



**Quality of jobs and  
innovation generated  
employment outcomes**

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## **QUALITY OF WORK AND INNOVATIVE CAPACITY: IMPLICATIONS FOR SOCIAL EQUALITY**

*QuInnE Working Paper No. 8*

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QuInnE - *Quality of jobs and Innovation generated Employment outcomes* -is an interdisciplinary project investigating how job quality and innovation mutually impact each other, and the effects this has on job creation and the quality of these job.

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# Quality of Work and Innovative Capacity: Implications for Social Equality

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## *Executive summary*

The last decade has seen the promotion of management workforce policies designed to enhance productivity and innovation by improving certain aspects of job quality. Such ‘high performance’ management policies seek to increase the motivation of employees, in particular through providing better opportunities to improve skills, allowing employees to exercise initiative in work and increasing their involvement in decisions. This paper examines which types of employees have been most affected and whether such policies have contributed to a convergence or divergence in the distribution of good job quality across the workforce? Have the benefits of such initiatives primarily improved the conditions of those who were already in relatively good jobs, accentuating inequalities? Or, have they led to an upgrading of employees who were previously relatively disadvantaged, reducing previous inequalities?

This paper examines these issues for the period between 2005 and 2015, using cross-national data from the European Working Conditions Surveys. These surveys provide representative data for employees. They also make it possible to contrast the period including the years of deep economic crisis (2005 to 2010), with the subsequent years (2010 to 2015) in which many of the European economies had returned to growth. To provide adequate sample numbers, countries have been grouped into seven regions: among the EU-15 the North West (the UK and Ireland), the Nordic, the Continental, and the Mediterranean regions, and, among the New Member States, the North East, the Central East and the South East regions.

The paper constructs an index of innovation-conducive job quality (ICJQ) based on four dimensions of job quality that have been thought to have positive effects for employee innovative behaviour – task control, the ability to use initiative at work, learning opportunities and job security. It focuses on whether there has been a trend towards convergence or polarization with respect to five key dimensions of workforce differentiation: region, occupational class, gender, contract duration and age.

It begins by showing that jobs ranked highly on the measure of innovation-conducive job quality are, as predicted by the high performance management literature, associated with higher work motivation in terms of a range of indicators. Further, it shows that those in such jobs are more likely to report personal involvement in innovation and are more likely to be in organizations where innovation has taken place in the previous three years.

In the following sections, the paper examines whether there has been a change over time towards either greater or less inequality in the distribution of such jobs between classes, gender, age groups and contract categories.

The only respect in which there has been marked convergence is in the reduction in the gap between the Nordic and other regions. The Nordic countries stood out in each period as those with the greatest prevalence of innovation-conducive jobs, but other regions significantly improved their relative position, particularly in the period 2010 to 2015. Although this reduced regional differential was partly due to a small deterioration in the position of the Nordic countries, it primarily reflected a significant growth of innovation conducive jobs in other regions - in particular the North West, the Continental, the Southern and the Central European regions. Although part of this convergence can be accounted for in terms of the changing composition of the workforce and industry structure, the results also point to a greater diffusion of high performance management practices. The main qualification to the broader picture of convergence is that there is some evidence that the relative position of South East Europe declined over the period.

In general the analysis indicated that differentials relating to individual characteristics – sex and age – remained relatively stable over the period. Even in 2005 there was little evidence that women were to a lesser extent in innovation-conducive jobs than men (in marked contrast to their disadvantage with respect to pay). This close similarity between men and women remained unchanged through the economic crisis and the subsequent period of growth. It is only when account is taken of changes in workforce and industry structure over the period that a more qualified picture emerges, with the relative position of women deteriorating in the Continental and South East regions and improving in the Central East countries.

Both young (under 25 year old) and, to a lesser extent, older workers (50+) were less likely to be in innovation-conducive jobs than prime aged (35-49 year old) workers. There was little change in the relative position of younger workers over the period, with the exception of the North West countries where their jobs became more similar to those of prime-aged workers. The relative position of older workers also remained very similar over time in most regions, apart from some improvement in the Continental countries, and, taking account of compositional changes in workforce and industry structure, in the Mediterranean countries.

In contrast to this picture of relatively stable differentials with respect to individual characteristics, there were notable changes in disadvantage with respect to both class and contract status. Relative changes in class advantage were linked to the economic situation that characterised the period. Taking the period 2005 to 2015 as a whole, there was little change in class differentials. But the gap between the low skilled on the one hand and professionals and managers on the other generally increased in the period of deepest economic crisis 2005 to 2010 and then contracted in the period 2010 to 2015 when many countries experienced a return to growth. The pattern plausibly reflects the importance of labour market conditions for employees' power to influence management decisions. In periods of economic crisis, employees lack the capacity to defend their interests and employers more easily revert to traditional directive patterns of management. In contrast, in tighter labour markets, employers are more likely to take account of employee welfare in their organisational policies.

While patterns of class disadvantage were cyclical, those with respect to contract indicated a continuous and marked decline in the relative position of temporary workers compared with permanent employees both over the period of economic crisis and in the subsequent period of stabilisation. This suggests that the strong policy emphasis in many countries on increasing labour market flexibility may give priority to short-term cost savings at the expense of the longer-term innovative capacity needed to raise productivity levels.

