

Job polarisation: Capturing the effects of work organisation

The Economic and
Labour Relations Review
2021, Vol. 32(4) 594–613

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DOI: 10.1177/1035304621996064

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Abstract

This article critically challenges the findings and assumptions of mainstream job polarisation literature. Based on the European Working Conditions Survey data and on the Job Demand-Control model, which allows for capturing the organisational dimension of jobs, we examine the patterns and evolution of occupations in 22 European countries from 2005 to 2015. Instead of pervasive job polarisation, we observe a near-pervasive trend of upgrading job quality, suggesting that job polarisation may be caused by the undervaluation/devaluation of jobs low in the occupational hierarchy – not by computerisation-driven changes in work tasks. Indeed, only the former can explain the decrease in the number of low-quality jobs while the number of low-paid jobs increases. After documenting the relevance of firm-level organisational choices, we suggest that counteracting job polarisation requires, beyond meso-level collective bargaining, a public intervention that promotes participatory decision-making in firms.

JEL Codes: J2, J81, M540

Keywords

Devaluation of work, European Working Conditions Surveys, job command-control model, job polarisation

Introduction

It is generally accepted that job polarisation, defined as growing employment in both high- and low-skilled occupations with declining employment in middle-skilled occupations, broadly characterises labour markets in advanced countries. Statistical evidence documenting job polarisation has been provided by Cortes (2016), Autor (2013, 2015) and Goos et al. (2009, 2010, 2014) who also developed theoretical and econometric

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models suggesting that job polarisation is primarily explained by computerisation – computer technology changes the tasks performed by workers, substituting for workers in routine tasks and complementing them in non-routine problem-solving tasks (Autor et al., 2003). Offshoring and institutional settings are found to have a weak or negligible effect on polarisation (Goos et al., 2010, 2014), and as polarisation is technology driven, it should be taking place in all advanced economies and we would have no alternative but to accept it. We challenge the alleged pervasive character and causes of job polarisation offered in this literature by proposing a new approach to examining job polarisation, one that allows better capture of the differences in occupational profiles across countries. Our findings show that nation-level institutional environments and firm-level organisational choices have a powerful impact on the extent, if any, of job polarisation.

In fact, evidence is mounting that casts doubts on the polarisation hypothesis. Analysing changes in employment structures in the same countries and period as Goos et al. (2010), a second strand of literature – which we label ‘institutional’ – shows a plurality of patterns distributed across European countries (Fernández-Macias, 2012; Fernández-Macias and Hurley, 2017; Holman and Rafferty, 2018; Janičko and Krčková, 2019). Cross-national diversity is explained by national-level institutional differences in labour regulation and industrial relations systems. This divergence in empirical results is largely due to the different methods used to characterise and rank jobs or occupations, which depend in turn on theoretical assumptions about work and production. While the first strand of literature adopts a ‘task-based approach’ (Autor, 2013), grounded on the neoclassical production function, the second examines employment changes by looking at a broader range of aspects including job quality (Fernández-Macias and Hurley, 2017; Holman and Rafferty, 2018) – this allows an unveiling of the complexity of changes and the plurality of underlying driving factors.

In both strands of literature, the analysis focusses on characterising jobs while overlooking the organisational dimension of work and production. This article aims to redress this gap by providing an approach to job polarisation that accounts for organisational choices. The article’s specific aims are as follows: (1) to critically examine the job polarisation literature and establish the importance of taking work organisation into account; (2) to map the evolution of organisational features across European countries and occupations from 2005 to 2015; and (3) to better explain the plurality of structural employment changes through emphasising the role of firm-level organisational choices, associated with but distinct from national-level institutional factors and accordingly derive implications for policy. Overall, our results show that job polarisation is far from inevitable, but rather, by devising institutional arrangements which give greater voice to workers within firms, public policies can slow the current trends towards growing inequalities.

Given the high complexity and multidimensionality of work organisation, empirical studies inevitably cover only parts of the phenomenon. The Job Demand-Control (JDC) model (Karasek, 1979; Karasek and Theorell, 1990) is based on two hypotheses which allow for adequate capture of the organisational dimension of jobs: the ‘job strain’ hypothesis captures the extent to which work organisation impacts workers’ well-being, and the ‘active learning’ hypothesis captures the extent to which work organisation allows using and improving skills. Although a leading model in organisational studies,

and notwithstanding its relevance for economic concerns, the JDC model is barely used by economists. The data for the empirical study come from the 2005, 2010 and 2015 waves of the European Working Conditions Survey (EWCS) (Eurofound, 2018), which provide rich information for our purpose – 22 European countries, grouped by welfare regimes, are covered. The empirical study seeks to explore the paradox of why the number of people employed in low-quality jobs decreases when the number of people employed in low-paid jobs increases?

In the next section, we critically examine the assumptions underlying the job polarisation economic literature – based on the conventional production function, this perspective discards the wide-ranging influence that organisational choices have on job design – and introduce the *JDC model*, on which our empirical study is built. The empirical strategy and the operationalisation of the JDC model are presented in section ‘Empirical strategy and the construction of JD and JC indices’. Section ‘The structure and evolution of the occupational JD/JC patterns’ reports the empirical results, which serve as a basis to critically examine previously reported findings. Section ‘Explaining differences across countries and drawing policy implications’ provides tentative explanations of the results, emphasising the relevance of organisational factors and drawing policy implications. Section ‘Conclusion’ concludes.

