Job quality differences among younger and older workers in Europe: The role of institutions

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ABSTRACT

We compare non-wage aspects of job quality of younger and older workers across European countries and relate the differences between them to the prevailing institutional settings. Microdata from the European Union Labour Force Survey are used to carry out the measurement of a job quality index during the period 2005–2015, while aggregate indicators are used to approximate a set of labour market institutions. Our findings support the notion that the institutional framework affects the age gap in job quality. Among other results, we find that older workers fare better than younger workers, that the employment quality is higher for employees working in countries where the wage-bargaining system is more coordinated/centralized and the employment protection for regular workers is stricter and that these institutions tend to favour the job quality of older workers over younger ones.

1. Introduction

The link between job quality and well-being at work has become an ingredient in a broader approach to the measurement of national well-being, while, at the same time, at least in European policy discourse, it is usual to find continuous references to the quality, as well as the quantity, of employment. However, although studies of specific non-wage domains of job quality (such as insecurity) exist, usually in single countries, there are few examples of works that examine a range of countries and multiple features of job quality and none that compare socioeconomic groups (such as younger and older workers) and extend the analysis to a relatively large period.[1]

Countries, which vary in their institutions, may also differ in terms of job quality precisely due to their distinct socio-economic models. Studies have documented the importance of countries in assessing job quality. Theoretical arguments and empirical evidence highlight differences in employment conditions associated with institutional arrangements, mainly labour market structures and workers' power, such as educational and training systems, the organization of the labour market and employment relations, and policies related to wages and employment opportunities (Ebbinghaus and Kittel, 2005; Hanké and Rhodes, 2005; Brady, 2007). Differences in job quality among young and older workers in European countries may exist due to the institutional environments that shape the processes of labour market entry, permanence and exit. Job quality differences between younger and older workers within the same country may also vary across European countries according to those institutional arrangements. Previous studies on job quality usually either consider countries separately without making reference to their institutional settings (Smith et al., 2008; Green et al., 2013;

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[1] Regarding socioeconomic groups, the only differential that has been thoroughly examined is the gender gap in various non-wage domains of job quality. In this area, the empirical studies have yielded, however, mixed results that can be partly attributed to the focus on a single aspect of job quality and on a single or very narrow group of countries that are also characterized by different labour market arrangements and employment conditions (see Stier and Yaish, 2014).

Piasna, 2017) or group them into various categories (Davoine et al., 2008; Leschke et al., 2008), focusing their attention on particular domains of the employment quality. Furthermore, they do not explore in depth the notion that the institutional settings may affect the job quality of young workers differently and consequently have an impact on the differential with respect to that of older workers.

To overcome these gaps, the contribution of this piece of research is twofold. Firstly, it examines the magnitude to which non-wage aspects of job quality of younger and older workers varies across European countries using a job quality index (JQI), which is made up of three different dimensions (working conditions, skills and training, and quality of life balance) and several distinct sub-components. In line with the developing practice, we use an objective concept of job quality, including only variables characterizing jobs, and not workers' self-reports about their working conditions as other studies do (for instance, Green and Mostafa, 2012, using the European Working Conditions Surveys, EWCS; and Stier and Yaish, 2014, using the International Social Survey Program, ISPP). Some initiatives to enhance the measurement of job quality have been taken at the international level to establish guidelines for producing internationally comparable indicators. There are several proposals that try to measure primarily the objective aspects of the quality of jobs (European Commission, 2001; Eurofound, 2002, 2012; Leschke et al., 2008; OECD, 2014). The approach used in these studies, as in ours, follows the one proposed in the economics literature to measure the quality of employment and jobs, which is based on the construction of indicators for each dimension and their aggregation into a synthetic indicator.[2]

Secondly, it analyses whether those observed cross-national variations are somehow related to differences in the institutional design, as there are other reasons that may explain why younger and older workers are persistently affected by generally poorer/better working conditions, and these are not solely the individual workers' characteristics. For that, a set of indicators related to supporting institutions (collective bargaining, union power, minimum wages, employment protection legislation and skill systems) is measured for all the selected countries, a strategy that facilitates the analysis of the role of specific institutions in shaping job quality differences. Thus, with respect to methodology, this article improves on prior work on job quality in that it disentangles the effects of compositional factors as well as cross-national differences associated with different policy models and institutions. Here, we follow the lead of some previous works that focus on the impact of policies and institutions on the variation of job quality across the life course as they shape the behaviour of workers (as Piasna and Plagnol, 2018, do for women in different life stages). In this vein, we depart from previous empirical studies that, despite examining trends for relatively long periods, either consider countries separately or gather countries into groups.

The measurement of the job quality of younger and older workers and the analysis of the way in which labour market institutions affect it are carried out for the period 2005–2015 and for 13 Member States using data from the European Union Labour Force Survey (EU-LFS).

The structure of the article is as follows. Section two discusses the potential implications of different institutional settings for job quality and the differential between young and older workers. Section three presents the EU-LFS database and briefly describes the indicators used to measure the JQI. Section provides some basic descriptive evidence and reports the estimation results of the multivariate analysis. Finally, the last section summarises and discusses the main conclusions.

2. Literature review: institutional settings and job quality

Some authors stress the influence of national-level institutions on jobs, whether in terms of wages or in terms of other aspects of job quality. In the recent political economy literature on 'varieties of European capitalism' (see Hall and Soskice, 2001), two types of advanced economies, 'liberal market economies' (LME) and 'coordinated market economies' (CME), are distinguished according to the predominant ways in which firms coordinate with each other and other stakeholders in five different areas (industrial relations, vocational training and education, corporate governance, inter-firm relations and relations with employees). In LMEs the main forms of coordination are competitive markets and hierarchies, while in CMEs firms rely more on non-market forms of coordination, even though there is considerable variation within the group of countries that make up the CMEs. In this so-called 'production regime' model, the hypothesis is that the job quality will be greater in CMEs than in LMEs, since in the former employers' strategy is to commit to long-term employment relations. The implication is not only better job security but also better job quality in all dimensions in the CMEs.

Following this strand of research, there are authors who try to delve into these differences among countries and the transformations at play in the post-industrial world. For instance, Thelen (2009) proposes to complement the continuum of 'cooperation' (with its distinction between LMEs and CMEs) with a second (analytically distinct but related) dimension, running from 'solidarism/collectivism' to 'segmentalism/dualism'. This framework is similar to the 'employment regime' (or the 'power resources') model, which, within CMEs, differentiates between social corporatist (or inclusive) and dualist regimes (Gallie, 2007; Olsen et al., 2010), the distinctiveness of which is driven by the nature and strength of trade unions and the balance of power between labour and capital. The prediction is not only that the job quality is higher in CMEs than in LMEs but also that it is more equally distributed in social corporatist regimes (such as the Nordic countries).

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[2] The debate on job quality initiated by OECD is of particular importance. In 2011, the OECD Better Life Initiative was launched with a set of well-being indicators presented in the biannual report How's Life (OECD, 2013b). Building on the extensive work already done by other international organizations and on the OECD work on multi-dimensional well-being, OECD (2014) focuses on those aspects of a job that have been shown to be particularly important for people's well-being (earnings quality, labour market security and quality of the working environment), while OECD (2015) analyse the effects of low-quality jobs, showing that, in a majority of OECD countries, standard jobs have disappeared in the middle of the distribution in terms of wages and skill, while non-standard jobs have contributed to an increase in jobs at both ends of the distribution. Non-standard jobs tend to pay lower wages than standard jobs, especially at the bottom of the earnings distribution, thereby raising earnings inequality. That study also shows that the impact of non-standard work on household incomes is relevant: non-standard workers living alone or with other nonstandard workers suffer from higher chances of low income and poverty.

Therefore, it seems clear enough that the job quality in key domains reflects the national regulations. The different forms of coordination and institutional design may produce varying outcomes in terms of job quality, such as access to training, contractual stability, working conditions, wage inequality and work–life balance. As a general rule, regulations can be expected to improve job quality and to lower inequalities in job quality, as it is primarily in the lower-quality jobs that controls bite. Thus, CMEs would tend to have better job quality and more specifically 'inclusive' or 'corporatist' CMEs would have the lowest level of inequality in multiple dimensions. Several labour market institutions would therefore be important, as stated above, and responsible for these expected outcomes, in particular the wage-bargaining structures (including the system of minimum wages), the power of trade unions, the regulations governing the hiring and firing of workers and the skill systems.

In the first place, whereas in CMEs the union density tends to be high and the wage bargaining relatively centralized and coordinated at the industry/national level, in LMEs social partners are less organized and bargaining takes place primarily at the company level. In fact, the variations within the CME model are substantial. The degree of centralization and coverage of collective bargaining in CMEs varies considerably across Europe (European Commission, 2009; OECD, 2017) and is changing in different ways and at different rates (Visser, 2016a). Wage-setting institutions normally reduce the pay dispersion (Blau and Kahn, 1999) but may produce different effects when a high level of labour market segmentation exists. In this case, unions' power and collective bargaining coordination could only play the expected role for insiders (permanent, full-time workers) while exacerbating downward wage flexibility and the worst working conditions for outsiders (atypical workers).