## Quality of Work and Innovative Capacity: Implications for Social Equality

Duncan Gallie

### **Introduction**

There has been growing evidence that some aspects of good job quality bring benefits both for employees and for the innovative capacity of organisations. There has been little research, however, on how jobs with these characteristics are distributed across the workforce. Are they concentrated among an elite of highly skilled occupations or are they more widely spread across the workforce? Even less is known about the trends: have such jobs been increasing over time and, if so, has this contributed to a convergence or divergence in the distribution of good quality jobs across the workforce? This paper examines these issues for the period between 2005 and 2015, using cross-national data from the European Working Conditions Surveys. It focuses on five key dimensions of workforce differentiation: region, occupational class, gender, contract duration and age.

### **Theoretical Perspectives on Innovative Capacity and Job Quality**

The EU's QuinnE research programme, to which this paper is a contribution, is focused on the relationships between job quality and innovation. As set out in the initial QuinnE theoretical schema, job quality may affect innovation through its implications for workforce innovative capacity (Warhurst et al. 2016). After several decades in which analysts pointed predominantly to an inherent conflict between the objectives of effective business performance and the quality of employees' jobs, new theoretical perspectives emerged from the 1980s that argued that they were not only compatible but mutually advantageous.

The earlier analyses, following on from the work of Braverman (1973), were premised on a belief in the efficiency benefits of Taylorist forms of work organization. These promoted a detailed division of labour involving the simplification and routinisation of job tasks, the imposition of tight controls over work speed and the removal from employees of discretion over the work process. Further, the simplification of job tasks made it easier to replace existing employees and hence increased their job insecurity. The spectacular growth of the Western economies in the postwar years was seen as built upon a progressive degradation of labour that affected not only the manual working class, but increasingly the intermediary classes of clerical workers and technicians.

While there was widespread consensus that Taylorism had been the master trend in the development of work from the 1930s to the 1950s, the first misgivings about extrapolating the trend into the distant future came from researchers working on the implications of advanced automation for work organisation (Blauner, 1964; Woodward, 1970; Gallie, 1978). The argument was that automation necessarily implied a reversal of the historic trend towards an ever-increasing division of labour and a reintegration of work tasks that restored

significant control to employees in the running of complex and highly integrated production systems. The combination of the relative volatility of such systems and the high costs of downtime meant that the active intervention of employees to anticipate and manage problems became crucial to economic performance.

The notable development in the 1980s was the emergence of more general theories of management that predicted an increased focus in workforce policies on improvements in job quality as a condition for productivity and competitiveness in an era of intensified international trade, increased diversification, faster rates of change, and rising demands for product and service quality. Generically, these have come to be referred to as 'high performance' workforce policies. Walton (1985) argued that a revolution was under way in the management of work, involving a shift from seeking to increase productivity through detailed control of employees' task performance to winning their commitment by improving the quality of their jobs. In the new era, employees would work in self-supervising work teams, would have good opportunities for training, would be given a voice in organizational matters and have higher levels of job security. In a similar vein, Lawler (1986) argued for the benefits to employers as well as to employees of systems of 'High-Involvement Management', a general line of thinking which, under diverse names, became increasingly influential (Appelbaum et al. 2000; Lawler et al. 1995; Butler et al. 2004; Wood and Wall, 2007). In short developments in managerial theory came to reinforce the conclusions of theorists of technology who predicted that higher job quality was an essential condition of improved economic performance in an economy increasingly premised on technical innovation. The underlying arguments were extended theoretically, and reinforced empirically, in the 2000s, leading to the identification of a number of key aspects of job quality that were likely to be conducive to innovation.

Theorists of high involvement management placed a strong emphasis on decentralising decision-making responsibilities to employees and increasing involvement through consultation about wider organizational issues to provide the higher levels of motivation needed to improve quality standards. Another influential strand of theory underlined the importance of continuous learning and the competitive advantages of 'learning organizations' in contexts of uncertainty and rapid change (Lundvall and Nielsen, 2007; Valeyre et al, 2009; Lorenz and Lundvall, 2011). The information technology revolution, it was argued, transformed the dynamics of modern economies by enhancing the rate of change. It is not just that the rate of innovation in ICT itself is rapid and provides pressures for more frequent organizational change, but ICT speeds up innovation in other sectors through the improvement it brings to communications. In situations of rapid change, knowledge becomes more rapidly obsolete and learning new skills and competencies becomes more crucial to improvements in performance. Learning new skills is increasingly 'learning through experience' and 'learning through doing', rather than through formal channels of knowledge acquisition. But such learning depends upon the way an organization is structured - its design, practices and culture (see also Evans et al. 2006; Hoyrup, 2010). In particular, it requires a culture that promotes the importance of learning, relative flat organizational structures and

forms of job design that give employees the discretion that allows them to learn through experience.

The factors pointed to by these broad theories of high performance workforce policies have received support from more recent research on employees' 'innovative work behaviour', defined in terms of 'finding, suggesting and implementing new and beneficial work-related ideas' (De Spiegelaere et al. 2014). Research on the determinants of innovative behaviour has been based predominantly on relatively small samples in specific organizational contexts but studies have obtained interesting results. A wide range of studies has found that control over the immediate job (autonomy, task discretion) is an important predictor of innovative work behaviour. In a meta-analysis, Hammond et al. (2011) concluded that, of all predictor categories, job characteristics demonstrated the strongest relationships with individual innovation. The main determinants were autonomy, together with task complexity and supervisory expectations of creativity. These factors proved of greater importance than either personality factors or education and tenure. An analysis of the relative importance of different spheres of decision-making (De Spiegelaere et al. 2016) concluded that it was above all employees' control over their methods of work that was important for innovative work behaviour rather than control over work scheduling and times of work ('flexitime').