Developing a job quality framework

Analysis of job polarisation is largely shaped by the assumptions and method proposed in Autor et al. (2003), whose purpose was to study how computerisation affected skill demands. Autor et al.’s (2003) approach – which we label the ‘task-based approach’ – developed into a highly influential strand of literature (Autor, 2013) on structural employment changes. The approach’s point of departure is the production function found in conventional economic models that views production as a mechanical process of transforming inputs into outputs. Autor (2013) proposes an enhanced version of the production function where the fundamental units of production are job tasks that are potentially supplied by labour or capital (machines) and combined to produce outputs. Jobs are composed of tasks and tasks are defined as units of work activity; this approach follows the strategy of the US Dictionary of Occupational Titles (DOT, 2006; O*Net Resource Centre, 2020) which identifies job characteristics based upon an occupational classification system (Spencer, 1980). While neoclassical models work as an abstract black box, infusing work with content and substance epitomises a major – and welcome – innovation. However, by ignoring work organisation, the production function conceptual framework is left unchanged: ‘the key difference between production in India and Japan is not technology but cost: labour is comparatively cheap in India’ (Autor, 2013: 5).

Autor and Handel (2013) and Cortes (2016) offer models that establish a causal link between skills, occupational assignments, job tasks and wages. These models assume, first, that wages are primarily determined by job tasks and, second, that workers self-select into the job tasks that are most valued to maximise their wage, given their skill endowments – occupations or jobs – are in turn defined by their main task. The link observed between skills, occupation, job tasks and wages is primarily explained by workers’ self-selection. In contrast, we consider that (1) the task composition of jobs is

determined by firms' organisational choices more than by technology or workers' self-allocation; (2) rather than workers endowed with given skills self-selecting into job tasks, it is the way jobs are designed by organisational choices that determines the skills required from workers, and (3) wages are highly influenced by the level of discretion and accountability granted to workers/jobs, a variable not considered in previous models. Further, we consider organisational choices to vary across firms largely because of national-level labour-related institutional factors. Therefore, we expect to observe a range of phenomena, from polarisation to upgrading along the occupational ladder, because, if the use of computers does affect some types of tasks, the impact on the structure of jobs depends on how tasks are *recombined*.

In contrast, the institutional literature contests that job polarisation is a pervasive phenomenon. The theoretical assumption is that work and labour markets are structured not only by technology but also by the following: industrial relations systems and labour market regulation, institutions that influence the division of labour, occupational boundaries and the allocation of labour to occupations (Fernández-Macias, 2012). The plurality of institutional frameworks is expected to lead to plurality in the patterns of occupational change. Instead of using the 'task-based approach' – which ranks and groups jobs/occupations into three groups according to the routine/analytical content of tasks: high-paid/skilled, middle-paid/skilled and low paid/skilled – Fernández-Macias (2012) and Eurofound (2014) use the 'jobs approach' to analyse the same set of countries over the same 1993–2007 period as Goos et al. (2010, 2014) The jobs approach defines jobs on an occupational basis crossed with sector at detailed levels; these are then characterised in terms of task content, wages and education. Jobs are ranked and grouped according to wage (wages being considered a good proxy for job quality) and analysed for change in the number of workers across the tiers of wage/job quality over the period.

'Institutional' studies reveal a plurality of patterns across Europe, a plurality that authors attribute to the different national industrial and labour regulation systems. Between 1995 and 2007, three main patterns are found: polarisation (e.g. The Netherlands, France and Germany), upgrading (e.g. Finland, Luxembourg, Denmark and Sweden) and middling-upgrading, that is, countries with an expansion of employment in the middle of the pay structure – the opposite of polarisation (e.g. Spain, Portugal, Italy). These findings are clearly at odds with those reported by Goos et al. (2010, 2014). It is worth noting that Germany and the UK have been polarising since the 1980s – prior to mass computerisation – while Scandinavian countries have been upgrading since the 1970s. Nonetheless, all studies reveal that the number of high-paid/high-skill jobs has consistently increased across countries and time. What is yet to be explained is the diversity in the evolution of low- and mid-paid jobs.

In addition, some institutional studies have looked at job polarisation from the standpoint of work autonomy¹ (Holman and Rafferty, 2018; Janičko and Krčková, 2019), but, like in the task and jobs approaches, the influence of organisational choices on the task composition of jobs and on the autonomy given to workers has not been directly addressed.

While the variables and methods used to characterise jobs differ in both these strands of literature, the criterion used to rank jobs/occupations is always the mean or median wage. Doubts therefore emerge on the extent to which what is observed is *wage* rather than *job* polarisation. Autor and Handel (2013) and Fernández-Macias and Hurley (2017)

show that wages, education and the cognitive content of tasks are highly correlated; however, using job-wage to rank jobs generates more polarised patterns: polarisation is much less obvious when jobs are ranked by education, and ranking by job quality leads to an upgrading pattern, that is, the number of people employed in low-quality jobs decreases in almost all countries (Eurofound, 2014: 40–60). So, why does the number of people employed in low-paid jobs increase in so many countries?

Our aim is not to dispute Autor et al. (2003)'s analysis of the effects of computerisation on work tasks but instead to open the black box of the production function by considering the organisational nature of production and firms. Discarding work organisation and its forceful influence on job design may lead to severely biased evidence or biased understandings of employment changes. Therefore, we expand our analysis to how job design evolved across occupations and countries.

Karasek (1979) and Karasek and Theorell (1990)'s JDC model provides a particularly adequate analytical framework and tool to operationalise our approach. The JDC and questionnaire are designed to measure organisational, social and psychological characteristics of jobs, thus going beyond the DOT characterisation of jobs (Spenner, 1980). A major advantage comes from how the model reconciles multiple scientific literatures; it is sociological in that it presumes that social environments affect workers' well-being and behaviour; it is psychological in that it presumes that individual psychosocial experiences predict health outcomes more than social features; and last but not least, the JDC questionnaire helps to capture and understand the social structures of production processes (Karasek et al., 1998), making it relevant for institutional economists.

The JDC assumes that work environments are composed of two critical facets, *job demands* (JD) and *job control* (JC), whose combined effect is greater than each individually. JD capture work psychological requirements; examples are time pressure, work overload and conflicting goals. JC – which we also refer to as work autonomy (Note 1) – captures the extent of decision authority and intellectual discretion granted to workers; examples are freedom to control and organise work, high use of skills and creative and non-repetitive work. JC thus refers to the extent to which workers can engage in non-prescribed behaviours such as cooperating with others, or engaging in non-prescribed tasks or performing tasks through new methods. JC is shown to be correlated to motivation and work engagement, which are in turn proven to influence innovation and economic performance (Lazauskaite-Zabielske et al., 2018).