Furthermore, countries differ not only in the minimum wage level but also in the methods followed in fixing the minimum wage (Boeri, 2012; ETUI, 2006). Even though some authors defend the possibility that weaker provisions for minimum wages can have the impact of reducing the pay gap between atypical and regular workers, unless they are symmetrically applied to the two segments (Da Silva and Turrini, 2015), many others contend that high minimum wages are related to less pay inequality, a lower incidence of low-wage employment and better job quality (Lee and Sobeck, 2012; Lucifora et al., 2005). Increases in (or high) minimum wages, although having a (small) negative impact on the employment of young and low-skilled workers (Neumark and Wascher, 2008), may also provide incentives to employers to improve their organization of work and invest in new technologies, thus raising the quality of jobs, and to increase the demand and work productivity (Addison et al., 2009).

Regarding employment protection legislation, European countries are quite heterogeneous, with CMEs showing stricter regulations than LMEs (Maurin and Postel-Vinay, 2005; OECD, 2013c). The low protection and/or the deregulation of atypical contracts (for instance, through weaker limitations on the purposes for which these contracts can be used) may increase wage inequality and worsen working conditions. These results may occur because strict regulation on the firing of permanent workers and fewer restrictions on hiring using atypical contracts (especially temporary contracts) favour a short-term increase in employment that negatively reflects on productivity and consequently wages. Therefore, the long-term outcome is that the larger proportion of atypical jobs determines poor accumulation of firm-specific skills that may be detrimental to innovation, productivity and workers' welfare and wages (Blanchard and Landier, 2002; Boeri and Garibaldi, 2007; Cabrales et al., 2017).

Finally, countries have different schooling structures that vary in their focus on job transition. Some stress vocational education that develops specific job-related skills to prepare labour market entrants to work in specific occupations, while others emphasize general education that provides individuals with broad knowledge and basic skills and serves as the foundation for further learning and training. In general, in CMEs workers tend to have specific skills tied to the firm or industry in which they work, while in LMEs they tend to have more general skills that can be moved across firms and industries.[3] Consequently, in countries that provide a differentiated system of vocational education, the association between skills and labour market outcomes is closer (improving the entry of workers and making them productive at an earlier point) and consequently the job quality of young workers should be better than that in countries that primarily offer general education (Müller and Gangl, 2003; Shavit and Müller, 1998). However, that initial advantage may decrease (and even reverse) with age if specific skills become obsolete at a faster rate (Hanushek et al., 2017).

In sum, we put forward a hypothesis concerning whether countries with higher coordination/centralization of collective bargaining, more intervention of the government in the system of minimum wages, more union power, stricter legislation governing the hiring and firing of workers and skill systems that are more oriented towards vocational training and apprenticeships exhibit better job quality in general and lower inequality between insiders (older workers) and outsiders (younger workers). The empirical sections of this paper are devoted to investigating the potential relationship between this concise set of supporting institutions and specific non-wage dimensions of job quality.

3. Data and job quality indicators

3.1. The database

The data used in this paper come from the annual EU-LFS coordinated by Eurostat, which conducts this survey in the 28 Member States of the European Union. The data set includes detailed information on the household structure and the demographic and socioeconomic attributes of all the household members. For each adult, the EU-LFS provides an indicator of economic activity during the reference week. This indicator is built using information on a set of questions and establishes whether the individual is employed, unemployed or inactive. Young workers are defined as individuals aged 15–29 years and older workers as those aged 50–64 years. In

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[3] Even though the systems of vocational education and training vary significantly between different CMEs (see Eichhorst et al., 2015, for a thorough review).

the analysis, we use yearly data for the period 2005–2015 and consider individuals from Austria, Belgium, Germany, Denmark, Spain, Finland, France, Ireland, Italy, the Netherlands, Portugal, Sweden and the United Kingdom.[4] We select these countries due to their large sample sizes and because they are different enough to reflect different institutional structures.

The EU-LFS contains a wide set of variables that can be used for the study of employment quality (there is a complete section containing questions on the attributes of the respondents' jobs and the firms in which they perform their tasks), has a large sample (which assures statistical reliability when measuring the sub-dimensions and variables that make up the quality index for sub-categories of workers) and permits long, consistent time series (which allow for the measurement of the index on a year-by-year basis and for a long period). A key additional aspect is that the use of microdata and the measurement of job quality at the individual level enable us to compare the quality of jobs for different groups of workers. This is relevant, since almost all the existing indicators are based on the use of aggregate data (usually coming from various data sources), something that hinders their use in examining distributional aspects appropriately, that is, whether the job quality is better or worse in some groups than in others (Muñoz de Bustillo et al., 2011b).

There are, indeed, other European data sources that can be used to analyse job quality, each with their advantages and short-comings. One is the European Working Conditions Survey (EWCS). It covers a wide range of issues related to work and employment, being the most important data source on working conditions in Europe. The main problems are its periodicity (it is carried out every five years) and the small sample sizes per country. Another data source is the EU Statistics on Income and Living Conditions (EU-SILC), which offers yearly data since 2004. Although it incorporates a longitudinal perspective, the survey collects information about respondents' jobs at the time of the interview but it does not necessarily correspond to the job that originated the labour income reported; the sample size is smaller than that of the LFS; and information on job quality is rather limited. Finally, several editions of the International Social Survey Program (ISPP) are rich in information on intrinsic aspects of job quality, although it has a small sample size, a very sparse periodicity and the degree of harmonization of its methodology is low.

As regards the labour market institutions, we select various indicators based on the discussion carried out in the previous section. Thus, indicators in five domains are considered: collective bargaining; minimum wage; union power; hiring and firing regulations; and education and training systems. The information is gathered from different sources and merged with the EU-LFS individual data.

The indicators on the first three institutional areas come from the Amsterdam Institute for Advanced Labour Studies (AIAS) database (Visser, 2016b). The indicators concerning the system of collective bargaining cover a wide range of relevant aspects. We select two related to centralization and coordination and another one measuring the government intervention in wage bargaining. These three indicators ('CWB', 'COORD' and 'GOVINT', as they are named in the database) are categorical, ranging from 1 to 5 (in the case of the coordination of wage setting from 'fragmented bargaining, mostly at the company level' to 'economy-wide bargaining'; in the case of government intervention from 'no influence' to 'imposition of wage settlements, ceilings or suspensions') or from 1 to 5.75 (in the case of centralization). Regarding union power, it may be evaluated using at least two indicators, namely the union density ('UD') and the adjusted bargaining coverage rate ('ADJCOV'). Both are built as continuous variables as a proportion of wage and salary earners in employment. As for the minimum wage, the AIAS database contains a variable on minimum wage setting ('NMS'), which ranges from 0 ('no statutory minimum wage, no sectoral or national agreements') to 7 ('the minimum wage is set by the government, without a fixed rule'). This indicator reflects the (increasing) degree of government intervention and discretion in setting the minimum wage or conversely the degree to which the government is bound in its decisions by unions and employers and/or fixed rules.

The strictness of hiring and firing regulations is measured using the OECD's employment protection legislation (EPL) indicators (until 2014). It comprises two different dimensions: one for the employment protection of regular workers against individual dismissal and additional, specific provisions for collective dismissals ('EPL-REG'); and another one for the regulation of temporary forms of employment that describes the conditions under which workers can be hired on fixed-term or temporary work agency contracts ('EPL-TEMP'). In the empirical section, we use the EPL indicator for regular workers as well as the difference between the two indicators based on the notion that it captures the incentives and/or ability of firms to create and destroy less stable, productive jobs relative to more permanent ones.

Finally, regarding the education and training system (ETS), data are drawn from the World Bank's *World Development Indicators*, which provide information on the distribution of secondary-school students between general and vocational programmes. Following Hanushek et al. (2017), we build an indicator on the skill system measured as the share of secondary-school students in vocational education programmes.

3.2. The job quality index

In the literature, job quality is considered to be a multidimensional concept, covering four main dimensions: socio-economic security (decent wages and stability); working conditions (intrinsic quality of work and health and safety); opportunities for improvement (qualification and training); and a balance of working and non-working life.[5] The information contained in the database

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[4] We choose 2005 as our starting date because some countries lack information on some of the questions that are relevant to constructing the JQI dimensions in previous years. This also extends to certain countries and years in our sample period: there is a lack of information in the files provided by Eurostat on the variables that allow the construction of the 'work–life balance' dimension (see below) for Spain and the Netherlands in 2005 and the UK in 2008. Nevertheless, missing data in this case is not worrisome because it basically occurs in the initial year of our period of analysis. Furthermore, this period is quite long (2005–2015) and the indicators on institutions (our main concern) have remained quite stable, with relatively minor changes, during all these years.

[5] These four dimensions are roughly in line with the categories that Davoine et al. (2008) and Eurofound (2002) suggest, following the proposal of the European Commission (2001) as well as Eurofound (2012) and Muñoz de Bustillo et al. (2011a), although they are grouped in a different way. For a thorough review of the existing indicators, see Muñoz de Bustillo et al. (2011b).

that we use delimits the construction of a job quality index. We rely on Arranz et al. (2018), who build and measure a non-wage JQI related to the areas of opportunities for improvement and work–life balance and partially working conditions and security using microdata from the EU-LFS. In the following, we briefly present the main characteristics of this synthetic index and its three constituent dimensions (see also Table A.1 of the Appendix).

