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Convergence in working conditions*

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Abstract

This article documents the convergence in non-monetary working conditions in Europe. We compute composite indexes widely used in previous literature for 207 regions in six different areas of job quality drawing on survey data from 1995 to 2015. Our findings reveal the existence of a strong process of unconditional β -convergence and some evidence for σ -convergence during the two decades considered. Our results are robust to a wide range of changes in the sample and different econometric specifications.

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1. Introduction

Contemporaneous economic research clearly indicates that workers' well-being goes beyond earnings. They value non-pecuniary job amenities and are willing to exchange income for improvements in other domains (Clark, 2005, 2015; Fernández & Nordman, 2009; Maestas et al., 2018; Nikolova & Cnossen, 2020). This topic also

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concentrates the attention of international institutions. Since more than a decade, the quality of work has become a central concern for organisms such as the International Labour Organization (ILO) (Director-General of the ILO, 1999), the European Union (European Council, 2000) or the Organisation for the Economic Co-operation and Development (OECD) (OECD, 2014).

At the same time, the evolution of global inequalities ranks high among the priorities listed in the research and political agenda (Milanovic, 2016), an interest fostered by the rise of automation technologies (Ivanov et al., 2020). The study of convergence constitutes one of the glasses through which society can look at the evolution of global inequalities (Milanovic, 2005) and, nowadays, it continues representing a hot topic in Economics (Johnson & Papageorgiou, 2020), fostering passionate debates (Kremer et al., 2021; Pande & Enevoldsen, 2021).¹

Unlike convergence in income, productivity, or wages, we know very little about whether and to which extent this process applies to non-pecuniary dimensions of job quality. As long as these attributes clearly shape workers' well-being, economists should care more about the eventual convergence of those features than they do. This topic is also relevant in the light of the recent debate about the decoupling between productivity and wages in OECD countries (Compagnucci et al., 2021; Schwellnus et al., 2017), which leaves non-monetary working conditions aside, particularly, keeping in mind that most of job amenities workers value are often costly for firms (Clark, 2015). Therefore, a proper assessment of the relationship between the evolution of output per unit of labour and worker's well-being should consider

¹Furthermore, the last two decades has attended to the emergence of a large literature exploring the patterns of convergence in different types of indicators of living standards apart from income (Jordá & Sarabia, 2015; Martínez, 2012; Mayer-Foulkes, 2003, 2012; Mazumdar, 2002, 2003; Neumayer, 2003; Noorbakhsh, 2007; Ortega et al., 2015; Sab & Smith, 2002).

other features of jobs part of the remuneration package.

This paper explores whether there is convergence in non-monetary working conditions using data from European regions from 1995 to 2015. It aims to provide the first rigorous attempt to analyse the existence of this phenomenon in non-pecuniary job amenities. There is some previous related literature on this topic from other traditions, like Management and Social Psychology. Such works adopt a narrower perspective than the one followed here, since they deal with many other topics, only cover either a few countries or a limited set of working conditions, do not rely on formal and clearly defined concepts of convergence, and do not make use of any tools of statistical inference for assessing if their results in this domain are statistically significant.

The first noteworthy work in this line (Olsen et al., [2010](#)) explores the evolution of five dimensions of job quality (extrinsic rewards, intrinsic rewards, work intensity, working conditions, and interpersonal relationships) in Norway, Germany, the United States and the Great Britain. Using data from International Social Survey Programme, they look at the differences between liberal (the United States and Great Britain) and coordinated market economies (Norway and Germany). They conclude that the sum of the differences in job security, work intensity and working conditions, and social relations (after controlling for workers' characteristics) diminish during the analysed period, although they do not perform any test of statistical significance.

The second relevant research on this topic is Eurofound ([2015](#)). This report makes use of the European Working Conditions Survey (EWCS) to assess the evolution of several dimensions of job quality (skills and discretion, work risks, work intensity, and working time quality) across the European Union between 1995 and

2010. They explore graphically the relationship between the change in each dimension over such a period and the mean in 2010, without any formal statistical test. Such analysis does not fit any widely known concept of convergence, neither β or σ one.² The research of Holman and Rafferty (2018), based on the previous report, examines the evolution of job discretion in four institutional regimes comprising the European Union-15 countries (social democratic, continental, liberal, and Southern European). They find that the average absolute change in social democratic regimes exceeds the one observed in the rest of institutional context, which they interpret as a sign of partial divergence.

Our work does not only draw on the formal concepts of convergence widely used in Economics but also considerably extend previous studies in terms of the countries and time periods covered. Specifically, we calculate indexes of job quality in six domains of common use in the specialised literature using data from the European Working Conditions Survey 1995–2015. After carrying out an extensive work of harmonization over time, we are able to analyse indicators of working conditions across 20 years and more than 200 European regions, which provides our analysis with a sizable statistical power. Our findings suggest the existence of both σ and, particularly, β convergence in all the areas considered. These results hold under a large battery of robustness checks.

The rest of the paper unfolds in four sections as follows. The second one discusses the theoretical arguments for expecting convergence in working conditions. Section 3 describes the databases and methodological tools employed in the analysis. We present and debate the results of convergence in the fourth section and

²Actually, instead of assessing the joint movement of all the Member States, the authors conclude that some countries goes closer to the European Union average, but not others.

the last one summarises the main conclusions of the research.

2. Rationale for convergence in working conditions

The expectation of convergence in productivity naturally arises from the neoclassical growth model and the existence of diminishing returns to capital (Barro & Sala-i-Martin, 1991, 1992). The case for convergence in working conditions is apparently not so straightforward. Nevertheless, given that workers does not only value the money and non-pecuniary job amenities are usually costly to provide for employers (Clark, 2015), raises in the productivity of labour should translates not only into improvements of wages but also into upgradings of other kinds of working conditions.³ In this fashion, recent studies highlight that innovation activities, resulting in higher productivity levels, might raise job quality at the firm level, although with heterogeneous effect across workers (Duhautois et al., 2018; Duhautois et al., 2020; Mofakhami, 2021).⁴ It is worth highlighting the lack of a consensus about the prevalence and scope of this phenomenon in the recent academic literature. Whereas some works support the existence of convergence in productivity levels, particularly, when looking at the last decades (Kinfemichael, 2019; Kinfemichael & Morshed, 2019; Kremer et al., 2021; Madsen & Timol, 2011; Monfort, 2008; Nell, 2020), a relevant share of research is quite sceptical about it or limit its scope to certain industries or groups of countries (Inklaar & Diewert, 2016; Martino, 2015; Monfort, 2020; Ram, 2017; Rodrik, 2013; Sondermann, 2013). We could also speculate about the possibility of diminishing returns to

³The literature also identifies examples of synergies between productivity and some non-monetary amenities like health and safety conditions (Buhai et al., 2017).