Ideally, JD and JC should be highly correlated but Karasek (1979) sensed this was not always the case. Thousands of studies testing the JDC across countries, occupations and organisational settings have since shown JD and JC are distinct, orthogonal dimensions. In fact, the JDC allows for the partial capture of phenomena such as power and status, which shape organisational choices – phenomena often concealed by synthetic indicators. Thus, we interpret the discrepancy between JD and JC across countries as resulting from divergence in organisational choices.

The JDC generates two hypotheses; the strain hypothesis posits that jobs defined by heavy demands and low control (represented by axis B in Figure 1) result in mental strain, stress and health problems, and the active learning hypothesis posits that jobs with high demands and high control (axis A) provide workers with learning and development

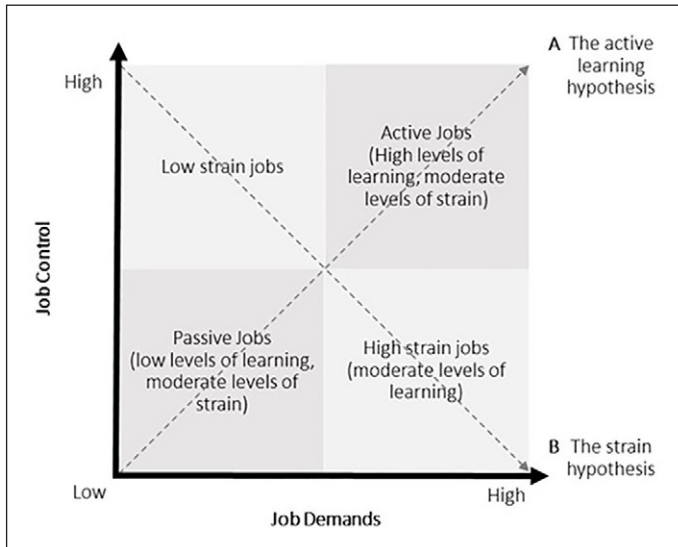


Figure 1. Job Demand-Control model (Karasek, 1979).

opportunities. Crossing JD and JC leads to identifying four types of jobs whose characteristics are presented in Figure 1:

- Low-strain jobs require little intrinsic motivation and offer few challenging opportunities;
- High-strain jobs are very demanding and workers lack decision authority to respond to work demands, which results in high risk of stress;
- Active jobs are demanding but workers have decisional latitude to deal with demands through searching for solutions and experimenting, resulting in higher learning opportunities;
- Passive jobs offer little room for learning and personal development.

While the strain hypothesis has been tested and supported by thousands of studies for a large variety of health symptoms and job definitions in many countries (Theorell et al., 2015), the active learning hypothesis has been less so. This is partly because Karasek and Theorell never clearly defined the active learning concept nor indicated how it could be tested, though often referring to the ‘development of new behaviour patterns [. . . and . . .] problem-solving activity’ (Karasek, 1979: 288) or the ‘active-passive behavioural correlates of jobs’ (Karasek et al., 1998: 346). Consequently, evidence supporting the learning hypothesis, as reported by Taris and Kompier (2005), is quite weak until 2003. Later studies provide further supportive evidence, such as the following: De Witte et al. (2007), the skills of young workers in their first job increase the most in ‘active jobs’; De Spiegelaere et al. (2015), active jobs are associated with positive effects on work engagement and innovative work behaviour; and Parker’s (2017) literature review, work demands are positively associated with learning only when work autonomy is high.

Empirical strategy and the construction of JD and JC indices

Our study draws on the 2005, 2010 and 2015 waves of the EWCS, a cross-sectional dataset providing unique and detailed information on the quality of work in Europe. The EWCS is questionnaire based, administered using face-to-face interviews, conducted with interviewees in their own home. Sampling is representative of those aged 15 years and older who are in employment, in each wave. In the 2010 and 2015 waves, a multi-stage, stratified random sampling design was used for each country.² Cases were weighted using the final country-level weights provided in the EWCS data file, which combine design and post-stratification weights to ensure the results reflect the population of workers in each country (Eurofound, 2015). Because the EWCS questions relevant for our purpose have remained the same since 2005, 2005 was chosen as our study's first wave (Lopes et al., 2014).

For the empirical analysis we, first, used 14 items from the EWCS to build reliable indices of JD and JC. Second, we developed a picture of how jobs have evolved in terms of JD and JC across 22 countries (comprising the 16 most common countries examined in job polarisation studies, including Eastern Europe). Third, since our findings showed pattern differentiation by welfare regime, the countries were grouped accordingly, and we then examined the evolution over time of occupations in terms of JD and JC for each group. Our unit of analysis is occupations at the two-digit code, like in all job polarisation studies.

Following the findings from the institutional job polarisation literature and based on our assumption about the relevance of organisational choices, we expect the following:

1. Occupational JD/JC patterns and their evolution to differ across countries because these patterns are influenced by national-level institutions – industrial relations systems and labour market regulation – and firm-level organisational choices;
2. Greater diversity in the middle and bottom of the occupational ladder across countries than at the top because labour regulatory institutions concentrate on improving the circumstances of the least privileged workers.

As discussed previously, the task-based approach conceptualises jobs and occupations as bundles of tasks. These studies analyse job polarisation, based on job descriptors, by assigning tasks to each occupation and classifying tasks into three groups (Autor, 2013): routine cognitive and manual tasks, deemed to be non-complex tasks; abstract analytical and managerial tasks, deemed to require creativity and problem-solving; and non-routine manual tasks requiring physical or interaction abilities. The tasks an occupation comprises are presumed static over the studied period, the focus being the number of people employed in each occupation. In contrast the JD/JC approach presents a number of major advantages. First, occupations are characterised more richly as jobs are depicted with many more features. Second, organisational choices are captured by the way in which tasks are combined within a given occupation. Third, the evolution of occupations in terms of task content can be accounted for instead of presuming such content static.