The importance of control at work for innovation lies in the fact that it enables workers to experiment with different approaches and methods and thereby develop their ideas (De Spiegelaere et al., 2014). Both control over immediate job tasks and involvement in wider organizational decisions are associated with greater opportunities for workers to use their skills and knowledge on the job, as well with better learning opportunities (Gallie, 2013). They also increase the likelihood that people will share their knowledge with others (Inanc et al. 2015). Immediate job control is also likely to affect innovation through its positive direct effects on motivation, whereas the motivational effect of involvement in wider organizational decisions is primarily attributable to the fact that it leads to improvements in other aspects of job quality (Gallie et al 2017).

Finally, there is some evidence that job security may be important for employees' capacity to be innovative. Surveying the literature, Probst (2009) finds evidence that job insecurity may lead to risk-averse thinking, behavioural rigidity and a lower willingness to engage in organizational citizenship behaviours whereby people are prepared to step outside their formally defined roles to benefit the organization. Experimental research has shown that individuals threatened with lay-offs were less able to solve a subsequent creative task (Probst, Stewart, Gruys and Tierney, 2007). A study examining the impact of downsizing on creativity found that it significantly reduced aspects of the work environment that favoured creativity, such as individual freedom on the job, access to resources, supervisory encouragement and work group support (Amabile and Conti, 1999). Similarly, Stynen et al. (2015) found that fear of loss of quality in the employment relationship (for instance with respect to working conditions and career opportunities) had an overall negative effect on organizational citizenship behaviour by undermining employees' sense of autonomy, competence and relatedness. The implications of job insecurity are partly moderated by the



level of participation that employees have in decision-making. Participation both reduces the likelihood that people feel insecure (Gallie et al. 2017) and, if they do experience insecurity, it reduces its negative impact on employees' well-being and commitment to the organization (Probst, 2005).

Consistently with the arguments about the growing need for high performance management policies, the research literature on factors affecting employee motivation and innovative behaviour points to a number of job characteristics that are both central to good job quality and have positive effects on performance improvement and innovation. These can be termed 'innovation-conducive job quality (ICJQ)'. They constitute a subset of the dimensions normally regarded as constituting overall job quality (for a discussion of the broader concept, see Warhurst et al. 2016). There is a relatively wide consensus that they include employee participation in decision-making, particularly with respect to the immediate job task, and the importance of good learning opportunities at work. Some authors also have also pointed to the potential importance of task complexity, role breadth, supervisory expectations and job security.

While there is now significant evidence pointing to the potential benefits of some key dimensions of good job quality for innovation, there has been little attempt to examine the implications of high performance work policies for inequalities between different categories of employee<sup>1</sup>. The primary focus has been on class differentials and, even in this respect, the arguments developed in the literature are ambivalent. Some point to a positive effect of new workforce practices on the work conditions of less skilled occupations, while others imply that the benefits are likely to be primarily for the most highly skilled occupations.

The advocacy of high involvement management was inspired partly by the relative success of the Japanese car industry in drawing on employee initiatives to enhance production quality. The Volvo experiment in Sweden, which involved a more radical delegation of decision-making to work teams, was also influential. Both examples suggested that improvements in the quality of work could be beneficial for innovation for those in relatively routinized work, allowing semi-skilled workers to make a significantly greater contribution. Arguably such measures were less necessary for those in more skilled occupations, since these would already have relatively good quality jobs and hence strong motivation to be innovative at work. In this scenario, the extension of policies to improve work conditions could be expected to lead to a degree of convergence in job quality across the workforce.

The 'learning organization' literature, however, which places a stronger emphasis on the role of ICT and rapid technical change in reshaping the challenges faced by organizational structures, implies that such policies will bring greater benefits for those in the most advanced technical sectors and hence more skilled employees. This is also an implication of a literature on the effects of technical change on the occupational structure (Autor et al. 2003; Autor, 2010; Goos et al. 2009) which suggests that advanced technology is complementary to

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<sup>1</sup>Charlwood (2015), however, has examined change in the social distribution of 'high involvement management' practices in Britain.

the skills of those in higher occupations but tends to displace the skills of employees in intermediate-level jobs. These differential effects would imply that the beneficiaries of policies to improve job quality in the interests of innovation would tend to be the higher skilled and that such policies would increase workforce polarization with respect to the quality of jobs.

These theories assume that changes in production processes lead to a relatively general process of change in advanced societies. But there is some evidence that some aspects of the quality of work are affected by the nature of institutional systems in societies (Gallie, 2007a, 2013). In particular, those countries in which organized labour has a stronger institutional position in the formulation of national policy have generally better working conditions and lower levels of class inequality. It seems plausible that such countries will have lower class differentials with respect to those aspects of job quality that are conducive to innovation.

Employer policies with respect to job quality also may vary with labour market conditions, a factor that could be particularly important given the economic crisis that followed the banking collapse. Arguably, in periods of economic crisis, employers have an incentive to cut costs by reducing labour rather than improving conditions, while in periods of expansion, the emphasis shifts to labour retention and improvement of performance by stimulating motivation through better quality work (see for instance Ramsay, 1977). It may be important then to distinguish developments in the period 2007 to 2010 when, in most Western countries, GDP was still below its pre-crisis peak from developments in the period between 2010 and 2015, when many (although certainly not all) of the European economies were once more expanding.