⁴There is a remarkable correlation between innovation and job quality at the firm level, but the causal nexus is hard to disentangle (Grande et al., 2020).

investment in some dimensions of job quality. For instance, it is reasonable to argue that the cost required for reaching a certain level of achievement in certain dimensions is likely to be increasing (e.g., health and safety measures), but this might not be true for other amenities (e.g., work breaks).

An argument related to the previous one has to do with the process of structural change. *Ceteris paribus*, the increasingly similar sectoral employment shares in Europe (Palan & Schmiedeberg, 2010) should represent a driving force of convergence in productivity levels and working conditions. Nevertheless, the different developments of high-tech industries across the continent (Goos et al., 2018; Ridao-Cano & Bodewig, 2019) might hamper the potentiality of this factor for fuelling convergence in job quality.

A third argument for anticipating convergence lies on the existence of process of harmonization of institutional frameworks in the age of globalisation. State-of-art research tends to support the hypothesis that labour market regulation becomes more and more similar across countries (Davies & Vadlamannati, 2013; Duanmu, 2014; Gahan et al., 2012; Hefeker & Neugart, 2010; Mehmet, 2006; Obadić et al., 2021). With a lower degree of agreement, the same applies to welfare state arrangements (Arts & Gelissen, 2010; Bouget, 2006; Obinger & Starke, 2014), which contribute to shape work outcomes. The growing involvement of the EU in the social arena might well reinforce this trend (Vaughan-Whitehead & Vázquez, 2019).

In the fourth place, experimental evidence suggests that workers' preferences over job amenities are subject to the law of diminishing marginal utility (Maestas et al., 2018). This implies that, other things being equal, they are more inclined to choose balanced bundles of job characteristics, which makes more likely that we

observe convergence in a certain attribute.

Finally, in contrast with income, some indicators of job quality face natural upper bounds, as in the case of life expectancy and educational variables considered in the assessment of multidimensional indicators of well-being (Jordá & Sarabia, 2015; Mayer-Foulkes, 2012; Mazumdar, 2002; Noorbakhsh, 2007; Ortega et al., 2015). For instance, it is perfectly feasible the existence of working environments totally free of biological and chemical risks or with full job discretion. Regulations and social customs are very likely to reinforce this effect: overall, the number of regulations affecting non-monetary working conditions exceed by a large extent the ones that apply to earnings. Actually, the dispersion of non-pecuniary job amenities is significantly lower than in the case of wages (e.g., working hours) (Green et al., 2013; Muñoz de Bustillo et al., 2011). Nevertheless, these superior limits might also appear due to a reduced number of available variables or measurement issues. We further discuss this potential problem in the next section and outline several robustness checks that reinforce our confidence on our main results.

3. Data and methods

3.1. Data

Our source of information on working conditions is the European Working Conditions Survey, carried out on five-year basis by the European Foundation for the Improvement of Living Conditions (Eurofound, 2020). Particularly, we make use of the last five waves of this survey, corresponding to the years 1995, 2000/2001, 2005, 2010, and 2015.⁵ The sample sizes and the number of variables available

⁵We only exclude the first wave (1990) because the number of countries included, the amount of working conditions covered, and sample sizes are substantially lower than in the later years.

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 plus the United Kingdom and, irregularly, Albania, Montenegro, Norway, Republic of North Macedonia, and Turkey. ⁶

In order to ensure an adequate statistical power in our exercise and given that the EWCS is representative at such a level, regions represent the unit of analysis in our work. They mainly correspond to the Nomenclature of Territorial Units for Statistics at the second level (NUTS 2), although in some cases, because of the existence of administrative changes in the boundaries of NUTS we cannot trace over time, we make use of larger geographical units. As a result, we are able to trace 207 regions over the period of interest that comprise 184,974 workers. We make use of 36 variables on six 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.

3.2. Measurement of working conditions

In order to measure the quality of working conditions and reduce the dimensionality of the problem to manageable levels, we rely on the set of indicators developed by the Eurofound and their collaborators (see, e.g., Muñoz de Bustillo et al., 2011, Eurofound, 2012, 2015, 2019, Fernández-Macías et al., 2015, and Green et al.,

The third wave of the survey corresponded to year 2000 in the Member States of the European, while it took place in 2001 in the case of the 12 countries that joined the EU between 2004 and 2007. We keep into account this issue when computing the annual rate of change in working conditions in our analysis.

⁶There are also two non-consecutive waves for Switzerland and two single waves for Serbia and Kosovo, which we logically exclude from the analysis.

2013) 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 modify 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 36 available variables into 14 sub-dimensions and the six dimensions mentioned above (see Table 1).

We define all the domains so that a higher value of the indicator implies a better 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 six domains.⁷

Workers' ability to adapt to changes and cognitive dissonance might reduce the meaningfulness of subjective assessments of job quality (Muñoz de Bustillo & Fernández-Macías, 2005; Muñoz de Bustillo et al., 2011). Therefore, we privilege the use of objective measures over subjective valuations of job features whenever possible. In any case, given the undeniable correlation between objective and subjective measures of well-being (Clark, 2015; Oswald & Wu, 2010), we also look at the behaviour of job satisfaction (a 0–100 variable in our database) in order to check the robustness of our results. With the same spirit, we compute an extended version of our indexes with 49 variables for the period 2005–2015 (see Table S.1 in our supplementary online material).

⁷In other words, as in most of the recent works using these sorts of indexes (see, e.g., Green et al. [2013], Menon et al. [2019] and Antón et al. [2020]), 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. (2011) 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.

3.3. Convergence

Firstly, we look at the convergence issue from the perspective of β -convergence. It refers to the degree to which the change in regional average value of a dimension over a certain period of time is negatively related to its initial level (Barro & Sala-i-Martin, 1991, 1992). We explore the existence of this type of convergence through the following equation:

$$\frac{\log y_{rct} - \log y_{rct-5}}{5} = \alpha + \beta \log y_{rct-5} + D_t + D_c + \epsilon_{rct} \quad (1)$$

where y_{rct} denotes the average job quality in the dimension y in the region r in country c at time t , y_{rct-5} , the outcome in the initial period (five years earlier), α is an intercept, D_t and D_c represent fixed time and country effects, respectively, and ϵ_{rct} is disturbance (which we assume does not correlate with the regressors). In this framework, $\beta < 0$ indicates the existence of convergence. In order to maximize the statistical power of our analysis, we pool region-level five-year changes. In the spirit of Rodrik (2013), we consider that the specification that includes country fixed effects allows exploring conditional convergence, while the removal of these dummies from the equation implies a focus on unconditional convergence. In principle, we should expect that conditional convergence is faster than unconditional one, since we control for country-specific conditions.