Small sample sizes in each cohort were avoided by combining some countries or occupations together in groups. We followed Janíčko and Krčková (2019) by grouping countries according to the conventional (though arguable) classification of welfare regimes: the Nordic Group – Denmark, Finland, Sweden and Norway; Continental Group – Belgium, Germany, France, Luxembourg, The Netherlands and Austria; Liberal Group – United Kingdom and Ireland; Southern Group – Portugal, Spain, Italy and Greece; and the Eastern European – Bulgaria, Czech Republic, Hungary, Poland, Croatia and Slovakia. The means of JD and JC for each occupation were calculated within each group and for each year, based on the two-digit International Standard Classification of Occupations (ISCO)-1988 classification. While most data collection entities dropped ISCO-88 when ISCO-08 was introduced, the EWCS has used ISCO-88 consistently across the three waves under study, which enables comparing occupations over 2005–2015. Our empirical study examined whether the JD/JC profile of occupations polarised, upgraded or downgraded over the period.

From the EWCS questionnaire, 14 items relating to JD and JC, which were present across all three waves, were selected for analysis. As stated earlier, the utility of the JDC lies in the separation and juxtaposition of these two dimensions (Karasek, 1979). Thus, we studied the underlying correlational structure between the 14 questions by means of non-linear principal component analysis (NLPCA; categorical principal component analysis (CATPCA) within SPSS). NLPCA is an alternative for the principal component analysis (PCA) that can deal with non-metric, categorical variables and reveal potential non-linear relationships between them. It is an iterative method, alternating between a quantification and decomposition phase, until *optimal quantification* for each category is found, in a process known as *optimal scaling*. The latter refers to transformations of the original values, meeting the measurement-level requirements of the original variables, that are best for the fitted model, that is, the first p components explain as much variance as possible (Linting and Van Der Kooij, 2012). Linting and Van Der Kooij (2012) provide a tutorial, and Linting et al. (2007) and Meulman et al. (2004) provide technical details. The main advantage over traditional PCA is the ability to mix nominal, ordinal and metric variables within the same model without a priori linear assumptions while allowing for result interpretation similar to standard PCA. Cronbach's alpha coefficient is displayed for each retained dimension, being the largest one possible for the current configuration (Meulman et al., 2004: 55).

Table 1 presents the loadings on the two-dimensional space obtained through CATPCA. Items Q49a and b; Q50a, c and e; and Q61g (see the questions' full wording in Table 1) strongly correlate uniquely with the second dimension – JD. Likewise, items Q54a, b and c and Q61i are most important to the structuring of the first dimension – JC. Although the correlations of the latter items with JD are low, their negative sign is theoretically expected and testifies to the coherence of the obtained dimensions. Finally, items Q53b, c, e and f have a noticeable role in the structuring of both dimensions, though with a higher loading on JC. Most interesting is that these items, common to both JC and JD, capture the facets of work that are precisely used to classify tasks in the task-based approach, namely the routine versus complex and analytical character of tasks. Our methodological approach – labelled hereafter the JC/JD approach – thus complements rather than discredits previously reported results, by unveiling facets of work

Table 1. Loadings in a two-dimensional space (correlations between items and dimensions^a).

	1: Job control	2: Job demands
Q49a. Does your job involve – Working at very high speed? ^b		0.73
Q49b. Does your job involve – Working to tight deadlines? ^b		0.78
Q50a. Is your pace of work dependent on – The work done by colleagues? ^c		0.49
Q50c. Is your pace of work dependent on – Numerical production targets or performance targets? ^c		0.52
Q50e. Is your pace of work dependent on – The direct control of your boss? ^c	-0.16	0.41
Q61g. You have enough time to get the job done? ^d		0.48
Q53b. Generally, does your main paid job involve – Assessing yourself the quality of your own work? ^c	0.44	0.26
Q53c. Generally, does your main paid job involve – Solving unforeseen problems on your own? ^c	0.56	0.18
Q53e. Generally, does your main paid job involve – Complex tasks? ^c	0.48	0.37
Q53f. Generally, does your main paid job involve – Learning new things? ^c	0.56	0.26
Q54a. Are you able to choose or change – Your order of tasks? ^c	0.72	-0.17
Q54b. Are you able to choose or change – Your methods of work? ^c	0.74	-0.16
Q54c. Are you able to choose or change – Your speed or rate of work? ^c	0.64	-0.22
Q61i. You are able to apply your own ideas in your work? ^e	0.65	-0.13
Cronbach's alpha	0.72	0.64

^aAbsolute values over 0.10 are shown.

^b1: never; 2: almost never; 3: around 1/4 of time; 4: around half of time; 5: around 3/4 of time; 6: almost always; 7: always.

^c1: no; 2: yes.

^d1: always; 2: most of time; 3: sometimes; 4: rarely; 5: never.

^e1: never; 2: rarely; 3: sometimes; 4: most of time; 5: always.

ignored by previous studies. Importantly, it also highlights that previous results only depict part of what is actually going on in the world of work.

Cronbach's alphas were 0.72 for JC and 0.64 for JD, indicating sufficient internal consistency. By applying CATPCA to each wave rather than on pooled data, we verified that the structure of each dimension was the same and that individual object scores were not substantially different, thus confirming the stability of the two dimensions. The (standardised) scores on each dimension are used hereafter as JC and JD indices (dataset pooled).