The 'working conditions' (WC) dimension is composed of four sub-components. The first concerns the working day and the availability of the option (and thus the willingness) to work fewer hours. The second sub-component refers to an aspect of the employment relationship that is related to the adequacy of the fit between the hours effectively worked and those agreed between the employee (or his or her representatives) and the company. The third sub-component refers to the mismatch that may exist between the hours that the person wants to work and the hours that the job offers. Finally, the fourth sub-component relates to the contractual stability, aiming to measure the stability of the contractual bond between employer and employee and recognizing that the more desirable outcome is having a permanent contract.

The 'skills and training' (ST) dimension consists of three sub-components. The first two relate to the training received by the worker in the company in which he or she currently works. The second sub-component refers to qualifications, not from the point of view of workers (the ability to use their knowledge effectively) but from the perspective of jobs (the requirements associated with each position in terms of qualifications). Finally, the third sub-component takes account of the existence of a match between the skills required by the job and those possessed by the worker who occupies it (the notion is that, if a person is in a position that requires lower qualifications than those held, that person is not using his or her skills adequately).

The 'work–life balance' (WLB) dimension consists of two sub-components. The first is the length of the working day, which is based on the question concerning regular weekly hours in the main job. The second sub-component concerns the programming of the working day. The idea is that working outside 'normal' hours is undesirable, because it interferes with social and family life. This sub-component is a composite of indicators based on variables that measure the degree to which individuals work in the afternoons and evenings and on Saturdays and Sundays and whether they work on a shift basis.

The variables have been recoded using a 0–100 metric, based on a normative rule of the desirability of each attribute in terms of quality, where 0 is the least desirable result, 100 is the most desirable and any intermediate value is assigned accordingly. Regarding the aggregation of information at the highest level (aggregate JQI), we perform this by calculating the weighted average of the three dimensions considered (JQI = (44.4%·WC) + (33.3%·ST) + (22.2%·WLB)), with the weight of each sub-component in the total JQI being the same (11.1%).[6]

4. Findings

4.1. Basic facts

Table 1 provides the results based on the synthetic JQI of younger (Y) and older (O) workers in the countries under analysis. The quality outcomes shown are the average of the period 2005–2015. This table displays the level of the JQI for both groups of workers and the difference between them. Figure A.1 of Appendix offers a broader picture, showing the country-by-country evolution over time of the predicted values for the JQI.[7]

The institutional characteristics of countries (and the different reactions of markets to the same institutions) can contribute to explaining the pattern of differential outcomes in job quality across countries. To undertake an exploratory analysis of this issue, the values of the synthetic JQI are plotted against the indicators describing the labour market institutions under scrutiny separately for younger and older workers in two years, 2006 and 2014 (see Figures A.2–A.9 of Appendix). Since institutions take time to become effective and produce effects on labour markets, we use lagged values of all eight indicators.

The information suggests that job quality varies across countries, with no obvious trend for the JQI over time (except a declining one in Portugal and for the younger workers in Ireland and the Netherlands and an increasing one in Sweden). This finding of considerable continuity agrees with previous studies that use the EWCS (Green et al., 2013) or data from different data sources (Leschke et al., 2012). Considering the information for all workers in Table 1, the job quality is highest in Denmark, followed by the UK, Sweden, the Netherlands and Belgium, and lowest in Spain, Portugal and Germany. The ordering of the countries is quite similar when we focus our attention on older workers but alters somewhat in the case of younger workers. For the latter, the job quality is highest again in Denmark and the UK and lowest in Spain and Portugal, but it is also low in Finland, Sweden and the Netherlands.[8]

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[6] Regarding the aggregation of the variables into dimensions and of the dimensions eventually into an aggregate index, the majority of proposals use equal weights and only a few different weights. This issue is one of the most controversial due to the value judgements implied and since no appropriate theoretical guide exists. In this regard, we have performed a sensitivity analysis of the results, applying a different set of weights to the dimensions and sub-components. In scenario (2), the three dimensions have been assigned equal weights (33.3%), implying that the sub-components of each dimension have different weights. In scenario (3), more weight has been assigned to the first dimension (66.6%) and less to the second and third ones (16.7%, respectively). Results (available to the readers upon request) hardly alter from those provided below: changes of the levels are observed for both groups of workers, but differences between them (smaller in scenario (2) and larger in scenario (3)) remain. At any rate, the empirical results provided in section 4 do not modify when different weights are used.

[7] These figures display the predicted values for the quality indexes evaluated at the mean of the covariates (having controlled for worker, job and employer characteristics), taking compositional changes into account. To achieve this, we estimate models using ordinary least squares (OLS) for the period 2005–2015 (see below).

[8] This finding points to the relevance of taking account of the information on individual countries when grouping them into aggregate categories (as many studies do), since the aggregation procedure may obscure the situation of specific countries and socioeconomic groups. In this case, young workers in countries as different institutionally and economically as Sweden and Spain, for instance, seem to face similar hard times when it comes

Table 1
JQI by age group and country. Pooled EU-LFS (2005–2015).

	JQI All (1)	JQI Younger (2)	JQI Older (3)	Absolute difference (4) = (2) − (3)	Relative difference (5) = 1 + [(4)/(3)]
AT	62.4	60.9	63.4	− 2.5	0.961
BE	64.3	61.4	66.3	− 4.9	0.926
DE	61.3	58.6	62.9	− 4.3	0.932
DK	67.1	63.4	68.5	− 5.1	0.926
ES	60.7	56.8	63.8	− 7.0	0.890
FI	63.1	57.9	65.3	− 7.4	0.887
FR	62.4	58.8	64.4	− 5.6	0.913
IE	62.1	59.3	64.3	− 5.0	0.922
IT	64.1	59.4	66.6	− 7.2	0.892
NL	63.7	58.5	67.1	− 8.6	0.872
PT	61.2	57.0	63.7	− 6.7	0.895
SE	64.3	58.2	66.6	− 8.4	0.874
UK	64.7	63.0	65.3	− 2.3	0.965
Average	62.8	59.5	64.7	− 5.2	0.920

Furthermore, job quality measured with the aggregate JQI is poorer for younger than for older workers. However, the size of this age gap in job quality varies substantially across countries, with Sweden and the Netherlands showing the biggest difference, followed by Italy, Spain and Finland, while the UK and Austria exhibit the smallest difference. Denmark is placed just on the average.[9,10]

In general, the institutional variables are quite stable, although there are some exceptions (bargaining coordination in Ireland, government intervention in wage bargaining in Portugal and the minimum wage system in Spain). This means that the financial and economic crisis of 2008–2010 did not seem to cause big changes to the institutional setting of the countries analysed over the period considered.

One of the indicators measuring different attributes of the system of collective bargaining (coordination) exhibits a positive correlation with job quality, although this is less clear in the case of the indicators capturing the centralization and the degree of government intervention in wage bargaining. A positive relationship also arises when considering the indicators related to the power of trade unions (density and coverage rate – in the latter case for older workers only). As regards hiring and firing regulation, the EPL for permanent jobs seems to be associated negatively with the JQI of younger workers.[11] Finally, regarding the rest of the indicators, it seems that job quality is negatively correlated with systems of minimum wage setting in which governments have more power or influence, while at the same time countries where the skill systems are more oriented towards vocational training and apprenticeships exhibit higher values of the JQI (at least for older workers).

4.2. Multivariate analysis

The presence of country-level institutional factors originates a multilevel structure of data, in which observations at the individual level are nested within the country level. Therefore, a two-level model is used to test the impact of labour market institutions on the quality of jobs (see the Technical Annex for a description of the empirical models and methods). As the country level variables (those related to labour market institutions) take the same value for all workers of the same country in the same year, this feature of the dataset is taken into account in the econometric procedure. As Bryan and Jenkins (2013, 2016) point out when comparing regression methods applicable to multilevel country datasets, the point estimates of the fixed parameters, both for individual- and country-level regressors, are almost identical across the methods considered (either fixed effects or random effects) and the same as a two-step method, consistent with them being unbiased. In our case, we choose a fixed-effect model (following Perugini and Pompei, 2017; Stier and Yaish, 2014).

Table 2 reports the results for the JQI estimated separately for younger, prime-age and older workers. We present only the coefficients of the institutional variables. Each cell corresponds to the estimation of an independent model that includes an intercept,

Table 2

Estimate results of the regressions on the JQI (coefficients of the institutional indicators). Pooled EU-LFS (2006–2015).