We also assess the existence and extent of σ -convergence during the period 1995–2015. One can explore this perspective making use of almost any dispersion statistic. Specifically, we resort to the standard deviation and the coefficient of variation of the log of each job quality index.⁸ We should also bear in mind that β -

⁸Naturally, when one addresses σ -convergence, the analysis should consider only those regions

convergence is necessary but not sufficient for σ -convergence (Quah, 1993; Young et al., 2008).

4. Results

Figure 1 shows a pattern of unconditional β -convergence in the six dimensions considered in our analysis when we look at the whole sample. The main results of our regression-based analysis (Table 2) clearly indicates the existence of β -convergence in all the domains of working conditions. This applies to both unconditional and conditional convergence. Furthermore, while the speed of unconditional convergence seems faster in the case of social environment, work intensity, and physical environment, once we account for country fixed-effects, as expected, the coefficients becomes larger (in absolute value) and differences essentially vanish.

As mentioned above, the inclusion of all available observations means that some countries are only present during the last periods (particularly, those that joined the EU after 2004 or became accession candidates). This could introduce some bias in our estimates, so we re-estimate all our regressions considering two balanced samples. The first one, from 1995 to 2015, comprises the Member States of the EU before the Eastern enlargement (Table 3), whereas the second one corresponds to 27 countries, the current members plus the United Kingdom and minus Croatia, and covers the period 2000–2015 (Table 4). The results are essentially the same in both qualitative and quantitative terms. At most, the speed of convergence seems faster when we limit the sample to a balanced panel of regions.

for which there are available observations over the whole period of interest. Although the risk is much lower than here, it is also possible that the inclusion of different units over time introduce some bias in the assessment of β -convergence. Therefore, we carry out several robustness checks using balanced panels for the periods 1995–2015 and 2000–2015.

Our analysis of σ -convergence draws on the two balanced panel of regions mentioned above. Figure 2, based on the EU before the Eastern enlargement, indicates that the dispersion of job quality in the six dimensions slightly decreases from 1995 to 2015. Interestingly this, pattern is non-monotonic. When we extend the country coverage—at the expense of losing a period—, we observe a very similar pattern, which indicates that the selection of the countries does not drive the outcome of the analysis. The main exception is the small increase in the standard deviation of job quality due to work intensity from 2000 to 2015. Nevertheless, we should bear in mind that we cannot observe the value for year 1995.

In order to further check the stability of our results, we perform several additional analyses. In the first place, we weight the observations by the employment volume at the beginning of each period. This could mean a potential source of discrepancy, as the number of workers in each region greatly varies.⁹ We present the results of these estimations in an annex. The results for both β - (Figure A.1 and Tables A.1, A.2, and A.3) and σ -convergence (Figure A.2) are remarkably similar to those based on unweighed observations.

Secondly, we look at the evolution of job satisfaction over the periods of interest (1995–2015 and 2000–2015) (Figure A.3 and Table A.4). The clear pattern of σ -convergence and the evolution of the dispersion of this variable are in line with our prior findings, which reinforces our confidence that the results of our analysis is not an artefact of an imperfect database.

Our final assessment of robustness consists in employing a considerably en-

⁹The configuration of NUTS 2 largely reflects the desire of defining territories of a similar size in terms of population. However, there are still large differences across countries and, in our case, the need of merging some units because of changes in in the nomenclature exacerbates them.

riched set of job quality indexes that includes 13 additional variables, mostly affecting the third and sixth dimensions of working conditions. These results are available as a supplementary online material (Figures S.1 and S.2 and Table S.2). Reassuringly, these results agrees with the one showed above. This is particularly comforting in the case of the Dimensions No. 3 (working time) and 6 (prospects), where the possibility of considering additional job features does not seem to alter the main message of the analysis.

5. Conclusions

In spite of the extensive literature on the evolution of differences in living standards, welfare state regimes, or labour market regulations, there has been a lack of rigorous studies addressing convergence in working conditions. This article has aimed to fill this gap. Using comparable survey-based information for more European 200 regions and two decades, it has documented the existence of a strong process of unconditional β -convergence during the period 1995–2015. Our findings have also suggested a slight reduction in the dispersion during the same time window, providing evidence for σ -convergence. We have also shown that these results are robust to a number of robustness checks, such as changes in the sample or the enrichment of the job quality indexes.

Jointly with the recent evidence emphasizing workers' valuation of non-monetary job amenities and the persistent controversies about economic convergence and the decoupling of productivity from wages, it seems advisable to support a larger role for the analysis of working conditions in both academic research and policy making. This issue might be particularly relevant for research on the impact of globalisa-

tion and technology on labour markets, where, apart from remarkable exceptions (Adda & Fawaz, 2020; Antón et al., 2020; Lang et al., 2019) non-monetary job features have received relatively little attention.