First analysis of JD and JC country means by year showed 2010 to be a highly atypical year. The country means for 2010 decreased into negative scores from 2005 and then rose quite sharply back to positive scores for 2015, in most countries. To assess whether

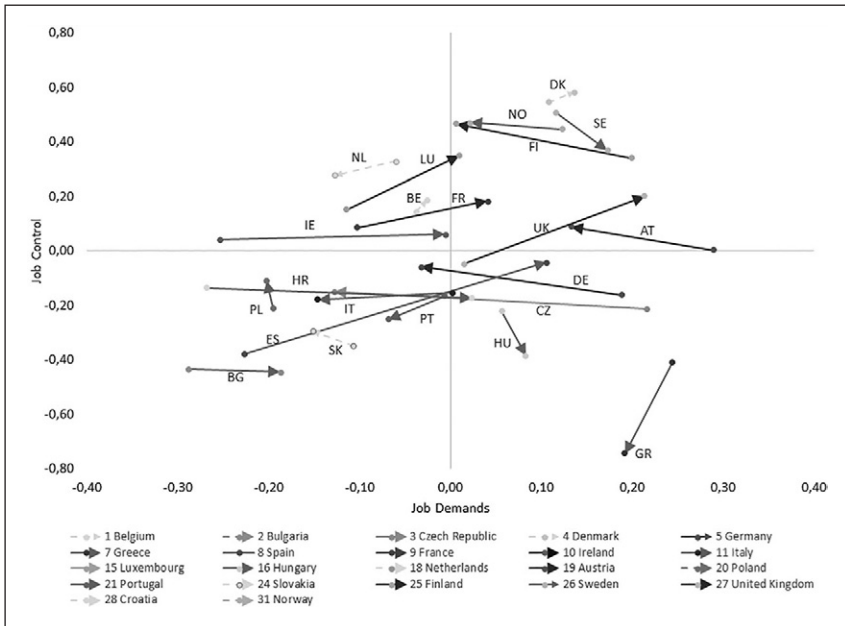


Figure 2. Means of job demands and job control in each country for 2005 and 2015. Solid arrows: significant differences on JC or JD; dashed arrows: no significant differences.

this overall effect was due to the 2009 Financial Crisis, analysis was carried out over the pooled data. Overall, significant differences were found (one-way analysis of variance (ANOVA), $F_{JC(2,87927)} = 21.4, p < 0.001, F_{JD(2,87927)} = 7.7, p < 0.001$), with the JC mean for 2015 found to be significantly different from both 2005 and 2010. This result suggests that work environments were substantially affected by the 2009 crisis, and thus, it is preferable to focus on the evolution over the whole period, 2005–2015, rather than considering changes pre- and post-2010. Therefore, discussion in further analyses is limited to 2005 and 2015 data.

The computed means of JD and JC for each country are represented in Figure 2; the arrows indicate the direction of the change between 2005 and 2015. For each country, the scores for 2005 and 2015 were compared by means of a t statistic.³ Solid arrows represent statistically significant differences on JD or JC and dashed arrows indicate that there are no significant differences ($\alpha = 0.10$).

Jobs in the Nordic countries – Denmark, Finland, Sweden and Norway – fare better in terms of both JD and JC, being entirely situated in the quadrant associated with the ‘active jobs’. Continental and Liberal countries are located around average, with the Netherlands, Luxembourg and Belgium located more in the ‘low strain’ quadrant and Germany at the frontier of the ‘high strain’ quadrant. Jobs in Southern and Eastern European countries all present below-average JC levels but very diverse JD levels – jobs in Greece, Hungary and the Czech Republic are mostly of a ‘high strain’ kind, while jobs in Bulgaria, Poland, Portugal, Slovakia and Italy are mostly ‘passive jobs’.

As for the changes between 2005 and 2015, jobs in Portugal and Czech Republic became even more ‘passive’; jobs in Greece, Croatia and Hungary became markedly more ‘high strain’, while Ireland, United Kingdom, France, Austria and Luxembourg headed towards more ‘active’ jobs. Overall, an increase in JC is observed in eight countries already displaying high scores in both JC and JD – denoting an upgrading change – while four countries (GR, HU, PT, CZ) characterised by low scores on JC register a decrease in either JD or JC – a downgrading change.

The structure and evolution of the occupational JD/JC patterns

Given the patterns of cross-national diversity and commonalities, we turned our analysis to occupations in countries grouped by welfare regimes. The differences between occupational means in 2005 and 2015 were assessed using *t* tests.⁴ (Test results, test statistics and additional figures and tables are online as Supplemental Material, available at: <https://journals.sagepub.com/doi/suppl/10.1177/1356336X19996064>).

The results showed the JC/JD profile of occupations to be quite diverse across European countries (Figure 3(a), (b)) (Nordic and Liberal countries; see also Supplemental Files Figures S1–S3 for Continental, Southern and Eastern European countries). The extent to which workers in the same occupation feel time pressure and dependence on others (JD), as well as the extent of their discretion regarding methods, learning opportunities and the complexity of tasks (JC), varied widely between welfare regimes for occupations in the middle and bottom of the occupational ladder, but not for occupations at the top. Importantly, the relative position of occupations was similar across regimes.⁵ For example, teachers had JD and high JC across all welfare regimes, but in Nordic countries, JD and JC were found to be the highest; likewise, sales and elementary professionals have less JD and higher JC in Nordic countries but remain, as elsewhere, located at the bottom of the occupational ladder. As expected, the differences in JD/JC profiles involved jobs in middle- and bottom-rung occupations, but not top occupations – whose JD/JC profile was similar across countries.

Most occupations in the Nordic countries were composed of active jobs (in relative terms since scores are standardised), followed by Liberal and then Continental countries, with Liberal countries having more passive jobs than the Continental Group – there is more JD/JC polarisation in Liberal countries. The major difference between Southern and Eastern countries, which have many occupations in the passive and high-strain quadrants, is that the latter have fewer active jobs.

For each combination of occupation and welfare regime, JD and JC differences were evaluated by means of ordinary independent *t* tests (results in Supplemental Material). Table 2 displays the changes between 2005 and 2015 by occupation shown to be significant.

The more salient features are as follows:

- A general upgrading of the JD and JC profile of occupations in Liberal countries – and also in Continental but much less marked – contrasting with a general downgrading in Nordic countries; no significant evolution in Eastern countries.