	Younger	Prime-age	Older
Coordination of collective bargaining	0.439**	0.422**	0.444**
	[0.049]	[0.031]	[0.046]
Centralization of collective bargaining	0.727**	0.891**	0.893**
	[0.058]	[0.037]	[0.055]
Government interv. in wage bargaining	−0.451**	−0.628**	−0.573**
	[0.052]	[0.029]	[0.045]
Systems of minimum wage	−0.448**	−0.377**	−0.446**
	[0.037]	[0.020]	[0.031]
Union density	−0.081**	−0.046**	−0.033**
	[0.014]	[0.008]	[0.011]
Coverage rate	−0.017*	0.005	−0.001
	[0.007]	[0.005]	[0.007]
EPL regular workers	4.442**	4.395**	4.233**
	[0.211]	[0.118]	[0.180]
Vocational training	−0.022**	0.003	0.008*
	[0.004]	[0.003]	[0.004]

Note: Each cell corresponds to the estimation of an independent model that includes an intercept and variables on gender, level of education, working time, types of contract, occupational group, industry affiliation, and firm size. Yearly dummy variables and country intercepts are also included. Robust standard errors appear in brackets. The number of observations is 1,642,499 for the sample of younger workers, 4,206,205 for the sample of prime-age workers, and 2,210,661 for the sample of older workers. These numbers are smaller in the models including the EPL indicator due to the lack of information on that indicator for 2015. R2 in all models range between 0.45 and 0.49. **$p < 0.01$, *$p < 0.05$.

an individual, job and employer attributes, yearly dummy variables and country intercepts (the full results of one of the specifications can be found in Table A.3 of Appendix; the rest are available on request). The objective is to establish whether there are differences in the job quality of young individuals across institutional configurations and whether these differences remain for older workers.[12]

Regarding the variables intended to capture distinct characteristics of the collective bargaining system of European countries, the results show that they produce significant effects on the JQI index. On average, greater coordination and centralization of wage bargaining increase the quality of jobs but more government intervention reduces it. Therefore, a positive role of bargaining co-ordination and centralization in increasing the quality of jobs is detected for all groups of workers. More coordinated and centralized bargaining is normally expected to favour less-advantaged workers and is often positively correlated with the union density. Especially in those countries where tripartite agreements are signed and implemented, strong collective bargaining coordination may allow high standards to be maintained and working conditions to be improved for all workers. However, at the same time, our results imply that countries where the influence of the government over collective bargaining is either null or scarce (because it only provides an institutional framework of consultation and information exchange, as is the case in the UK and Denmark) may obtain similar or better outcomes, especially for less-advantaged workers (the young). This would mean that different institutional configurations may generate similar job quality outcomes.

In line with the latter result, the impacts of the minimum wage system on job quality are quite similar to those obtained for the government intervention in collective bargaining. Our results suggest that countries where the minimum wages are set by the government (with or without a fixed rule) or by judges or an expert committee obtain worse outcomes in terms of job quality than countries where there is no statutory minimum wage or the minimum wage is set by a sectoral collective agreement or tripartite wage boards in (some) sectors or by a national agreement between unions and employers.

As far as the role of union power (as measured by the union density and bargaining coverage rates) is concerned, the results of the estimation models show that its impact on the values of the JQI is negative, suggesting that increasing power (through either a higher level of union membership or greater bargaining coverage) is associated with poorer job quality. This is clearly the case when union power is captured through the membership rate (showing a greater impact on the quality of jobs of younger workers). However, many authors question whether the membership rate is a good indicator of union power and consider that the coverage rate is conceptually better for capturing the potential impact of trade unions on the economy, this distinction being crucial in continental European countries (Flanagan, 1999). Using the latter, we find that greater bargaining coverage is associated with lower job quality only for younger workers and that this effect does not emerge for prime-age and older workers. This is a signal that unions are unable to influence the quality of jobs directly and only affect it indirectly through the collective bargaining process and the negotiation with employers.

The impacts of the strictness of EPL of regular workers on the JQI are positive, statistically significant and homogeneous across age groups. The estimation results indicate that the higher the EPL indicator, the higher the JQI. This outcome contradicts the idea that, when the regulation of the firing of permanent workers is very strict, employers turn to atypical contracts, increasing the

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[12] The reference category is a woman, with tertiary studies, working full time with an open-ended contract in a high-skilled white-collar occupation, in the agriculture sector and in a small firm in 2006. When we look at the effects of the covariates, we find that men and highly educated individuals, employees with permanent contracts who work part time in larger firms and workers in high-skilled white-collar occupations and in various service sectors fare better in the sub-samples of younger, prime-age and older workers. These findings agree with those obtained in the literature (see, for instance, Eurofound, 2012; Muñoz de Bustillo et al., 2011a).

creation of less-stable jobs with poor working conditions.[13]

Lastly, as regards the potential impact of the ETS (proxied imperfectly by the proportion of secondary students in vocational education programmes), the results suggest heterogeneous effects across age groups. According to our results, countries with skill systems that are more oriented towards vocational training exhibit poorer job quality for younger workers than countries with systems that are more focused on general education. However, the reverse is true for older workers. The former finding resembles the result obtained by De Grip and Wolbers (2006), who study the job quality of low-skilled young workers in relation to four aspects separately. They find that the job quality of young workers (in terms of employment in a permanent job, employment in a non-elementary job and participation in vocational training) is worse in occupational labour market environments than in internal labour market ones. The authors attribute the differential results to the differential impact of the demand for higher job qualifications and the consequences of the process of skill upgrading, since the acquisition of occupational skills is organized differently in the two institutional contexts. It is plausible to think that these outcomes may be reversed over the life cycle. Our results point to this possibility.

Next, we focus on examining the degree to which the differential JQI of younger and older workers varies across the institutional configurations of European countries. Accordingly, we consider all workers and interact the dummies for age groups and the institutional indicators in an extended model (see equation (2) in the Technical Annex). The main effects (effects on the intercept) in this case pertain to older workers, while the interaction effects (effects on the age slope) denote the deviation of the younger and prime-age workers' slopes from the older workers'. Table 3 provides the estimation results, reporting only the coefficients corresponding to the age groups and to those interactions.

The first result worth mentioning is that younger workers fare worse than older workers. This finding echoes that presented in Table 1, but this occurs after taking account of worker, job and employer attributes (i.e. the potential 'composition effect'), so it implies that the mean quality of jobs occupied by older workers is better than that of younger workers.

Furthermore, the interactions between the age groups and the institutional indicators enable us to test whether the labour market institutions under analysis affect the job quality of younger and older workers differently. Controlling for compositional differences, the results in Table 3 indicate that the age gap is affected by the institutional setting. In the case of the characteristics of the system of collective bargaining, an increase in the degree of coordination and centralization results in an expansion of the age gap in employment quality: the job quality of older workers significantly improves while that of younger workers deteriorates as coordination and centralization increase. The same happens with respect to the influence of the union power (measured by the coverage rate), the strictness of the EPL for regular jobs and the skill system. All these institutions produce similar impacts, so the outcomes imply that more coordinated and centralized wage bargaining, an extended presence of unions, stricter legislation for firing regular workers and an education and training system that is more oriented towards vocational training favour the job quality of older workers over that of younger workers and help the former to attain a better job quality than the latter.

On the other hand, the results of the indicators that capture the government influence on collective bargaining and on the minimum wage system also imply a widening of the age gap as that influence increases. This is because the job quality diminishes with more intervention for older workers but even more for younger workers. This outcome again points to a differential effect of the institutional setting. In this case, more intervention brings about poorer job quality for older workers, but it penalizes younger workers more intensely.

5. Conclusions and discussion

This paper examines the quality of jobs of younger and older workers, the difference between them and how this differential varies across the European countries. We analyse whether these observed cross-national variations are somehow related to differences in their institutional contexts. To achieve this, we consider a set of indicators measuring various dimensions of the specific labour market-supporting institutions (collective bargaining, union power, minimum wages, employment protection legislation and skill systems). We measure the non-wage quality of jobs using an aggregate index, with three constituent dimensions (working conditions, opportunities for improvement and work–life balance) and several sub-components. The data come from the EU-LFS conducted in the period 2005–2015.

After discussing the potential relationship between institutional settings and quality of jobs, we hypothesize whether countries with greater coordination/centralization of collective bargaining, more intervention of the government, more union power, stricter legislation on hiring and firing and skill systems that are more oriented towards vocational programmes exhibit better quality of jobs in general and lower inequality between insiders (older workers) and outsiders (younger workers).

The estimation results show that, after taking account of worker, job and employer attributes (i.e. the potential 'composition effect'), older workers fare better than younger workers. In addition, the aggregate non-wage job quality is higher in countries where the system of wage bargaining is more coordinated/centralized and the EPL for regular workers is stricter (alternatively stricter than that for temporary workers). Conversely, countries with less intervention of the government in the wage-bargaining process and the

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[13] This conclusion is confirmed by the results (not shown) obtained with an indicator that measures the difference between the EPL for regular workers and the EPL for temporary workers. This difference is positive for countries where the strictness of the EPL for regular workers is greater than the strictness of the EPL for temporary workers and negative otherwise. Our estimation results suggest that positive differences result in better job quality for all age groups, so the existence of comparatively fewer restrictions on hiring and firing using atypical contracts relative to stricter regulation on the firing of permanent workers would not necessarily imply poorer quality of jobs on aggregate.

Table 3

Estimate results of the regressions on the JQI (coefficients of the age groups and their interactions with the institutional indicators.) Pooled EU-LFS (2005–2015).