While the existing literature offers contrasting scenarios of possible trends with respect to class differentials and possible moderators in terms of institutional and economic context, it is notable that there has been little consideration of the implications of high performance workforce policies for the relative job quality of other disadvantaged labour market groups, such as women, young adults and those on temporary contracts. The objective, then, of the analysis in the following sections is to provide a more systematic assessment of changes in differentials in innovation-conducive job quality by occupational class, gender, age and contract status.

In the next section of the paper, the data source is discussed and a measure of ‘innovation-conducive job quality (ICJQ)’ is constructed and tested. Then differentials in ICJQ between workforce categories that have been regarded as relatively privileged and relatively deprived in terms of employment conditions are examined over time to assess whether the pattern points to convergence, polarization or stability. The analysis focuses successively on the differentials between employees in different European regions, occupational classes, sexes, ages and types of contract.

## Measuring Trends in Innovation-Conducive Job Quality

### *The Data*

The longest trend data for looking at changes in the quality of work in European countries is the European Working Conditions Survey, which is carried out approximately every five years. The analysis focuses on three waves – 2005 (which provides a picture of job quality prior to the economic crisis), 2010 (which marked, in most countries, growing emergence from the economic crisis) and 2015 (by which time most European economies were expanding). The surveys provide representative samples of the working population of each country, but the analysis focuses upon employees, since these have been the primary subjects of quality of work initiatives.

For the analysis of both country effects and differentials between workforce categories, countries have been grouped into regional areas to provide adequate sample numbers and simplify the presentation. Seven broad regions are distinguished (see Table 1): the North West, the Nordic, the Continental, the Mediterranean with respect to the EU-15 and the North East, Central East and South East with respect to the New Member States. Given its close links and significant policy coordination with other Nordic countries, Norway has been included in this group<sup>2</sup>.

**Table 1 Regional Country Groupings**

<b>North West</b>	<b>Nordic</b>	<b>Continental</b>	<b>Mediterranean</b>	<b>North East</b>	<b>Central East</b>	<b>South East</b>
Ireland	Denmark	Austria	Greece	Estonia	Czech	Bulgaria
UK	Finland	Belgium	Italy	Latvia	Hungary	Romania
	Norway	France	Portugal	Lithuania	Poland	
	Sweden	Germany	Spain		Slovakia	
		Luxembourg			Slovenia	
		Netherlands				

<sup>2</sup> The categorisation, which draws on earlier research on job quality (Gallie, 2007a; Gallie et al. 2013), overlaps with others used in the Quinne programme (for instance, Erhel et al. 2017). But, with respect to the EU-15, it disaggregates the North West (Anglo-Saxon), Nordic and Continental countries (allocating France to the latter), and subdivides the Transition countries into three subgroups, reflecting their different historical and trade ties.

*A Measure of Innovation-Conducive Job Quality (ICJQ)*

The literature points to a number of aspects of job quality that may be beneficial for innovative capacity. This working paper focuses on an index comprising three of these that have received particularly strong empirical support with respect to their links to innovative work behaviour – 1) knowledge development through training and informal learning, 2) the scope for personal task discretion and use of initiative, and 3) job security.

Other items that have featured in the literature were not included in the measure for different reasons. There were no good measures available of supervisory expectations with respect to innovation. The data contain a measure of role breadth (as indicated by job rotation), but tests suggested that this weakened rather strengthened the main measure – perhaps because job rotation can take different forms, some of which are more beneficial than others. A factor analysis (not shown) also revealed that ‘job rotation’ constituted a distinct factor from the remaining ICJQ items.

Seven questionnaire items were retained for the measure (numbers refer to EWCS 2015):

*Training and Learning*

Whether receives employer training (Q.65a)

Whether generally the job involves ‘learning new things’ (Q.53f)

*Task Discretion and Initiative*

Are you able to choose or change your order of tasks? (Q.54a)

Are you able to choose or change your methods of work? (Q.54b)

Are you able to choose or change your speed or rate of work? (Q.54c)

Whether you able ‘to apply your own ideas in your work’ (Q.61)

*Job Security*

I might lose my job in the next six months (Q.89g)

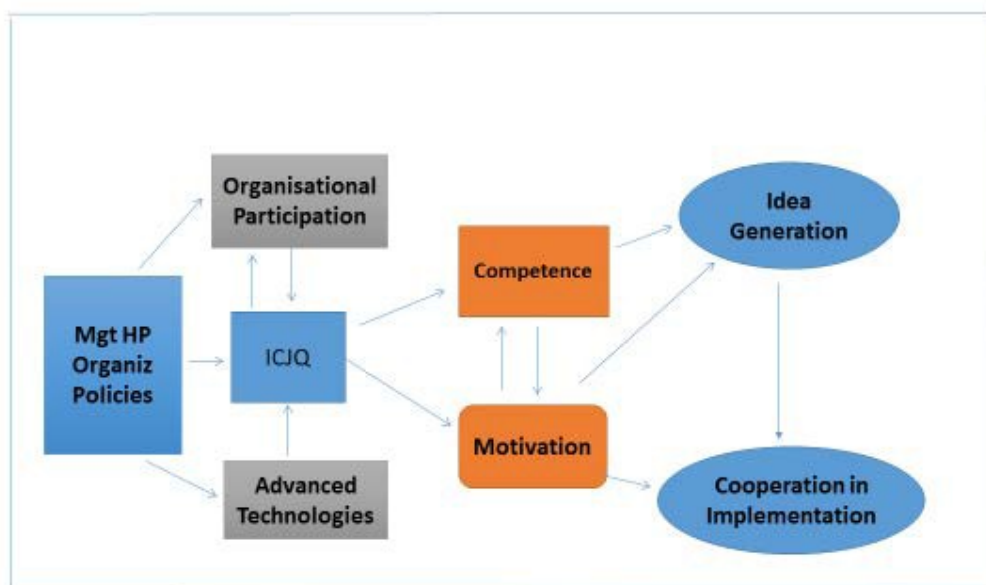
To construct the overall index, all of the component items were dichotomised into 1 (for positive) or 0 (for neutral or negative). The three task discretion indicators (Q.54a-Q.54c) were averaged into a single index ranging from zero to one to improve the balance of the