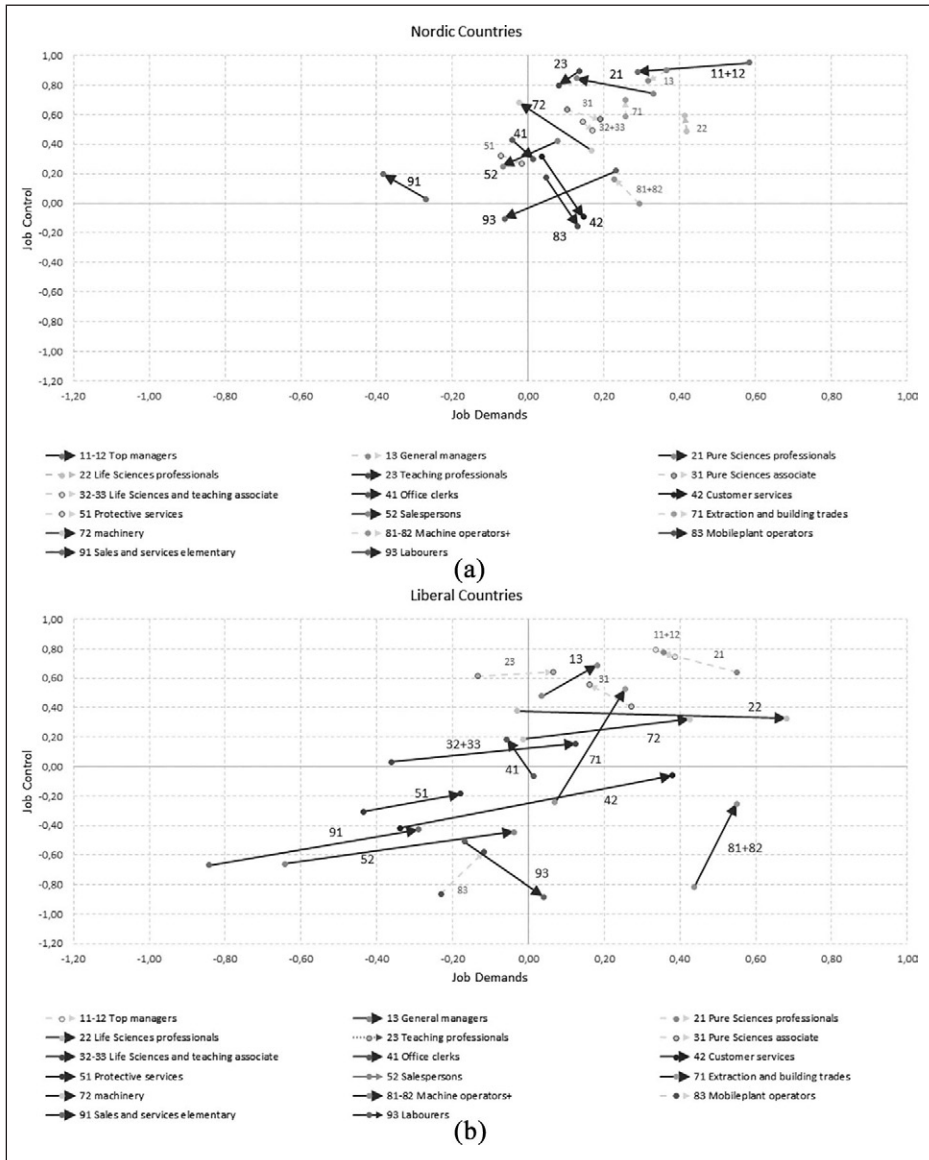


Figure 3. Occupations in countries grouped by welfare regimes by job control and job demands in 2005 and 2015 – (a) Nordic countries and (b) Liberal countries. Solid arrows: means for JD or JC differ significantly between 2005 and 2015; dashed arrows: no significant differences.

- No significant evolution at the top of the occupational ladder, contrasting with an overall upgrading at the bottom – except category 93. Evolution of occupations in the middle of the ladder differs within and across welfare regimes.

Table 2. Direction of change by occupations and country group.

Occupation	Nordic	Liberal	Continental	Southern	Eastern
11 + 12 Legislators and senior officials and corporate managers	Down D				Up C
13 General managers		Up C			Down D
21 Physical, mathematical and engineering science professionals	Down D		Up C	Up D	Up D
22 Life science and health professionals		Up D	Up D		Down C
23 Teaching professionals	Down C		Up C	Up D	
31 Physical and engineering science associate professionals					
32 + 33 Life science and health associate professionals and teaching associate professionals		Up D	Down C		Up D
41 Office clerks	Down C	Up C	Down C	Up C	Up D
42 Customer service clerks	Down C	Up C Up D		Down C	Down C Up D
51 Personal and protective service workers		Up D		Up C Up D	
52 Models, salespersons and demonstrators	Down C Down D	Up C Up D	Up C	Down C Down D	
71 Extraction and building trades workers		Up C	Up C Down D	Up C	Down D
72 Metal, machinery and related trades workers	Up C Down D	Up D	Up C	Up C	Up C
81 + 82 Stationary plant and related operators and machine operators and assemblers		Up C	Up C	Up C Up D	Up D
83 Drivers and mobile plant operators	Down C		Down D	Down C Down D	
91 Sales and services elementary occupations	Up C	Up C Up D	Up C Down D	Up D	Down C Down D
93 Labourers in mining, construction, manufacturing and transport	Down C Down D	Down C	Down D	Up D	

Caution is needed when comparing our results with previous findings because the unit of analysis is different: the number of people employed is used in most job polarisation studies, while we use JD/JC levels. The exercise is nonetheless stimulating.