	Coord. of bargaining	Central. of bargaining	Govern. intervent.	Minimum wage	Union density	Coverage rate	EPL	Vocational training
Younger	−0.735**	−1.473**	−1.883**	−0.485**	−0.484**	−2.285**	−1.824**	−1.202**
	[0.047]	[0.052]	[0.046]	[0.028]	[0.032]	[0.062]	[0.065]	[0.044]
Prime-age	0.150**	−0.911**	−1.462**	0.422**	0.893**	−1.849**	−1.503**	−0.136**
	[0.053]	[0.058]	[0.051]	[0.030]	[0.035]	[0.068]	[0.073]	[0.049]
Institution	0.501**	1.095**	−0.234**	−0.328**	−0.047**	0.013**	4.671**	0.009**
	[0.016]	[0.016]	[0.015]	[0.013]	[0.004]	[0.002]	[0.049]	[0.002]
Younger*Instit.	−0.240**	−0.692**	−0.938**	−0.116**	0.001	−0.039**	−1.054**	−0.042**
	[0.015]	[0.019]	[0.017]	[0.006]	[0.001]	[0.001]	[0.030]	[0.001]
Prime-age*Instit.	−0.066**	−0.202**	−0.270**	−0.048**	0.011**	−0.009**	−0.350**	−0.002*
	[0.012]	[0.015]	[0.013]	[0.005]	[0.001]	[0.001]	[0.023]	[0.001]
Constant	67.904**	67.483**	71.678**	69.955**	70.486**	70.932**	61.015**	70.471**
	[0.093]	[0.085]	[0.074]	[0.069]	[0.147]	[0.219]	[0.132]	[0.092]
Observations	8,059,365	8,059,365	8,059,365	8,059,365	8,059,365	8,059,365	7,797,284	8,059,365
R-squared	0.483	0.484	0.484	0.483	0.483	0.484	0.479	0.482

Note: Each column corresponds to the estimation of an independent model (see Table 2). Robust standard errors appear in brackets. The number of observations is smaller in the models including the EPL indicator due to the lack of information on that indicator for 2015. R2 in all models range between 0.48 and 0.49. **p < 0.01, *p < 0.05.

minimum wage system tend to exhibit higher quality of jobs. Although our approach is different, these results are in line with previous studies that do not find support for the view that CMEs have systematically higher job quality in all the quality features than the LMEs. Even though the literature on 'varieties of capitalism' and 'power resources' implies that LMEs should have not only worse job security but also poorer job quality in all dimensions than CMEs, several studies have found the opposite, except that the social corporatist countries fare better in working time and intrinsic work quality (Green et al., 2013; Leschke et al., 2008).

Furthermore, institutional contexts matter in relation to the differential quality of jobs between groups of workers. In this vein, we find that countries characterized by a system of wage bargaining that is more coordinated and centralized, legislation that is more protective of regular jobs and a system of education and training that is more focused on vocational education support the quality of jobs of older workers over younger workers. At the same time, more government intervention in wage setting (through wage bargaining and the minimum wage system) may be negative for older workers but even more so for younger workers. These results point out the notion that the institutional setting of CMEs tends to favour the job quality of older workers over that of younger workers, while this may not be the case for countries that are representative of other institutional approaches (the 'liberal' one – the UK – and the 'flexicurity' one – Denmark).

To conclude, our findings suggest that the vulnerability of young workers in the labour market is affected by a country's institutional setting. This should further alert policy makers to the conditions of youth. Although the European Union's directives have had widespread implications for job quality across the Member States, as national governments are required to bring their own laws into line with the European laws, it seems that national institutional configurations still matter. As the European countries develop in the direction of a knowledge economy, the demand for higher job qualifications will in general threaten the quality of jobs of young (and low-skilled) workers, as they may be either locked into poor-quality jobs with flexible contracts that further weaken their labour market position or even crowded out of employment entirely. Internal labour markets may have advantages for younger (and low-skilled) workers at entry, but the question is whether they remain over the life course. The interaction of different institutions may prove to be relevant.

Nevertheless, much work remains to be undertaken to move from the static perspective taken here towards a more dynamic perspective that places more emphasis on the prospects of work and changes of job quality in terms of career advancement over the life cycle. In addition, from the perspective of how to measure job quality, a further direction of extension would be to consider, for instance, hedonic weights for the different dimensions of the JQI, incorporating information from surveys such as the EWCS and making comparisons with the results that occur with the current weights, and to advance on the relationship between objective and subjective measures (such as job satisfaction).

Declaration of interest

Acknowledgements

Appendix

Table A.1. Structure of the Job Quality Index.

Dimension	Sub-component
WC: Working conditions (44.5%)	WC1 (11.1%): Working part-time by reason: not having found a full-time job (0); other reasons (50); not wanting a full-time job (100).
	WC2 (11.1%): Usually working more hours than agreed or contained in the labour contract or the collective agreement: more hours (0); otherwise (100).
	WC3 (11.1%): Wishing to work more or fewer hours than currently: more or fewer hours (0); same number of hours (100).
	WC4 (11.1%): Contractual stability: fixed-term contract (involuntary reasons) (0); fixed-term contract (voluntary reason: not wanting a permanent contract) (30); permanent contract (100).
ST: Skills and training (33.3%)	ST1 (11.1%): Having undertaken on-the-job training activities funded (totally or partially) by the company in the four weeks prior to the interview: no (0); yes, but not funded by the company (33); yes, and funded by the company (100).
	ST2 (11.1%): Level of qualification required by the job: occupational group 9 (0); groups 4–8 (33); group 3 (67); groups 1–2 (100).
	ST3 (11.1%): Skills mismatch: difference between the skills required by the job and those possessed by the worker: over-qualification/sub-employment (0); otherwise (100).
WLB: Work–life balance (22.2%)	WLB1 (11.1%): Regular weekly working hours in the main job: +48 (0); 43–48 (25); 38–42 (50); 21–37 (75); 1–20 (100).
	WLB2 (11.1%): Average of the following five variables:
	Number of times in the last four weeks that the working day ended any time between 20:30 and 24:00: more than half of the days worked (0); occasionally (50); never (100).
	Number of times in the last four weeks that the working day ended after 24:00: more than half of the days worked (0); occasionally (50); never (100).
	Number of times in the last four weeks that the individual worked on a Saturday: two or more (0); one (50), none (100).
	Number of times in the last four weeks that the individual worked on a Sunday: two or more (0); one (50); none (100).
	Working in a shift system: yes (0); no (100).

Table A.2. Descriptive statistics. Pooled EU-LFS (2005–2015).

	Younger	Prime-age	Older	Younger	Prime-age	Older
	Mean	Mean	Mean	SD	SD	SD
Gender						
Women	0.4762	0.4780	0.4803	0.4994	0.4995	0.4996
Level of education						
Primary	0.2347	0.2115	0.2813	0.4238	0.4084	0.4496
Secondary	0.5074	0.4469	0.4389	0.4999	0.4972	0.4963
Tertiary	0.2579	0.3416	0.2798	0.4375	0.4743	0.4489
Industry affiliation						
Agriculture	0.0161	0.0144	0.0144	0.1260	0.1192	0.1192
Manufacturing	0.1929	0.2151	0.1975	0.3946	0.4109	0.3981
Construction	0.1146	0.0837	0.0688	0.3185	0.2769	0.2532
Traditional Services	0.2163	0.1424	0.1175	0.4117	0.3495	0.3221
ICT Services	0.0323	0.0365	0.0251	0.1767	0.1875	0.1564
Other Services	0.4278	0.5079	0.5766	0.4948	0.4999	0.4941
Occupation						
White-collar high-skilled occ.	0.3201	0.4315	0.4179	0.4665	0.4953	0.4932
White-collar medium-skilled occ.	0.1305	0.1260	0.1311	0.3368	0.3319	0.3375
White-collar low-skilled occ.	0.2336	0.1426	0.1335	0.4231	0.3497	0.3401
Blue-collar high-skilled occ.	0.1497	0.1178	0.1111	0.3568	0.3224	0.3142
Blue-collar medium-skilled occ.	0.0603	0.0814	0.0827	0.2380	0.2735	0.2755
Blue-collar low-skilled occ.	0.1059	0.1006	0.1237	0.3077	0.3008	0.3292
Firm size						
1-10 employees	0.2140	0.1859	0.1825	0.4101	0.3890	0.3863
11-19 employees	0.2910	0.2662	0.2635	0.4542	0.4420	0.4405
20-49 employees	0.3987	0.4781	0.4923	0.4896	0.4995	0.4999
50 employees or more	0.0534	0.0348	0.0305	0.2248	0.1833	0.1720
Don't know	0.0430	0.0349	0.0311	0.2027	0.1835	0.1736
Working day						
Full-time	0.7559	0.7880	0.7628	0.4296	0.4087	0.4254
Part-time	0.2441	0.2120	0.2372	0.4296	0.4087	0.4254
Type of labour contract						
Permanent	0.6807	0.8995	0.9387	0.4662	0.3006	0.2398
Fixed term	0.3193	0.1005	0.0613	0.4662	0.3006	0.2398

Table A.3. Full estimate results of the regressions on the JQI (specifications using 'Coordination' as an institutional indicator). Pooled EU-LFS (2005–2015).