index between its main conceptual components. The overall ‘Innovation-Conducive Job Quality Score’ was constructed as the sum of the items for training, learning new things, overall task discretion, ability to apply ideas in work and job security. It is conceived as a theoretically derived additive index of distinct job characteristics that contribute to innovation capacity, not as a measure of some single underlying dimension of a job (although in practice the items all contribute positively to the first factor in a principal components analysis). For some analyses, the scores have been aggregated into three categories ICJQ low (0,1); ICJQ Medium (2,3) and ICJQ High (4,5).

*A Model of the Relationship between ICJQ and Innovative Behaviour*

The extent to which the index captures the broad ideas in the literature about the relationship between work quality and innovative behaviour can be examined by considering its correlations with other theoretically relevant variables.

**Figure 1 A Model of ICJQ and Innovative Behaviour**



The model of relationships implied by the literature is outlined schematically in Figure 1. The initial driver of ICJQ is the introduction of new management high performance organizational policies. However, the implications of such policies are moderated by two factors – the requirements of advanced technology and channels for higher level involvement in decision-making. In its turn, ICJQ is thought both to enhance employee competence and to strengthen motivation to contribute to the organization. Higher competence and motivation affect

innovation by encouraging the generation of new ideas, while higher motivation also contributes to the willingness to cooperate in the implementation of new ideas.

The evidence is broadly consistent with the initial assumption that the prevalence of ICJQ jobs would be affected by both the presence of advanced technology and by the quality of broader organizational participation. The correlation between the frequency of use of computers in work and ICJQ jobs was .35, with the mean scores for ICJQ ranging in a linear way from 2.91 among those in jobs where computers were not used to 3.45 where they were used all the time. Similarly, those who were in organizations where they reported that they could influence important decisions were considerably more likely to be in ICJQ jobs than those without influence. The overall correlation was .49, with ICJQ scores ranging (again in a linear way) from 1.88 among those who could never influence important decisions to 3.74 among those who felt they could always have an influence.

There is no measure of competence in the data set, so the model assumptions about the implications of ICJQ can only be partially examined. However, there are six items that can be taken as proxies of motivation: they ask whether people get a sense of ‘work well done’, feel motivated ‘to give my best job performance’; feel satisfied with the work conditions, feel ‘enthusiastic about my job’, ‘feel full of energy’ at their work and find that ‘time flies when I am working’. Several of these items were only available in the 2015 data, so the evidence is based on smaller sample numbers than those used in the main analysis. However, as can be seen in Table 2, the level of innovation-conducive job quality is related significantly to all of these items, supporting the expectation that good quality work enhances motivation.

Table 2 Innovation-Conducive Job Quality (ICJQ) and Motivation

	Sense of Work well done	Motivated to give best	Satis with work conditions	Full of Energy	Enthusiastic about job	Time flies
Low ICJQ	3.69	3.08	2.73	3.49	3.26	3.65
Medium ICJQ	4.13	3.52	3.03	3.75	3.79	4.00
High ICJQ	4.39	3.85	3.27	3.95	4.12	4.21
Corr	.26 **	.26 **	.28 **	.20 **	.32 **	.22 **
Unwtd Ns	69547	50003	69507	24810	24791	24808

Note: European Working Conditions Surveys 2005, 2010, 2015 (employees, all regions). ICJQ scores have been aggregated into three categories ICJQ low (0,1); ICJQ Medium (2,3) and ICJQ High (4,5). Figures show mean scores for each motivational variable by level of ICJQ, together with correlations (with full ICJQ scale).

There is also some evidence in support of an association between ICJQ and both innovation behaviour and organizational innovation. From 2010, the EWCS has included a question about whether the employee is involved in improving the work organisation or work processes of the department in which they are involved. In 2010 uniquely the EWCS also asked whether ‘new processes or technologies were introduced’ at their workplace during the last three years.

As can be seen in Table 3, there is a very steep gradient for both items relating to the extent to which employees are in innovation-conducive jobs. Whereas only 14.3% of those in jobs with low ICJQ were involved in improving work processes or work organization and 23.4% were in workplaces that had seen new processes or technologies introduced, for those who were in high ICJQ jobs the proportions rose to 66.2% and 55.4% respectively. It is notable that, although there was a sharp class gradient with respect to both individual innovative behaviour and reports of organizational innovation, the extent to which a job had ICJQ affected the likelihood of both within all classes.