Our results are in line with those of Janíčko and Krčková (2019) which show that (1) the proportion of low-autonomy workers fell considerably between 2005 and 2015, while that of high-autonomy workers grew and (2) the level of autonomy for low-autonomy workers increased, whereas that of high-autonomy workers stagnated. Likewise, results reported by Martinaitis et al. (2020) reveal that the proportion of jobs with high complexity increased significantly during 2005–2015, but with significant cross-national differences. In contrast to task approach studies, an upgrading trend is observed when considering features of work other than the routine/analytical content of tasks/jobs. The

end result is a narrowing of the gap between low- and high-autonomy workers rather than growing discrepancy. Our results reveal increased control and demands at the lower end of the occupational ladder (except category 93), which indicates higher learning potential and use of skills. Why, then, does the higher level of JD/JC not translate into higher wages at the bottom of the ladder while wages grow at the top without significant increase in JD/JC?

Evidence from the present study combined with evidence from previous studies suggests that overall, the share of employment with low skills/education and low job quality is decreasing but the share of employment with low wages is increasing – this is particularly the case in the UK and US. This suggests that the polarisation documented by task approach studies may be primarily caused by the undervaluation/devaluation, in terms of wages, of jobs low in the hierarchy, jobs that now display higher ‘productive’ value, in terms of skills, human capital and JD/JC – not by computerisation-driven change in the content of tasks. According to Eurofound (2014), the links between wages, skills and job quality vary across countries because of different wage-setting institutions. In this context, our results raise important questions: do national wage structures vary because of different wage-setting institutions or because of differences in JD/JC profiles? Put differently, do wage structures vary because of different national-level wage-setting institutions or because of different firm-level organisational choices? In addition, are JD/JC jobs profiles, that is, organisational choices, influenced by wage-setting institutions?

Most task approach studies assume that wage structures are similar across countries using the UK wage structure as a reference, whereas Fernández-Macias and Hurley (2017) and Fernández-Macias (2012) used country-specific wage rankings to test the polarisation hypothesis in 16(27) European countries from 1995 to 2015. They found great diversity between countries in changes to employment structures including declining employment in middling occupations, that is, polarisation; occupational upgrading; and in some countries, a combination of both patterns. Their studies showed no evidence of pervasive polarisation, using country wage structures even when jobs are ranked by wage.

Explaining differences across countries and drawing policy implications

The basic argument and empirical finding of the task-based approach is that computerisation generates job polarisation. Although robust evidence shows otherwise, this position is widely accepted in the academic community, testifying to the ascendancy of mainstream economics. Autor (2015) clarifies that *job* polarisation means *employment* (number of people employed) but not *wage* polarisation, depending on countries. In the same vein, Goos et al. (2010: 29) claim that ‘occupational wage movements in Europe are not strongly correlated with technology [. . . because . . .] many European countries have institutions (e.g. minimum wages and collective bargaining) that mute or stop a wage response, especially across middling and lower-paying occupations’.

The task approach assumes, in line with the neoclassical production function, that technology and the relative price of labour and capital determine factor allocation and hence relative labour demand. Our findings suggest how work is organised, rather than

solely the technical content of jobs, must be considered – by affecting the task composition of jobs, organisational choices impact the type and amount of labour demand. The task approach also argues, in line with the efficient market assumption, that wages are determined by the relative supply of each type of labour. According to Autor (2015), higher productivity and scarcity of highly educated workers lead firms to compete for workers, thus increasing their wages. Conversely, abundant supply of low-educated workers with non-routine abilities decreases wages for this group. Institutions ‘mute or stop’ these market wage responses (Goos et al., 2010). Although not addressed here, our findings suggest institutions may affect wages not only directly, through wage-setting procedures, but also indirectly, through their effect on organisational choices, and therefore productivity.

The institutional approaches relate country-level structural employment changes to country-level institutional variables: (Eurofound, 2014; Iversen and Soskice, 2015). Minimum wages and union-backed wage compression neutralise the polarising impact of technology by undermining the expansion of low-paid employment (e.g. personal/social services in Nordic countries); conversely, deregulation of employment legislation increases low-paid employment (e.g. Germany), and labour market flexibility explains polarisation in the US and UK (Fernández-Macias, 2012). Thus, jobs requiring similar skills do not receive similar wages in all countries. Our analysis highlights a phenomenon currently unaddressed in the institutional literature – occupations differ in terms of JD/JC across countries, suggesting that different task compositions require different skills for the same occupation. The division of work and the occupational boundaries, which affect the value of work for firms (productivity) and for workers (e.g. opportunities for learning and self-development, wage), are primarily set by firm-level organisational choices, not by national- or meso-level labour regulation institutions. By shaping wage structures, industrial relations systems may indirectly influence firms’ organisational choices.

Our results suggest that the changes occurring in the world of work result from the interaction of three factors: technological evolution, national-level institutions and firm-level organisational choices. Nordic countries were the only grouping to remain unchanged in all our analyses, meaning that Nordic countries, as a group, are more alike than other countries. The key distinctive trait of Nordic industrial relations systems is that unions participate in decision-making *within* firms and that workers participate in decision-making through effective participatory schemes: employees are represented in the governing boards of firms with more than 30/50 employees and they participate in powerful work councils (Waddington and Conchon, 2016).⁶ This difference in occupational JD/JC profiles between Nordic and other countries strongly suggests that work organisation is a key factor, explaining both the more equal wage profile and high economic performance (more active jobs) of Nordic countries. Lopes et al. (2017)’s multi-level analysis shows that union density and collective bargaining coverage are not associated with work autonomy, suggesting that national-level institutional specificities alone are insufficient to substantially influence organisational choices. Firm-level factors, like workers’ participation in decision-making, directly affecting the relationship dynamics between managers and workers, are required. Participatory workplaces are the ultimate distinctive institutional trait of Nordic countries.

Participatory workplaces may hinder all forms of polarisation as employees are able to influence organisational choices and promote upgraded job (re)design, thus preventing wages from receding or polarising. Political scientists are becoming aware of the dangers of polarisation, pointing to political unrest and social exclusion (Kurer and Palier, 2019). Income polarisation seems to further depress economic growth, constrain social mobility and increase feelings of alienation from other social groups, compared to linear income inequality (Wang et al., 2018).