	Younger	Prime-age	Older	All
Constant	68.936**	66.945**	67.106**	67.904**
	[0.271]	[0.173]	[0.258]	[0.093]
Younger	–	–	–	−0.735**
				[0.047]
Prime-age	–	–	–	0.150**
				[0.053]
Coordination	0.439**	0.422**	0.444**	0.501**
	[0.049]	[0.031]	[0.046]	[0.016]
Younger*Coordination	–	–	–	−0.240**
				[0.015]
Prime-age *Coordination	–	–	–	−0.066**
				[0.012]
Woman	1.465**	2.940**	2.518**	2.572**
	[0.037]	[0.023]	[0.033]	[0.014]
Primary education	−3.308**	−2.753**	−2.453**	−2.960**
	[0.044]	[0.029]	[0.039]	[0.016]
Secondary education	−2.311**	−1.744**	−1.605**	−2.016**
	[0.056]	[0.034]	[0.048]	[0.021]
Manufacturing	1.551**	0.462**	−0.001	0.707**
	[0.145]	[0.092]	[0.132]	[0.055]
Construction	2.637**	1.136**	0.693**	1.539**
	[0.148]	[0.096]	[0.140]	[0.058]
Traditional Services	−1.692**	−1.992**	−2.029**	−1.857**
	[0.146]	[0.094]	[0.135]	[0.056]
ICT Services	2.118**	0.832**	0.057	1.154**
	[0.169]	[0.104]	[0.157]	[0.064]
Other Services	1.100**	0.910**	0.596**	1.079**
	[0.144]	[0.091]	[0.130]	[0.055]
White-collar medium-skilled occ.	−3.247**	−2.937**	−2.947**	−2.985**
	[0.055]	[0.033]	[0.047]	[0.018]
White-collar low-skilled occ.	−12.718**	−12.269**	−11.779**	−12.350**
	[0.053]	[0.034]	[0.050]	[0.022]
Blue-collar high-skilled occ.	−10.092**	−9.422**	−8.612**	−9.276**
	[0.066]	[0.041]	[0.060]	[0.026]
Blue-collar medium-skilled occ.	−11.685**	−10.215**	−9.591**	−10.385**
	[0.087]	[0.046]	[0.066]	[0.029]
Blue-collar low-skilled occ.	−19.510**	−19.412**	−18.411**	−19.177**
	[0.065]	[0.040]	[0.053]	[0.023]
11-19 employees	0.171**	0.665**	0.793**	0.585**
	[0.048]	[0.031]	[0.044]	[0.018]
20-49 employees	0.003	0.518**	0.806**	0.486**
	[0.048]	[0.029]	[0.042]	[0.018]
50 employees or more	0.575**	0.498**	0.409**	0.443**
	[0.086]	[0.062]	[0.093]	[0.036]
Don't know firm size	0.402**	0.981**	1.176**	0.789**
	[0.093]	[0.062]	[0.093]	[0.034]
Part-time	0.646**	1.678**	3.483**	1.889**
	[0.043]	[0.028]	[0.038]	[0.018]
Temporary contract	−9.279**	−11.101**	−11.974**	−10.490**
	[0.037]	[0.035]	[0.063]	[0.021]
2007	−0.190**	−0.168**	−0.257**	−0.187**
	[0.069]	[0.043]	[0.066]	[0.028]
2008	−0.103	−0.102*	−0.187*	−0.115**
	[0.078]	[0.048]	[0.074]	[0.033]
2009	0.517**	0.161**	−0.048	0.189**
	[0.071]	[0.043]	[0.065]	[0.028]
2010	0.514**	0.158**	−0.045	0.187**
	[0.073]	[0.044]	[0.066]	[0.029]
2011	0.137	0.498**	0.314**	0.383**
	[0.072]	[0.044]	[0.065]	[0.028]
2012	0.098	0.496**	0.259**	0.368**
	[0.072]	[0.044]	[0.064]	[0.025]
2013	0.346**	0.783**	0.560**	0.659**
	[0.073]	[0.044]	[0.064]	[0.027]
2014	0.229**	0.712**	0.179**	0.499**
	[0.077]	[0.046]	[0.067]	[0.028]
2015	0.330**	0.750**	0.322**	0.581**
	[0.077]	[0.047]	[0.066]	[0.028]
BE	−0.846**	0.243**	0.652**	0.070**

	[0.128]	[0.081]	[0.127]	[0.021]
DE	−1.481**	−1.472**	−1.136**	−1.417**
	[0.099]	[0.065]	[0.103]	[0.019]
DK	4.178**	4.057**	3.804**	3.841**
	[0.147]	[0.100]	[0.143]	[0.019]
ES	−0.326**	1.421**	2.739**	1.234**
	[0.114]	[0.073]	[0.116]	[0.027]
FI	−0.652**	0.933**	1.538**	0.599**
	[0.132]	[0.087]	[0.125]	[0.023]
FR	−0.691**	0.538**	1.577**	0.432**
	[0.143]	[0.091]	[0.141]	[0.036]
IE	−0.840**	−0.044	1.072**	−0.086**
	[0.176]	[0.124]	[0.198]	[0.023]
IT	1.239**	2.785**	3.525**	2.530**
	[0.119]	[0.075]	[0.117]	[0.019]
NL	−0.316**	0.629**	1.453**	0.495**
	[0.119]	[0.080]	[0.121]	[0.021]
PT	−0.723**	1.573**	2.868**	1.253**
	[0.174]	[0.108]	[0.169]	[0.036]
SE	0.037	1.849**	1.827**	1.319**
	[0.139]	[0.090]	[0.129]	[0.015]
UK	2.694**	1.576**	1.658**	1.689**
	[0.177]	[0.114]	[0.174]	[0.048]
Observations	1,642,499	4,206,205	2,210,661	8,059,365
R-squared	0.482	0.480	0.458	0.483

Note: Robust standard errors appear in brackets. ***p < 0.01, **p < 0.05, *p < 0.1.
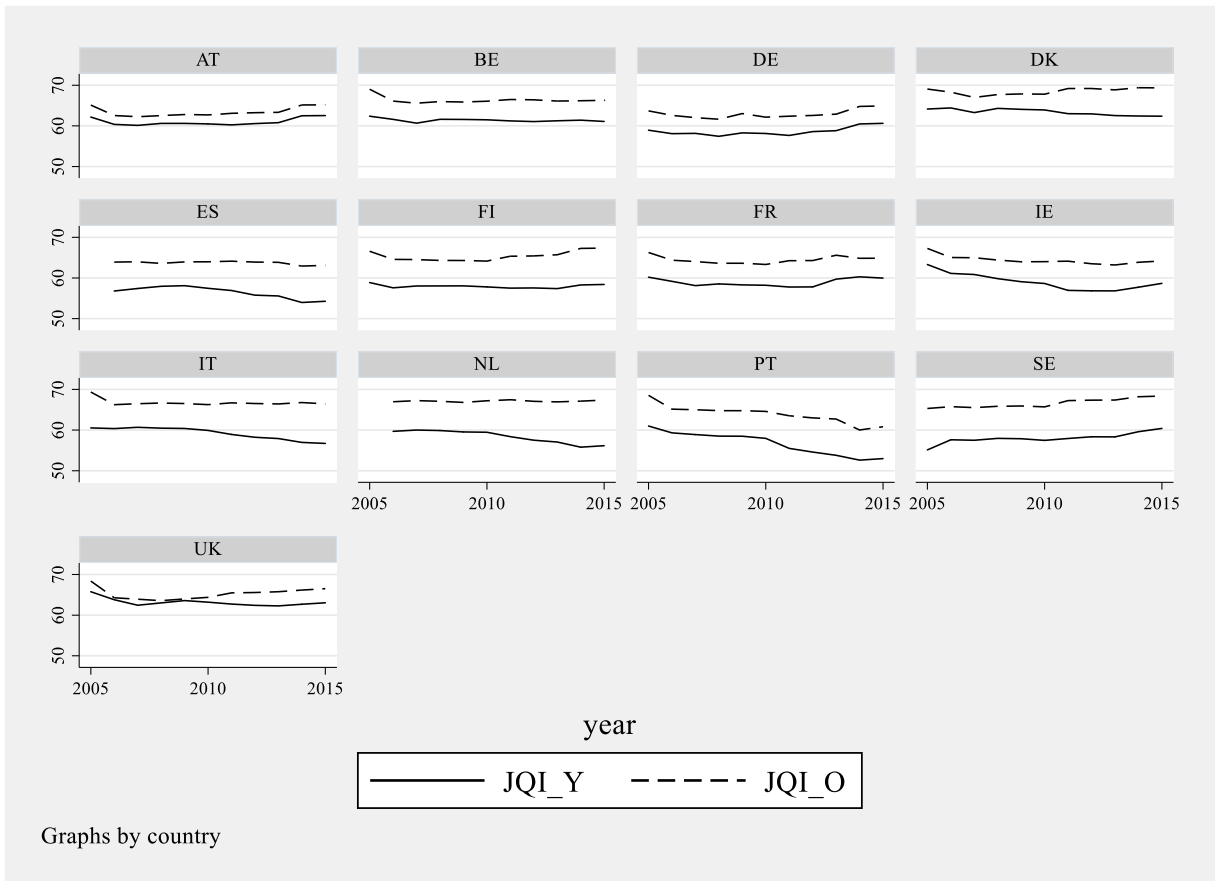