Table 3 Percentage of Employees Experiencing Individual Involvement in Innovation, and Organizational Innovation, by Innovation-Conducive Job Quality (ICJQ) Level

	% involved in improving work organisation/ work processes always or most of the time	% in organisations where new processes/technologies introduced in last 3 years
Low ICJQ	14.3	24.0
Medium ICJQ	36.8	38.7
High ICJQ	66.6	54.1
Corr	.46 ***	.23***
Unwtd Ns	49369	24786

Note: European Working Conditions Surveys 2005, 2010, 2015 (employees, all regions). Figures show percentage of employees with experience of innovation for each motivational variable by level of ICJQ, together with correlations (with full ICJQ scale). ICJQ scores have been aggregated into three categories ICJQ low (0,1); ICJQ Medium (2,3) and ICJQ High (4,5).

In short, the indicator of innovation-conducive job quality relates in the anticipated way to both the motivational bases that are thought to underlie innovative behaviour and to

individual and organizational innovative activities. It appears, then, to provide a reasonably sound indicator for assessing the changing distribution among different categories of employee of the core dimensions of job quality that encourage innovation.

### **Convergence or Polarization in the Distribution of Jobs with Innovation-Conducive Job Quality**

#### *Region*

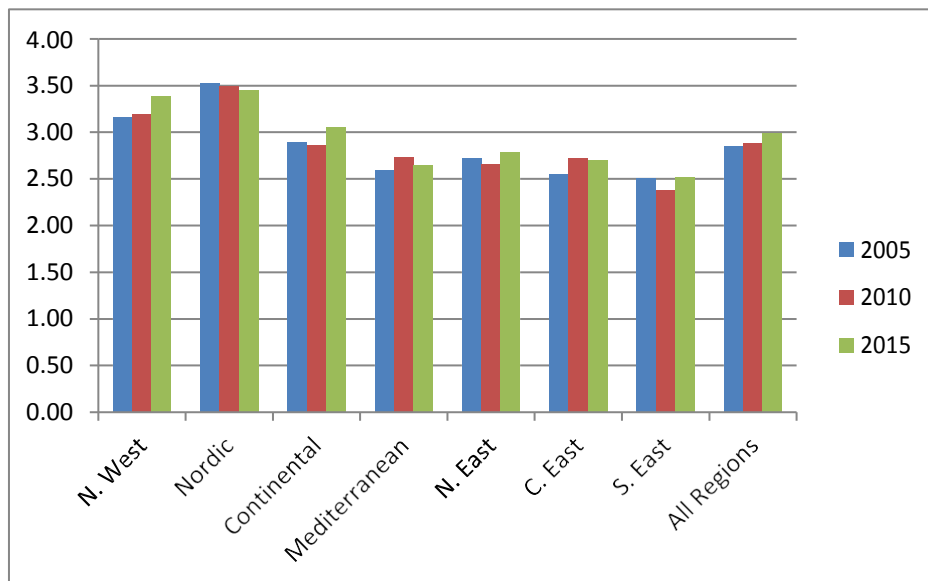
A first issue is how far developments in management policies favouring the introduction of new ICJQ type jobs have affected the relative position of employees in the more developed and less developed regions of Europe. There could be two conflicting expectations. It might be that the trends of change in work organization follow the logic of cumulative advantage, so that workforces in the richer and more technically advanced countries disproportionately reap the benefits of new developments. Alternatively, it might be the case that the rate of change would be faster in the less developed countries because of stronger pressure to modernise, greater incentives for foreign investment and looser regulative controls over employers.

The average scores of ICJQ jobs in the different regions of Europe and the trends over time can be seen in Figure 2. The columns show the average ICJQ score of employees in each region. A first point to note is that the Nordic countries had the highest average score in all three time periods. They were followed by the North West countries and the Continental European countries. Average ICJQ scores were lowest in the Mediterranean and East European countries. The pattern is consistent with the view that the prevalence of ICJQ is partly determined to a degree by the level of economic development.

It is notable that there is some evidence that innovation-conducive job quality was increasing in the European workforce in the period 2005 to 2015 (Figure 2 and Table 4). ICJQ scores for ‘all regions’ rose during the economic crisis and, even more significantly, in the period of economic recovery. The pattern of change over time varied however considerably between regions: there was an overall growth of such jobs between 2005 and 2015 in the North West, the Continental, the Mediterranean and Central East countries. In contrast, there was a significant decline of such jobs in South East Europe over the period of the economic crisis (although this effect had disappeared by 2015) and in the Nordic countries (once changes in workforce composition had been controlled). There was no clear relationship between changes in ICJQ and the economic crisis. In the Mediterranean and the Central East countries, the growth was primarily in the period of economic crisis, while in the North West and Continental countries, it occurred over the period 2010 to 2015.



Figure 2 Trends in ICJQ Scores by European Region



Source: European Working Conditions Surveys 2005, 2010, 2015

Table 4 Change in ICJQ by Region and Year (with and without controls)

	Year 2010 Interactions		Year 2015 Interactions		Year 2015 Interactions + Controls	
N. West	0.04	n.s.	0.23	***	0.11	***
Nordic	-0.01	n.s.	-0.05	n.s.	-0.13	**
Continental	-0.03	n.s.	0.16	***	0.15	***
Mediterranean	0.14	***	0.05	(*)	-0.01	n.s.
N. East	-0.06	n.s.	0.07	n.s.	0.02	n.s.
C. East	0.17	***	0.14	***	0.08	*
S. East	-0.14	**	0.01	n.s.	-0.10	(*)
All Regions	0.03	**	.14***		0.08	***

