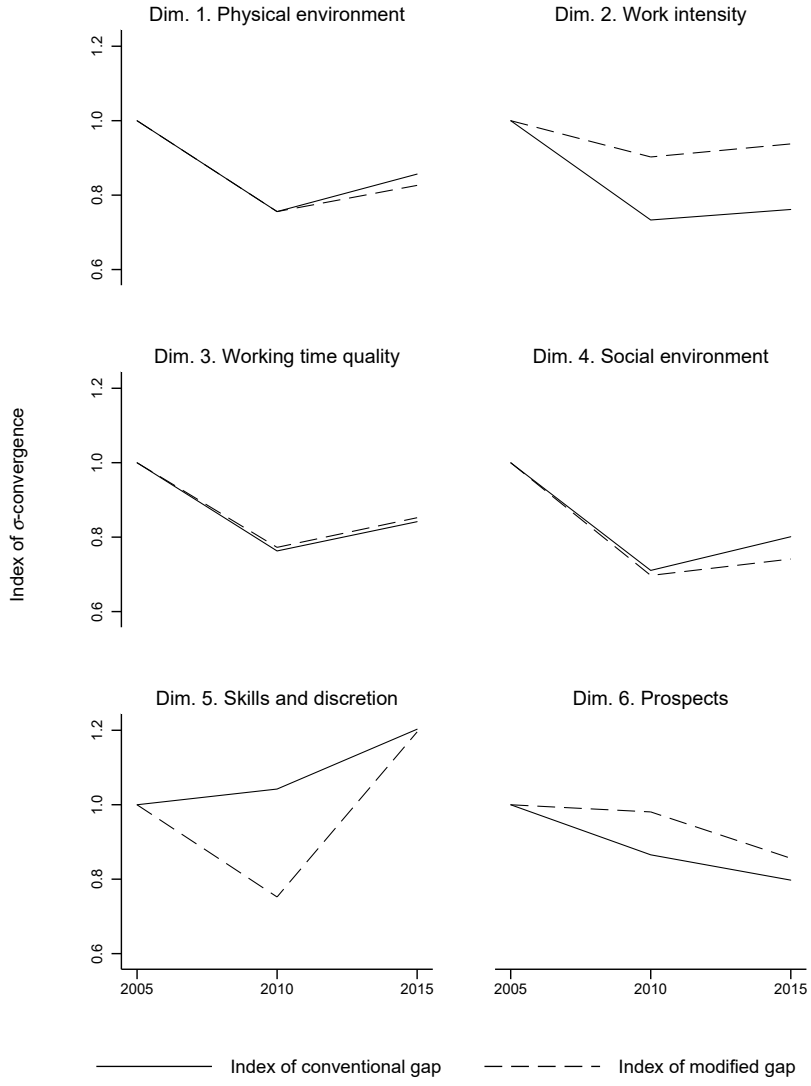
"U" shape, with strong reductions in the standard deviation in the first period, and an increase, or stagnation, in the second one. Only in the dimensions of prospects the reduction of the dispersion of the gender gap is roughly lineal. Having in mind that the end of the first period of analysis 2008–2010 coincides with the Great Recession, with difference length, intensities and consequences across Europe, this change in trend might be related with the impact of the economic crisis on working conditions and non-negligible compositional effects dramatically affecting trends. This situation, where the evolution of σ-convergence does not mirror the one of β-convergence is not rare in the specialised literature on growth and inequality.

Figure S.1. σ-convergence in the gender gap (with demographic controls) in working conditions dimension (standard deviation of the gap, European Union countries, 2005–2015)



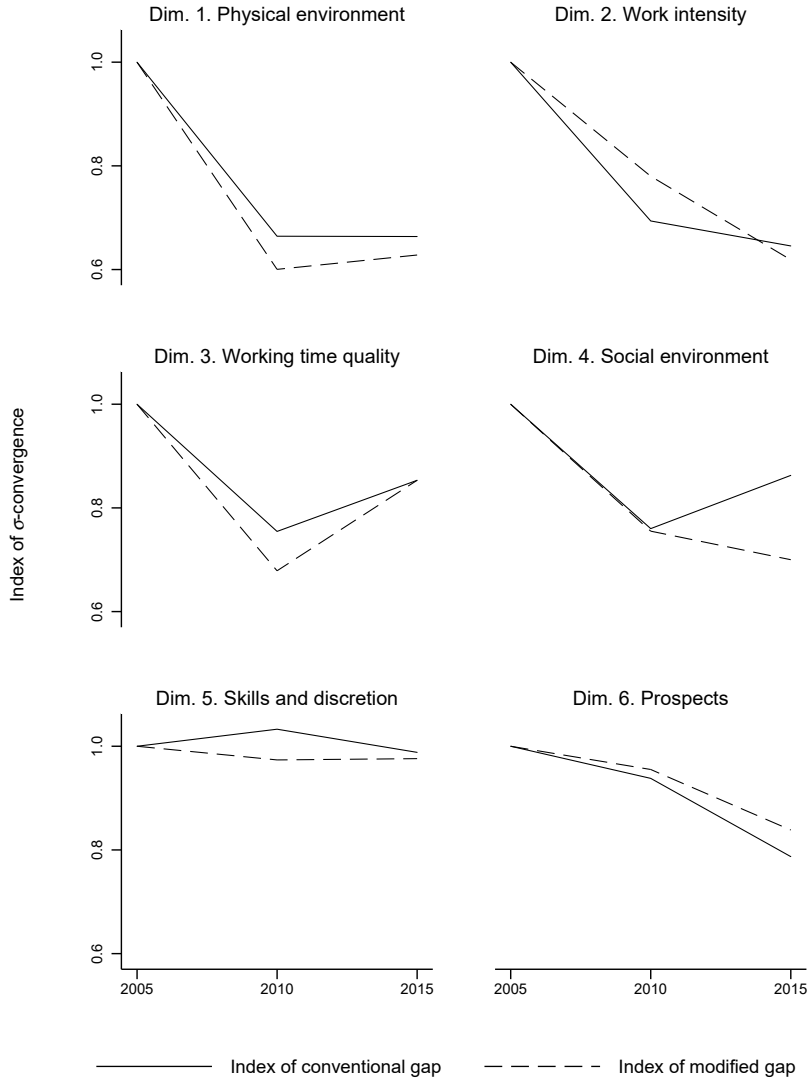
Note: The standard deviation is normalised by its initial value in 2005. *Source*: Authors' analysis from EWCS.

Figure S.2. σ-convergence in the gender gap (without controls) in working conditions by dimension (standard deviation of gap, European Union countries, 2005–2015)



Note: The standard deviation is normalised by its initial value in 2005. *Source*: Authors' analysis from EWCS.

Figure S.3. σ-convergence in the gender gap (without demographic and occupational controls) in working conditions dimension (standard deviation of gap, European Union countries, 2005–2015)



Note: The standard deviation is normalised by its initial value in 2005. *Source*: Authors' analysis from EWCS.