Figure A.1. Evolution of the JQI across European countries (predicted values). Pooled EU-LFS (2005–2015).
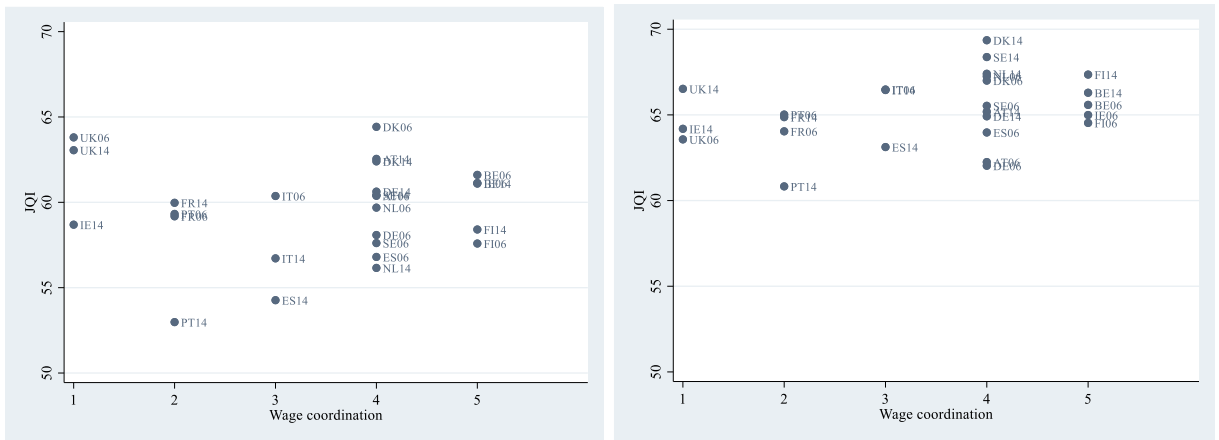
Figure A.2. Coordination of wage bargaining and JQI (younger workers -left- and older workers -right-).
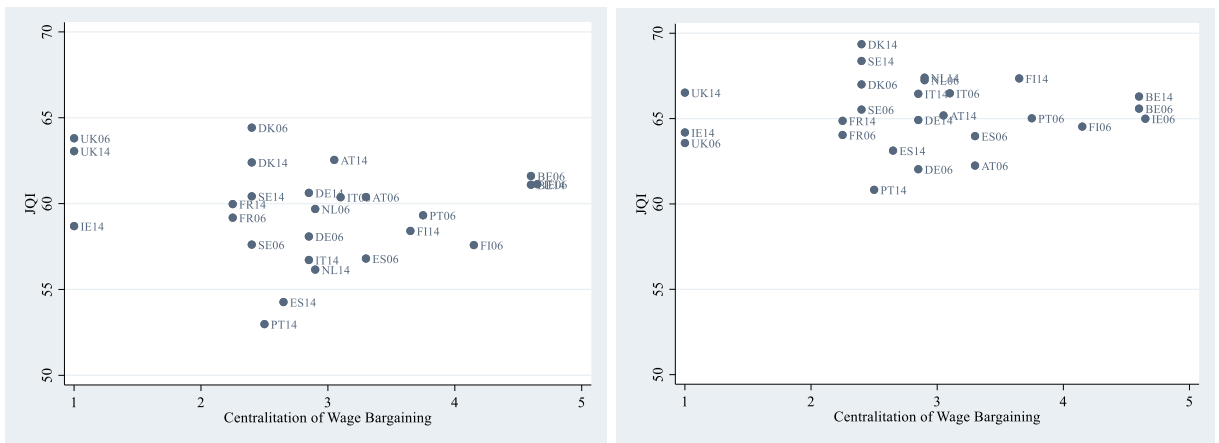

Figure A.3. Centralization of wage bargaining and JQI (younger workers -left- and older workers -right-).
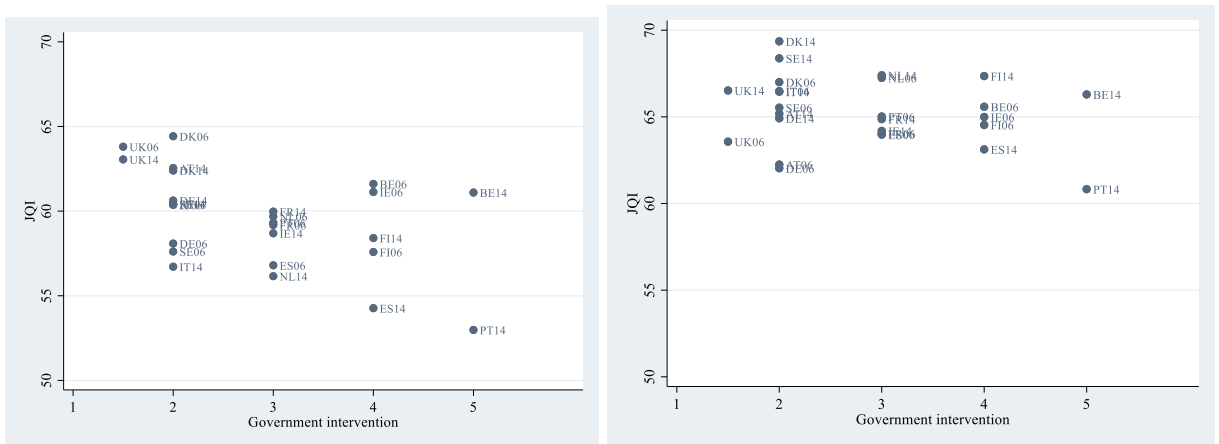

Figure A.4. Government intervention on wage setting and JQI (younger workers -left- and older workers -right-).
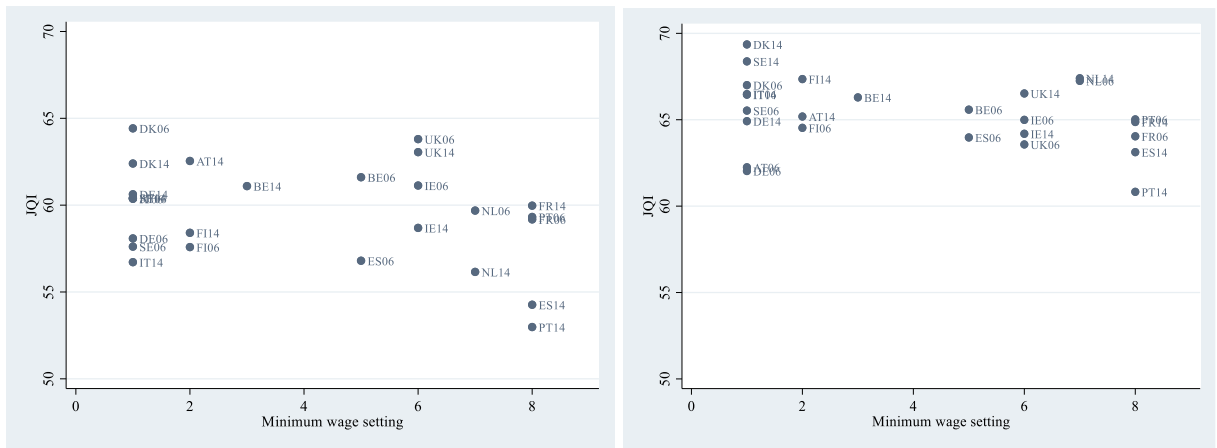
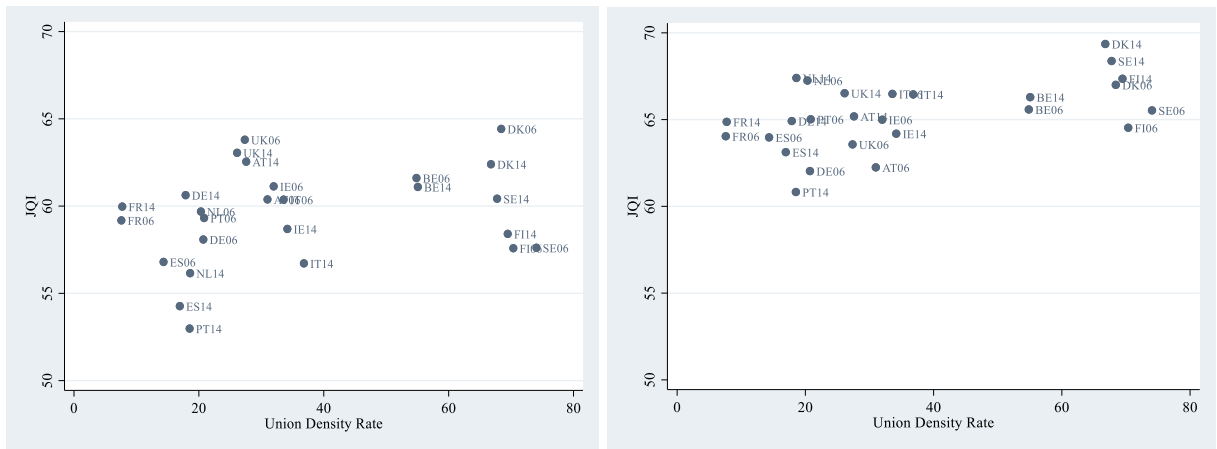**Figure A.5.** System of minimum wage and JQI (younger workers -left- and older workers -right-).

Figure A.6. Union density and JQI (younger workers -left- and older workers -right-).