Note: Source EWCS 2005, 2010, 2015. Interaction coefficients for employees, derived from separate regressions for each region (all years), with countries weighted by size. Significant positive coefficients indicate a reduction of differentials, significant negative coefficients indicate an increase. Sig:  $p < 0.001 = ***$ ;  $p < 0.01 = **$ ;  $p < 0.05 = *$ ;  $p < 0.10 = (*)$ . Controls for age, sex, class composition and industry structure. Unweighted Ns with controls: North West 5014; Nordic 9461; Continental 18479; Mediterranean 8622; N. East 5606; C. East 9984; S. East 3458

The implications of such trends for regional convergence or polarization can be assessed by a regression model that includes interaction terms between region and year. Table 5 shows the change in regional scores relative to the Nordic countries in 2010 and 2015 compared with the pre-crisis pattern in 2005. The first column shows that, between 2005 and 2010, there was an improvement in ICJQ scores relative to the Nordic countries in the Mediterranean and Central East European countries. By 2015, however, there was a more widespread reduction of the gap with the Nordic countries, including the North West, Continental, Mediterranean, and Central East countries. The final column, which takes account of differences in the age, sex, class composition and industry structure, confirms improvement in ICJQ in these regions relative to the Nordic countries independently of compositional differences. This suggests a trend towards regional convergence in managerial policies with respect to job quality.

Table 5 Interaction Coefficients for Change in Regional Differentials compared with the Nordic Countries

	Year 2010 Interactions		Year 2015 Interactions		Year 2015 Interactions + Controls	
North West	0.05	n.s.	0.28	***	0.28	***
Continental	-0.02	n.s.	0.21	***	0.33	***
Mediterranean	0.15	**	0.10	(*)	0.14	**
N. East	-0.05	n.s.	0.12	n.s.	0.17	n.s.
C. East	0.17	**	0.19	***	0.22	***
S. East	-0.13	(*)	0.06	n.s.	0.04	n.s.

Note: European Working Conditions 2005, 2010, 2011. Countries weighted by size. Coefficients, derived from an interaction model for employees including all regions (all years), show the change in differentials between each region and the Nordic countries in 2010 and 2015 respectively compared with the differential in 2005. Significant positive coefficients indicate a reduction of differentials, significant negative coefficients indicate an increase. Sig:  $p < 0.001 = ***$ ;  $p < 0.01 = **$ ;  $p < 0.10 = (*)$ . Controls for age, sex, class and industry structure. Unweighted Ns with controls: N. West (5447); Nordic (10486); Continental (21043); Mediterranean (10059); N. East (6586); C. East (11962); S. East (4270).

### *Occupational Class*

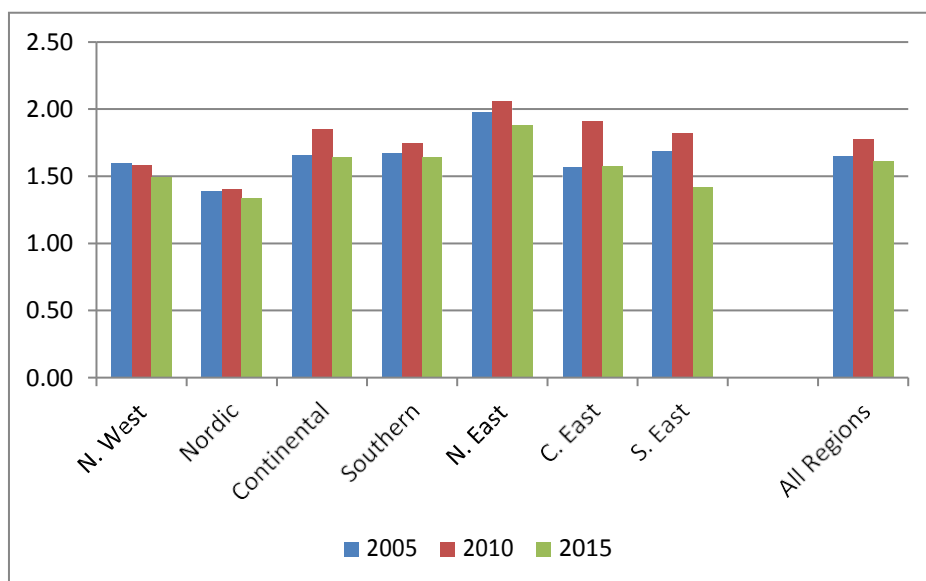
Empirical research in both the US and Europe has highlighted the widely varying levels of job quality of employees in different occupational classes. Differences of class have been shown consistently to be associated with wide pay differentials and, in some analyses, are the most significant determinant of pay dispersion (Tahlin, 2007). Class also has been found to be a major determinant of non-pecuniary job quality: whether people are in jobs that offer complex tasks, that involve problem solving (Smith et al. 2008), and that provide variety and new learning experiences (Handel, 2012). There is also strong evidence of a marked class

gradient in terms of differences in job control and wider voice in the workplace (Gallie, 2007b; Gallie and Zhou, 2013). Meta-analysis has confirmed that blue-collar workers have higher levels of job insecurity (Keim et al. 2014).

As seen in the earlier theoretical discussion, there could be very different possible scenarios about the implications of the increase in new ICJQ forms of work organisation for class inequalities. They might be expected to lead to greater equality in conditions by improving the ‘Taylorist’ work conditions that characterize lower class positions in large segments of both manufacturing and service industry. An alternative possibility is that the benefits of ‘high performance’ forms of management, which offer job conditions that enhance innovative capacity, may remain restricted to those with relatively high skills, sharpening the polarization between an elite stratum of ‘knowledge’ workers and the lower skilled.