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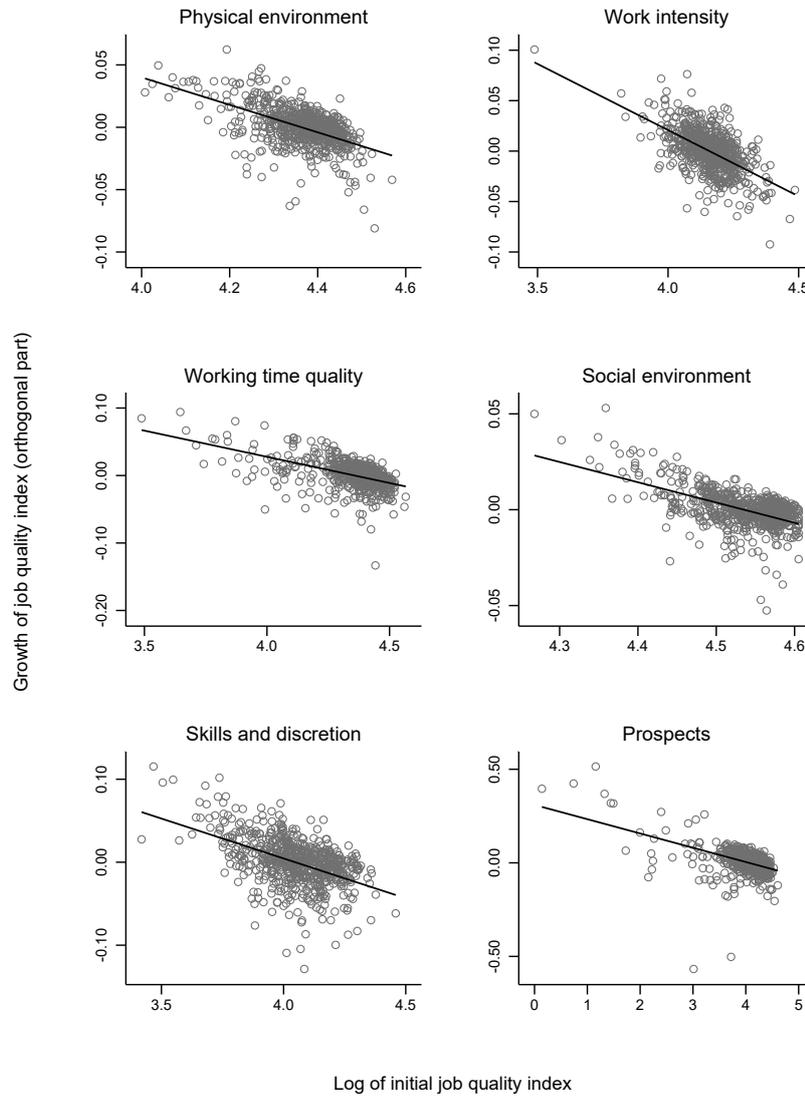
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Annex

Figures and tables

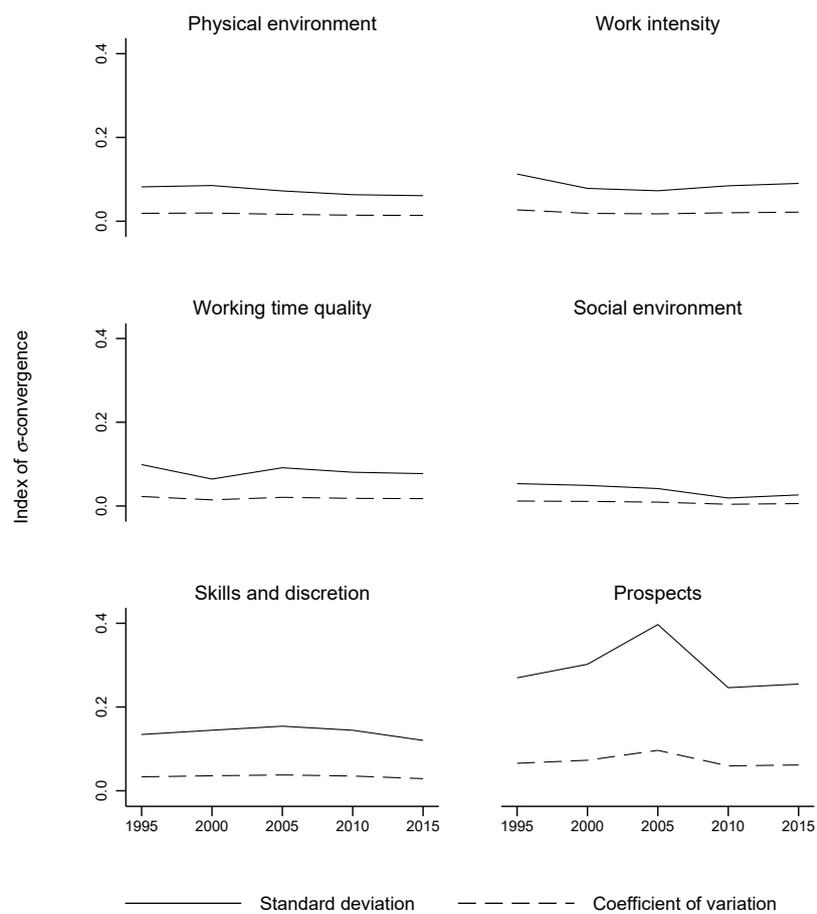
Figure 1. Unconditional β -convergence in working conditions in Europe (5-year changes)



Notes: The variable in the vertical axis is the growth in the job quality index controlling for time fixed effects.

Source: Authors' analysis from EWCS.

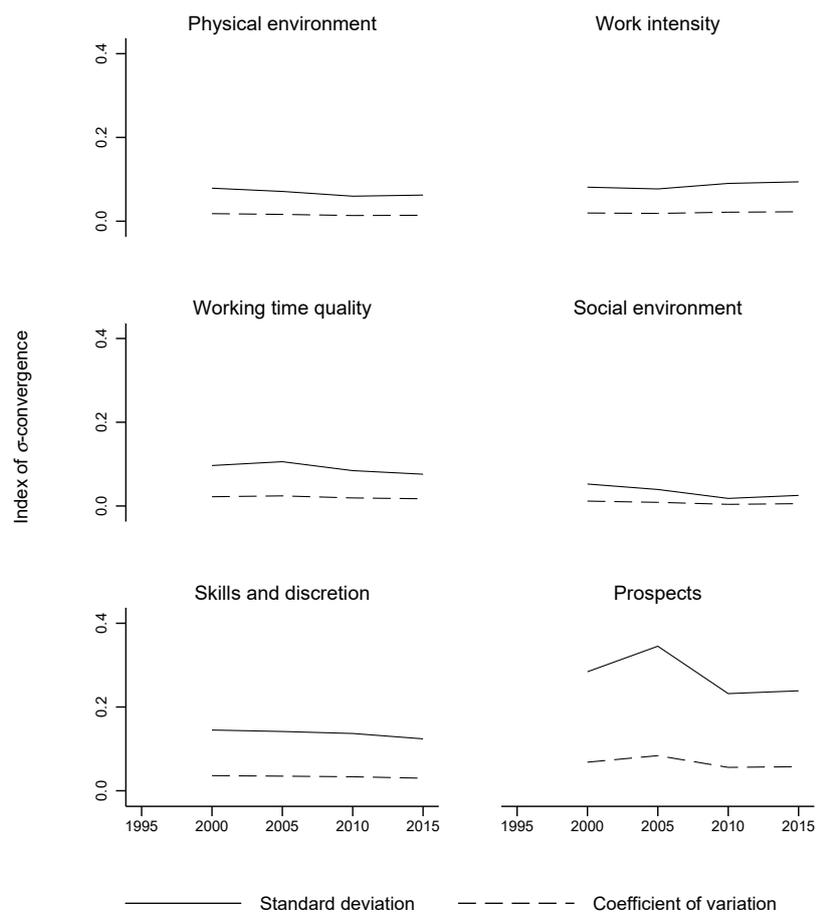
Figure 2. σ -convergence in working conditions by dimension (standard deviation and coefficient of variation of log of job quality index, 1995–2015)



Notes: The analysis only includes regions with observations for whole period 1995–2015.