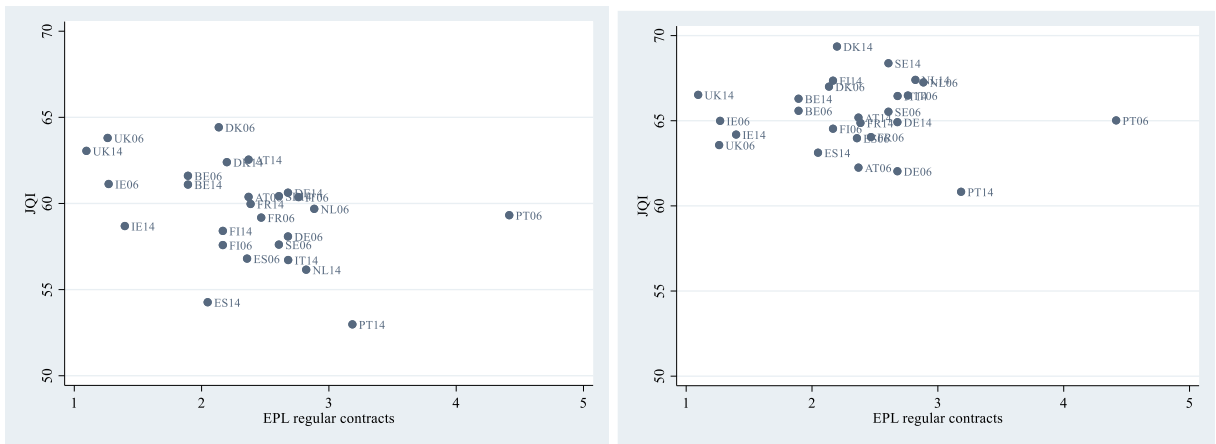**Figure A.7.** Coverage rate and JQI (younger workers -left- and older workers -right-).

Figure A.8. EPL for regular jobs and JQI (younger workers -left- and older workers -right-).
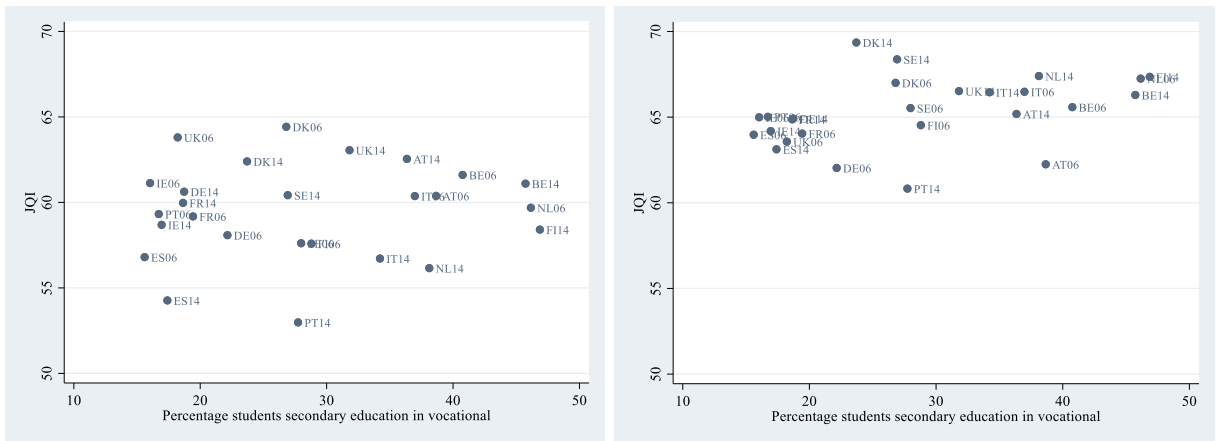

Figure A.9. Share of secondary students on vocational programmes and JQI (younger workers -left- and older workers -right-).

Technical Annex

As we are interested firstly in analysing the magnitude of the impact of varying labour market institutional configurations on the job quality of workers and their potential distinct effects within age groups, our strategy rests on the estimation of a model of the determinants of job quality separately for younger, prime-age and older workers. We estimate our empirical model by pooling the data for the selected countries and the years 2005–2015. The pooled (by country and by year) baseline empirical model takes the following form:

$$Y_{ij} = \beta \, X_{ij} + \gamma \, Inst_j + u_j + \varepsilon_{ij} \tag{1}$$

where subscripts i and j stand for individuals and countries, respectively; Y_{ij} is the JQI; X_{ij} is a vector of explanatory variables; $Inst_j$ is a vector of variables related to the institutional framework of the selected economies; u_j represents unobservable country-specific effects; and ε_{ij} is the individual error term.

The model controls for a range of personal and work-related attributes (see Table A.2 of the Appendix for some descriptive statistics). Regarding the socio-demographic characteristics of workers, we include gender and three dummies for educational level (low, medium and high). As for the job- and employer-related variables, dummy variables for employment status (1 if permanent, 0 if temporary), working time (1 if full-time, 0 if part-time), occupation (six variables), industry affiliation (six variables) and firm size (five variables) are included. Controlling for this set of attributes highlights the importance of the 'composition effect' when measuring the quality of jobs; that is, the quality scores may be influenced by the composition of employment, reflecting the varying characteristics of workers and jobs rather than differences in the average quality of jobs.

The pooling allows the estimation of the effect of the business cycle and the labour market institutions on the quality of jobs. Accordingly, we control for the economic conditions at the time of the survey using a set of dummy yearly variables (from 2005 to 2015) and consider a set of variables that capture distinct dimensions of the institutional framework of the European countries: the system of collective bargaining; the union power; the minimum wage system; the hiring and firing regulations for permanent and temporary contracts; and the education and training system. These indicators are lagged by one period to alleviate the endogeneity issues and to account for the fact that de jure institutional reforms (if any) take time to become effective. Furthermore, the presence of

country-level institutional factors originates a multilevel structure of data, in which observations at the individual level are nested within the country level. The baseline empirical model described in equation (1) is then estimated for each subsample of younger, prime-age and older workers by performing ordinary least squares (OLS) regressions for the 2005–2015 period. This single equation allows us to test the existence of differences within the groups of younger and older workers across countries characterized by varying socio-economic models.

A more extended specification of the model includes additional interactions between age groups (15–29, 30–49 and 50–64) and institutional variables. This specification is designed to determine whether there is an age gap in job quality and to examine the degree to which the differential job quality of younger and older workers varies across the institutional configurations of European countries. The extended pooled empirical model is also estimated by OLS, now taking the following form:

$$Y_{ij} = \beta\, X_{ij} + \delta_1\, Young_{ij} + \delta_2\, Prime_{ij} + \gamma_0\, Inst_j + \gamma_1\, Young_{ij}\, Inst_j + \gamma_2\, Prime_{ij}\, Inst_j + u_j + \varepsilon_{ij} \tag{2}$$

The country-level variables (the institutional ones) are interacted with the individual-level variables (the age groups) to obtain the effect that a country-level factor produces on the individual-level outcome. This allows us to estimate the effects of country-level institutional settings on the job quality gap between younger and older workers. Since the reference is the group of older workers, the coefficients for the other age groups (δ_1 and δ_2) give us the relative job quality of younger and prime-age workers once the 'composition effect' is taken into account, while the coefficient for the institutional indicator (γ_0) measures the impact of the corresponding institution for older workers. Furthermore, the interactions between younger and prime-age workers and the corresponding institution (γ_1 and γ_2) measure the differential effect of the latter for these groups compared with older workers.

After pooling the country data, we include distinct country intercepts, choosing in fact a fixed-effect model (see Perugini and Pompei, 2017; Stier and Yaish, 2014). In a fixed effects (FE) approach, the country effects are treated as fixed parameters: each country intercept represents the effect of unobserved factors that are shared within each country. From the point of view of the inferences that can be drawn from the model, the estimates refer to the specific sample of countries used and cannot be generalised out of the sample. If the country effects are considered as distinct values to be estimated, they are modelled as random draws from a distribution. In the random effects (RE) approach, the set of countries included in the analysis is modelled as s sample from a larger population of countries defined in terms of observed characteristics. Any remaining unobserved country effects are treated as being generated by some common mechanism and so are 'exchangeable' between countries (Snijders and Bosker, 1999). With these assumptions, the estimates can be generalised from the sample at hand (for instance, to other European countries with different policies and institutions). As Bryan and Jenkins (2013) stress, exchangeability is a strong assumption but also potentially unrealistic (depending on research context).

A key parameter of the RE model is the intra-class correlation $\rho = \sigma_u^2/(\sigma_e^2 + \sigma_u^2)$, where σ_e^2 and σ_u^2 are the variances of the individual and country random effects respectively. This correlation summarises the extent to which unobserved factors within each country are shared by individuals. It tends to zero as $\sigma_u^2 \rightarrow 0$. Assuming that the correlation structure of the random effects has a particular form leads to more efficient estimates of the individual-level effects represented by β. This is due to the fact that the RE approach 'borrows strength' from between-group variation (while FE uses only within-group variation). However, in practice, the difference between RE and FE estimates is likely to be negligible when using cross-country data that contain many more observations within counties than there are countries (large N_j, small j). This is because, with large N_j, almost all the variation use in RE estimation is from within, rather than between, countries. Bryan and Jenkins (2016) show that the point estimates of the fixed parameters, both for individual- and country-level regressors, in regression methods applicable to multilevel country datasets are almost identical across the methods considered and the same as a two-step method, consistent with them being unbiased.

Appendix B. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.ssresearch.2019.102345.

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