Our results suggest that counteracting the devaluation of work (which underlies job polarisation), that is, preserving the dignity and well-being of workers in the middle and bottom of the occupational ladder, can only be done effectively in the sphere of production, not that of redistribution. In contrast with both traditional welfare economics (Martins, 2019) and the historical phase of Fordism and related welfare state, redistributing income after the productive process no longer seems an appropriate or effective way to achieve welfare goals. Rather, in the present phase of capitalism, acting on the very process of production and organisation appears compelling. Mitigating the massive distributive, social and political effects of job polarisation raises near-insurmountable challenges in austerity-dominated contexts. In fact, politicians prefer not to confront the issue too actively because they lack comprehensive solutions (Kurer and Palier, 2019).

To hinder polarisation, institutionalists rightly advocate strengthened collective bargaining processes, empowered trade-unions and adequate employment regulation. But reinforcing employee participation in decision-making within firms must also be part of the agenda. Ideally, this should occur through (1) reforming industrial relations systems to enhance the participation of unions in firms' decisions and (2) reforming corporate law to establish employee participation at board and workplace levels within firms. Acknowledging the relevance of work organisation thus leads to policy recommendations seldom advocated in the institutional literature.

Conclusion

This article contributes to the literature by complementing previous findings with evidence on organisational features of jobs, so far overlooked in the literature. We have critically examined and challenged the findings of influential mainstream economics job polarisation studies – growing employment at the top and the bottom of the occupational ladder with declining employment at the middle. These findings are biased because of their reliance on the task approach methodology which ignores the relevance of organisational choices.

By devising and applying an alternative approach, based on Karasek's (1979) JDC model, to the 2005, 2010 and 2015 waves of the EWCS data, we show that the job polarisation process is not pervasive, rather there is a near-pervasive upgrading of the *quality of work* performed by workers at the bottom of the occupational ladder instead. Our findings, focused on the JD/JC profile of occupations, suggest that the polarisation documented by the task approach literature may be primarily caused not by the change in the content of tasks driven by computerisation but by the undervaluation/devaluation of certain jobs. The latter seems to result from two intertwined phenomena: (1) firm-level organisational choices that generate task-composed occupations low in work complexity

and work autonomy and (2) nation-level labour regulation institutions unable to satisfactorily protect the wages and employment conditions of bottom occupations. Thus, the number of people employed in *low-quality jobs decreases*, while the number of people employed in *low-paid jobs increases*.

By calling attention to the relevance of firm-level organisational choices, beyond that of national-level labour institutions, the article attempts to improve current explanation of differences across countries and allows for the formulation of novel policy implications related to firm governance. In this context, the arguments and results presented in the article go beyond research in the labour process tradition in that they scrutinise the role of collectively exercised control over the work process, rather than focusing only on individual control. Counteracting job polarisation and work devaluation can only be done effectively in the sphere of production by implementing participatory forms of decision-making in firms. Instituting firm governance modes that contribute to improving the psychological well-being and development opportunities of workers at the middle and bottom of the occupational ladder should be a compelling public policy concern.

Our empirical study suffers from limitations inherent to the self-reported nature of our data. Self-reported data are known to be subject to expectations and other biases, which may weaken the reliability of the underlying measures. However, our JD and JC indices are built on a large variety of reported data and standardised indices are used, which mitigates this limitation. Notwithstanding, the evidence presented should be viewed as a basis for follow-up research.

Future work should explore whether the differences observed in occupational job demands/control profiles are related to wage structures and productivity levels across countries and within sectors. The relations between wage structure, wage-setting institutions and organisational choices and participative forms of firm governance should also be further scrutinised.

Acknowledgements

The authors are grateful for the relevant comments of the Area Editor and two anonymous reviewers that contributed to improve the article. The European Working Conditions Surveys are sponsored and owned by the EUROFOUND and distributed by UK Data Archive, University of Essex. These institutions bear no responsibility for the present analysis and interpretation of the data.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship and/or publication of this article: This work was supported by Fundação para a Ciência e a Tecnologia, research units grants UIDB/03127/2020 and UIDB/00315/2020.

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Supplemental material

Supplemental material for this article is available online.

Notes

1. Job discretion, work autonomy and job control (JC) are terms used interchangeably to refer the same phenomenon, that is, the extent to which workers exercise control and influence over their work activities. The degree of work autonomy, and the extent and forms of work control are outcomes of organisational choices.
2. For more information on fieldwork and methodology, see technical report at https://www.eurofound.europa.eu/sites/default/files/ef_survey/field_ef_documents/6th_ewcs_-_technical_report.pdf.
3. As a first step, two full-factorial two-way (Country \times Year) analyses of variance (ANOVAs) were performed, for job demands (JD) and JC, respectively. Results (available as Supplemental Material) show significant main and interaction effects on both analyses. Thus, the relationship between 2005 and 2015 is country dependent, which led us to opt for country-by-country comparisons.
4. We first ran several full-factorial ANOVA models. Full-factorial three-way ANOVA models (Regime \times Occupation \times Year) revealed – for both JC and JD – significant three- and two-way interactions. We then ran for each Regime a two-way (Occupation \times Year) ANOVA, which revealed again significant interaction effects. We then proceeded, conversely, by adjusting a series of two-way ANOVA models on Regime \times Year, by Occupation. (Main results are available as Supplemental Material). Due to all the interaction effects, we decided to use simple *t* tests for each combination of Regime and Occupation.
5. Comparing our data with those provided in Karasek et al. (1998: 325) shows that the JD/JC profile of a greater number of clerical and manual occupations has substantially altered since the late 1980s, signalling changes in the tasks content of occupations.
6. Germany also possesses such a ‘co-determination’ governance mode, though for larger firms. However, in the last decade, Germany has substantially deregulated employment legislation, unlike Nordic countries.

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