Source: Authors' analysis from EWCS.

Figure 3. σ -convergence in working conditions by dimension (standard deviation and coefficient of variation of log of job quality index, 2000–2015)



Notes: The analysis only includes regions with observations for whole period 2000–2015.

Source: Authors' analysis from EWCS.

Table 1. Dimensions, subdimensions and variables of working conditions

Dimension	Subdimension	Variable
D.1. Physical environment	D.1.1. Ambient risks	Vibrations
		Noise
	D.1.2. Biological and chemical risks	High temperatures
Low temperatures		
D.2. Work intensity	D.1.3. Posture-relate risks	Fumes and vapours
		Chemicals
	D.2.1. Quantitative demands	Tiring positions
Heavy loads		
D.3. Working time quality	D.2.2. Pace determinants and interdependency	Repetitive movements
		Pace of work (high speed)
	D.3.1. Duration	Pace of work (tight deadlines)
Time pressure		
D.4. Social environment	D.3.2. Atypical working time	Colleagues
		Customer demands
	D.4.1. Adverse social behaviour	Production targets
Machine speed		
D.5. Skills and discretion	D.4.2. Social support	Boss
		Working hours (≥ 10 and ≤ 48 per week)
	D.5.1. Cognitive dimension	D.5.2. Decision latitude
Saturday work		
D.6. Prospects	D.5.3. Training	Sunday work
		Shift work
	D.6.1. Employment status	D.6.2. Career prospects
Unwanted sexual attention		
		Colleagues support
		Solving unforeseen problems
		Carrying out complex tasks
		Working with computers, smartphones, etc.
		Control the order of the tasks
		Control the speed of work
		Control the methods of work
		Control the timing of breaks
		Training provided by the employer
		Possibility of learning new things
		Type of contract
		Good career prospects

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

Table 2. β -convergence in working conditions in Europe (baseline specification, 5-year changes)

	(I)	(II)	(III)	(IV)	(V)	(VI)
	Physical environment	Work intensity	Working-time quality	Social environment	Skills and discretion	Prospects
<i>Panel A. Unconditional convergence</i>						
Log initial job quality	-0.111*** (0.009)	-0.134*** (0.009)	-0.078*** (0.006)	-0.167*** (0.007)	-0.098*** (0.008)	-0.078*** (0.010)
No. of countries	33	33	33	33	33	33
No. of regions	207	207	207	207	207	207
No. of observations	664	664	664	664	664	664
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects						
<i>Panel B. Conditional convergence</i>						
Log initial job quality	-0.173*** (0.011)	-0.176*** (0.008)	-0.170*** (0.012)	-0.185*** (0.008)	-0.189*** (0.008)	-0.162*** (0.012)
No. of countries	33	33	33	33	33	33
No. of regions	207	207	207	207	207	207
No. of observations	664	664	664	664	664	664
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects	✓	✓	✓	✓	✓	✓

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the regional level in parentheses.

Source: Authors' analysis from EWCS.

Table 3. β -convergence in working conditions in Europe (balanced panel 1995–2015, 5-year changes)

	(I)	(II)	(III)	(IV)	(V)	(VI)
	Physical environment	Work intensity	Working-time quality	Social environment	Skills and discretion	Prospects
<i>Panel A. Unconditional convergence</i>						
Log initial job quality	−0.113*** (0.011)	−0.153*** (0.011)	−0.117*** (0.015)	−0.168*** (0.009)	−0.103*** (0.009)	−0.091*** (0.016)
No. of countries	15	15	15	15	15	15
No. of regions	111	111	111	111	111	111
No. of observations	444	444	444	444	444	444
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects						
<i>Panel B. Conditional convergence</i>						
Log initial job quality	−0.168*** (0.014)	−0.176*** (0.011)	−0.179*** (0.013)	−0.183*** (0.009)	−0.182*** (0.010)	−0.170*** (0.008)
No. of countries	15	15	15	15	15	15
No. of regions	111	111	111	111	111	111
No. of observations	444	444	444	444	444	444
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects	✓	✓	✓	✓	✓	✓

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the regional level in parentheses. The specification only includes regions with observations for the whole period 1995–2015.

Source: Authors' analysis from EWCS.

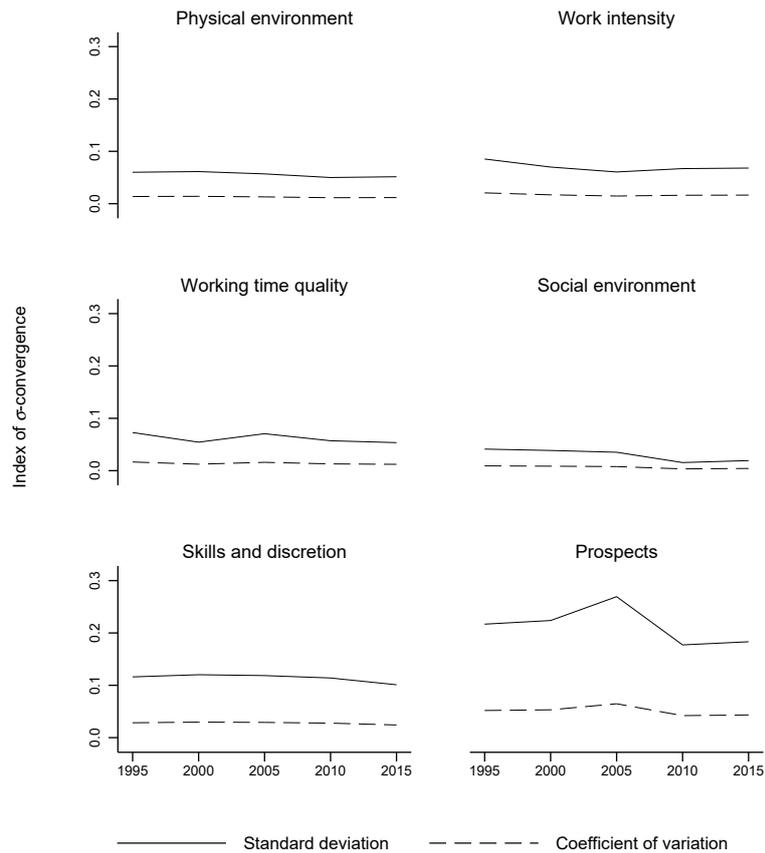
Table 4. β -convergence in working conditions in Europe (balanced panel 2000–2015, 5-year changes)

	(I)	(II)	(III)	(IV)	(V)	(VI)
	Physical environment	Work intensity	Working-time quality	Social environment	Skills and discretion	Prospects
<i>Panel A. Unconditional convergence</i>						
Log initial job quality	−0.130*** (0.012)	−0.134*** (0.011)	−0.092*** (0.008)	−0.172*** (0.009)	−0.119*** (0.010)	−0.100*** (0.014)
No. of countries	27	27	27	27	27	27
No. of regions	163	163	163	163	163	163
No. of observations	489	489	489	489	489	489
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects						
<i>Panel B. Conditional convergence</i>						
Log initial job quality	−0.184*** (0.013)	−0.189*** (0.011)	−0.151*** (0.010)	−0.195*** (0.010)	−0.206*** (0.013)	−0.171*** (0.007)
No. of countries	27	27	27	27	27	27
No. of regions	163	163	163	163	163	163
No. of observations	489	489	489	489	489	489
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects	✓	✓	✓	✓	✓	✓

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the regional level in parentheses. The specification only includes regions with observations for the whole period 2000–2015.

Source: Authors' analysis from EWCS.

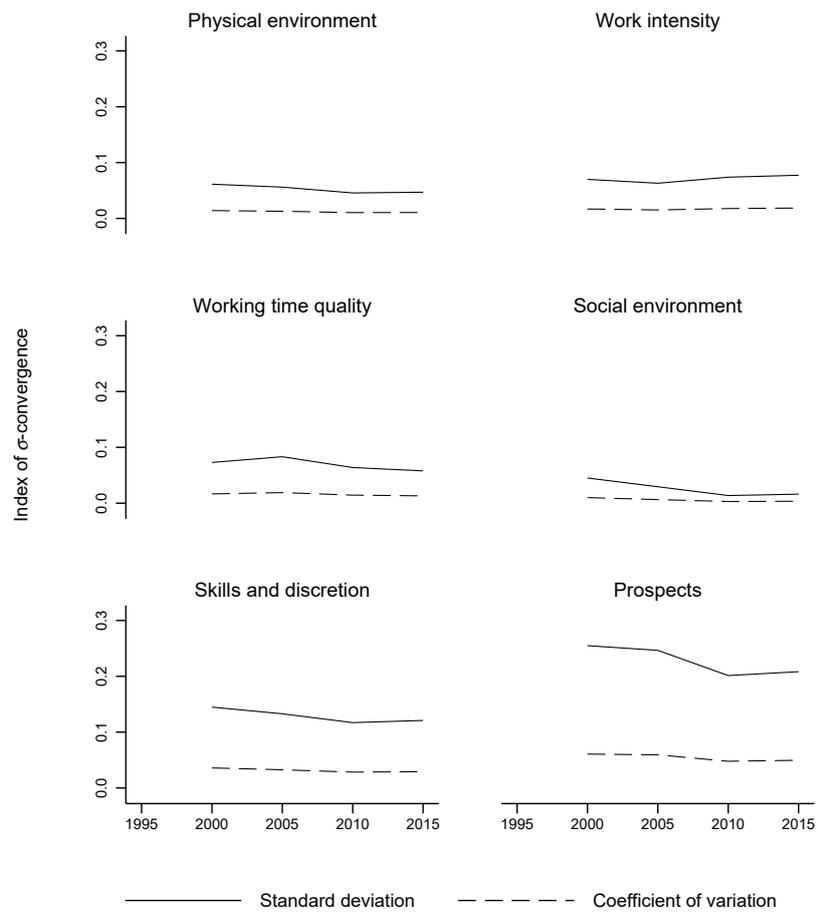
Figure A.1. σ -convergence in working conditions by dimension (standard deviation and coefficient of variation of log of job quality index, 1995–2015, weighted by regional employment)



Notes: The analysis only includes regions with observations for whole period 1995–2015. Observations are weighted by regional employed population.

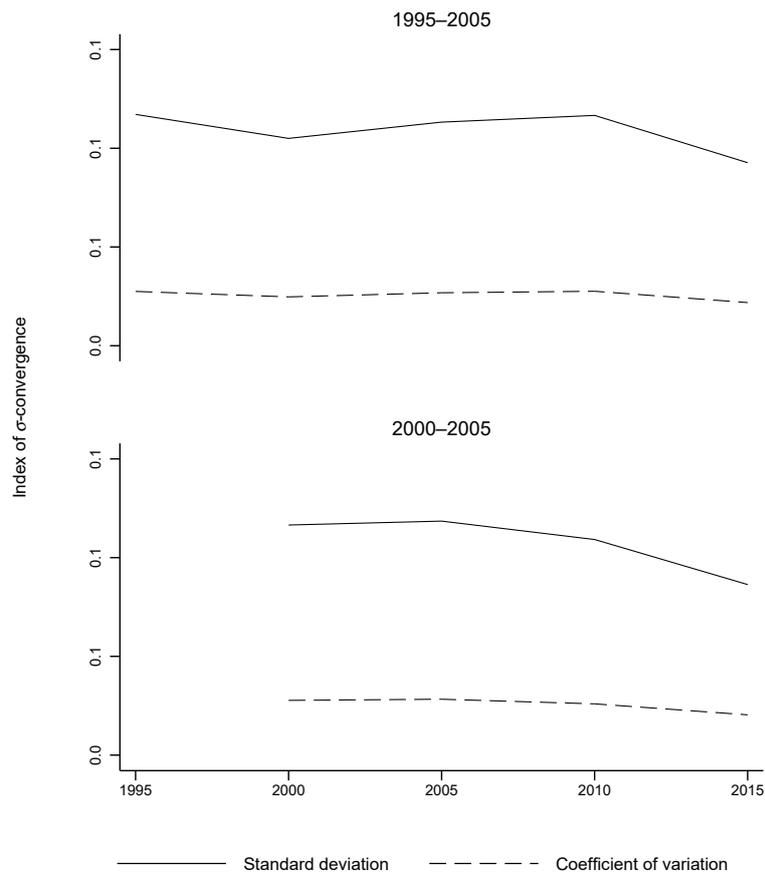
Source: Authors' analysis from EWCS.

Figure A.2. σ -convergence in working conditions by dimension (standard deviation and coefficient of variation of log of job quality index, 2000–2015, weighted by regional employment)



Notes: The analysis only includes regions with observations for whole period 2000–2015. Observations are weighted by regional employed population. *Source:* Authors' analysis from EWCS.

Figure A.3. σ -convergence in job satisfaction (standard deviation and coefficient of variation of log of job satisfaction, 2000–2015)



Notes: The upper figure only includes regions with observations for the period 1995–2015 and the lower one, for the period 2000–2015.

Source: Authors' analysis from EWCS.

Table A.1. β -convergence in working conditions in Europe (baseline specification, 5-year changes, weighted by regional employment)

	(I)	(II)	(III)	(IV)	(V)	(VI)
	Physical environment	Work intensity	Working-time quality	Social environment	Skills and discretion	Prospects
<i>Panel A. Unconditional convergence</i>						
Log initial job quality	-0.090*** (0.007)	-0.118*** (0.012)	-0.057*** (0.006)	-0.135*** (0.008)	-0.059*** (0.008)	-0.068*** (0.010)
No. of countries	33	33	33	33	33	33
No. of regions	207	207	207	207	207	207
No. of observations	664	664	664	664	664	664
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects						
<i>Panel B. Conditional convergence</i>						
Log initial job quality	-0.165*** (0.009)	-0.193*** (0.011)	-0.174*** (0.011)	-0.170*** (0.010)	-0.198*** (0.010)	-0.155*** (0.013)
No. of countries	33	33	33	33	33	33
No. of regions	207	207	207	207	207	207
No. of observations	664	664	664	664	664	664
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects	✓	✓	✓	✓	✓	✓

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the regional level in parentheses. All the regressions are weighted by regional employed population.

Source: Authors' analysis from EWCS.

Table A.2. β -convergence in working conditions in Europe (balanced panel 1995–2015, 5-year changes, weighted by regional employment)

	(I)	(II)	(III)	(IV)	(V)	(VI)
	Physical environment	Work intensity	Working-time quality	Social environment	Skills and discretion	Prospects
<i>Panel A. Unconditional convergence</i>						
Log initial job quality	-0.081*** (0.009)	-0.141*** (0.014)	-0.078*** (0.014)	-0.137*** (0.011)	-0.063*** (0.011)	-0.056*** (0.007)
No. of countries	15	15	15	15	15	15
No. of regions	111	111	111	111	111	111
No. of observations	444	444	444	444	444	444
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects						
<i>Panel B. Conditional convergence</i>						
Log initial job quality	-0.154*** (0.011)	-0.189*** (0.015)	-0.179*** (0.014)	-0.169*** (0.012)	-0.188*** (0.012)	-0.163*** (0.009)
No. of countries	15	15	15	15	15	15
No. of regions	111	111	111	111	111	111
No. of observations	444	444	444	444	444	444
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects	✓	✓	✓	✓	✓	✓

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the regional level in parentheses. The specifications only include regions with observations for the whole period 1995–2015. All the regressions are weighted by regional employed population.

Source: Authors' analysis from EWCS.

Table A.3. β -convergence in working conditions in Europe (balanced panel 2000–2015, 5-year changes, weighted by regional employment)

	(I)	(II)	(III)	(IV)	(V)	(VI)
	Physical environment	Work intensity	Working-time quality	Social environment	Skills and discretion	Prospects
<i>Panel A. Unconditional convergence</i>						
Log initial job quality	−0.095*** (0.010)	−0.120*** (0.017)	−0.073*** (0.010)	−0.138*** (0.007)	−0.069*** (0.010)	−0.063*** (0.010)
No. of countries	27	27	27	27	27	27
No. of regions	163	163	163	163	163	163
No. of observations	489	489	489	489	489	489
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects						
<i>Panel B. Conditional convergence</i>						
Log initial job quality	−0.163*** (0.011)	−0.204*** (0.013)	−0.160*** (0.011)	−0.159*** (0.009)	−0.207*** (0.012)	−0.176*** (0.013)
No. of countries	27	27	27	27	27	27
No. of regions	163	163	163	163	163	163
No. of observations	489	489	489	489	489	489
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects	✓	✓	✓	✓	✓	✓

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the regional level in parentheses. The specifications only include regions with observations for the whole period 2000–2015.

Source: Authors' analysis from EWCS.

Table A.4. β -convergence in job satisfaction in Europe (5-year changes)

	(I)	(II)	(III)
	All periods	Balanced panel 1995–2015	Balanced panel 2000–2015
<i>Panel A. Unconditional convergence</i>			
Log initial job satisfaction	−0.085*** (0.008)	−0.100*** (0.012)	−0.109*** (0.011)
No. of countries	33	15	27
No. of regions	207	111	163
No. of observations	664	444	489
Time fixed-effects	✓	✓	✓
Country fixed-effects			
<i>Panel B. Conditional convergence</i>			
Log initial job satisfaction	−0.182*** (0.011)	−0.192*** (0.013)	−0.204*** (0.011)
No. of countries	33	15	27
No. of regions	207	111	163
No. of observations	664	444	489
Time fixed-effects	✓	✓	✓
Country fixed-effects	✓	✓	✓

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the regional level in parentheses. Specification in columns (II) and (III) only include regions with observations for the periods 1995–2015 and 2000–2015, respectively.

Source: Authors' analysis from EWCS.

Supplementary material (not for publication)

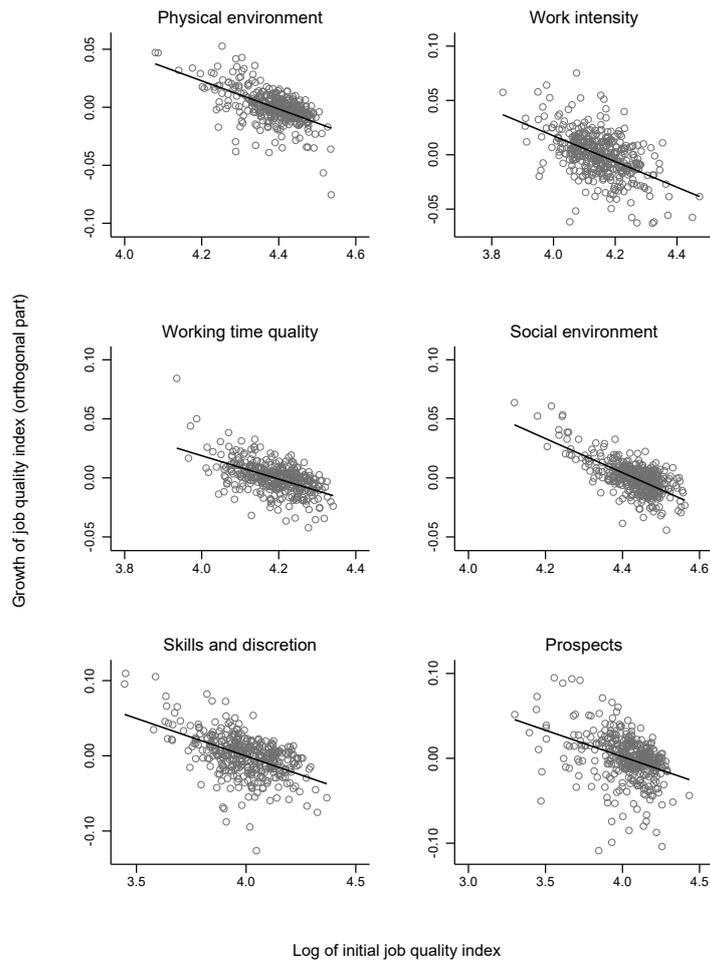
In this pages, we present the results obtained using an richer version of the indexes of job quality for the period 2005–2015 (Table S.1). Since year 2005, the number of variables available becomes larger and allows a more detailed assessment of working conditions in every dimension, particularly, in the case of working time quality and prospects. The results are qualitative and quantitatively similar to the ones reported in the main text.

Table S.1. Dimensions, subdimensions and variables of working conditions (enriched version 2005–2015)

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	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 (≥ 10 and ≤ 48 per week) Long working days (≥ 10 per month)
	D.3.2. Atypical working time	Night work
		Saturday work
		Sunday work Shift work
	D.3.3. Working time arrangements	Setting of working time arrangements (company versus worker)
	D.3.4. Work-life balance	Fit with family and and social life
D.4. Social environment	D.4.1. Adverse social behaviour	Physical violence
		Bullying and harassment Unwanted sexual attention
	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	Type of contract
	D.6.2. Career prospects	Good career prospects
	D.6.3. Job security	Job security prospects

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

Figure S.1. Unconditional β -convergence in working conditions in Europe (5-year changes)



Notes: The variable in the vertical axis is the growth in the job quality index controlling for time fixed effects.

Source: Authors' analysis from EWCS.

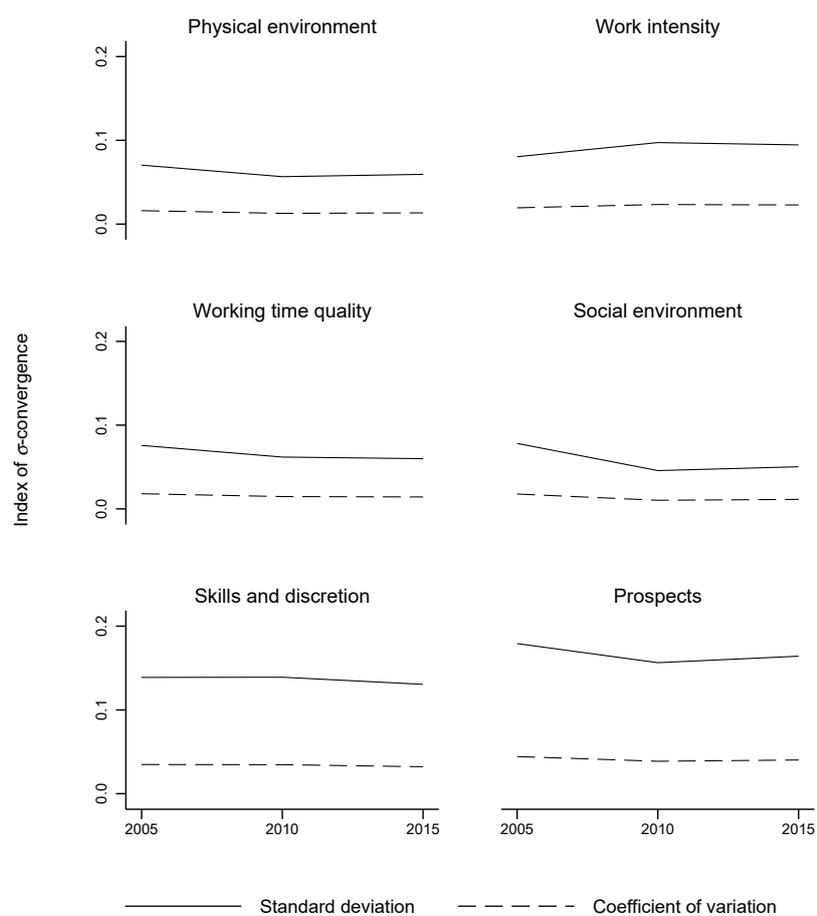
Table S.2. β -convergence in working conditions in Europe (baseline specification, enrich version 2005-2015, 5-year changes)

	(I)	(II)	(III)	(IV)	(V)	(VI)
	Physical environment	Work intensity	Working-time quality	Social environment	Skills and discretion	Prospects
<i>Panel A. Unconditional convergence</i>						
Log initial job quality	-0.122*** (0.011)	-0.121*** (0.011)	-0.099*** (0.012)	-0.158*** (0.011)	-0.101*** (0.010)	-0.063*** (0.009)
No. of countries	33	33	33	33	33	33
No. of regions	207	207	207	207	207	207
No. of observations	391	391	391	391	391	391
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects						
<i>Panel B. Conditional convergence</i>						
Log initial job quality	-0.195*** (0.015)	-0.183*** (0.014)	-0.187*** (0.016)	-0.197*** (0.011)	-0.183*** (0.012)	-0.141*** (0.017)
No. of countries	33	33	33	33	33	33
No. of regions	207	207	207	207	207	207
No. of observations	391	391	391	391	391	391
Time fixed-effects	✓	✓	✓	✓	✓	✓
Country fixed-effects	✓	✓	✓	✓	✓	✓

Notes: *** significant at 1% level; ** significant at 5% level; * significant at 10% level. Standard errors clustered at the regional level in parentheses.

Source: Authors' analysis from EWCS.

Figure S.2. σ -convergence in working conditions by dimension (standard deviation and coefficient of variation of log of job quality index, enrich version 2005–2015)



Notes: The analysis only includes regions with observations for whole period 2005–2015. Source: Authors' analysis from EWCS.