A measure of class differentials in job quality is the ratio between the ICJQ scores of those in managerial and professional work on the one hand and those in low skilled (operatives and elementary workers) on the other. As can be seen in Figure 3, which gives the ratio of the ICJQ scores of professionals and managers compared with the scores of the low skilled, there was a substantial class gap in all periods in ICJQ and this was the case in all regions of Europe. Those in Managerial and Professional work were much likely to have work conditions conducive to innovation than the low skilled.

Figure 3 Class Ratios in ICJQ between Managers-Professionals & Low Skilled



Source: European Working Conditions Surveys 2005, 2010, 2015. Occupational class is derived from ISSCO88 with Managers-Professionals=ISCO Major Groups 1 & 2; Low Skilled=ISCO Major Groups 8 & 9.

There were however significant variations between regions in the extent to which this was the case. It is notable that the class gap in ICJQ was lowest in each period in the Nordic countries, while it was highest in the North East region of Europe. There were also variations

over time. Overall, and in most regions, there was a rise in class inequality over the period of the economic crisis. In the subsequent period of economic recovery, however, differentials were reduced and returned to levels either similar to or lower than in the pre-crisis period.

Table 6 shows the statistical significance of these apparent trends through a regression analysis. It can be seen that, in the period 2005 to 2010, there is a significant negative coefficient for ‘all regions’ taken together, indicating a worsening in the relative position of the low skilled compared to managers and professionals. However, although all regions other than the North West also have a negative coefficient, this was significant only in the case of the Continental, Mediterranean and Central East regions. Moreover, comparing relative class positions with respect to ICJQ in 2015 with the pre-crisis situation in 2005, it can be seen that the growth of inequality had been reversed by 2015 in most of the regions affected. Once controls for individual and industry differences were taken into account, the only significant changes over the longer period were a relative improvement in the position of the low skilled in the North West and South East countries and a deterioration in the relative position of the low skilled in the Continental countries.

Table 6 Change in ICJQ Differentials by Class 2005-15: Year 2010 & 2015 Interactions for Low Skilled Professionals relative to Managers-Professionals

	Year 2010 Interaction Coeffs		Year 2015 Interaction Coeffs		Year 2015 Interaction Coeffs with controls	
North West	0.02	n.s	0.16	(*)	0.25	**
Nordic	-0.04	n.s.	0.12	n.s.	0.09	n.s.
Continental	-0.31	***	-0.09	n.s.	-0.11	*
Mediterranean	-0.16	*	0.06	n.s.	-0.02	n.s.
N. East	-0.01	n.s.	0.14	n.s.	0.09	n.s.
C. East	-0.59	***	0.01	n.s.	-0.05	n.s.
S. East	-0.10	n.s.	0.50	***	0.41	**
All Regions	-0.22	***	0.04	n.s	0.0	n.s.

Note: Source EWCS 2005, 2010, 2015. Interaction coefficients for employees, derived from separate regressions for each region (all years), with countries weighted by size. ). Significant positive coefficients indicate a reduction of differentials, significant negative coefficients indicate an increase. Sig:  $p < 0.001 = ***$ ;  $p < 0.01 = **$ ;  $p < 0.05 = *$ ;  $p < 0.10 = (*)$ . Controls for age, sex, and industry structure. Unweighted Ns with controls: North West 5014; Nordic 9461; Continental 18479; Mediterranean 8622; N. East 5606; C. East 9984; S. East 3458

In short, class inequalities in ICJQ grew worse over the period of the economic crisis but recovered in the subsequent period of economic growth, leaving class differentials generally unchanged over the period as a whole. Further examination of the data (not shown) indicates that the cyclical pattern was driven primarily by changes in the ICJQ of the low skilled, with their ICJQ scores declining in the period of the economic crisis and then rising in the subsequent period.

### *Gender*

While women are systematically disadvantaged with respect to pay, there is less evidence that they experience overall disadvantage in the non-pecuniary dimensions of work quality.

Although they have poorer chances of career advancement than men, there is little difference between men and women with respect to task monotony and task discretion, and women tend to be advantaged with respect to work intensity, the safety of working conditions and working time quality (Smith, 2008; Fagan and Burchell, 2002; Green et al., 2013). How then did men and women compare with respect to the characteristics that constitute innovation-conducive job quality?

Table 7 Innovation-Conducive Job Quality (ICJQ) Scores by Sex 2005-2015

		2005	2010	2015	Ch 2005-15	Unwtd Ns
Northwest	Male	3.13	3.20	3.35	0.22	2594
	Female	3.19	3.19	3.42	0.23	2852
Nordic	Male	3.53	3.53	3.52	-0.01	4890
	Female	3.54	3.53	3.44	-0.10	5595
Continental	Male	2.92	2.86	3.08	0.16	10331
	Female	2.86	2.87	3.02	0.16	10710
Southern	Male	2.57	2.76	2.63	0.06	4926
	Female	2.63	2.70	2.66	0.03	5132
N. West	Male	2.62	2.52	2.67	0.05	2534
	Female	2.81	2.80	2.87	0.06	2852
C. East	Male	2.53	2.72	2.61	0.08	5346
	Female	2.58	2.72	2.77	0.19	6615
S. East	Male	2.50	2.37	2.52	0.02	2027
	Female	2.53	2.38	2.48	-0.05	2243
All Regions	Male	2.84	2.88	2.98	0.14	32648
	Female	2.86	2.88	2.99	0.13	37198

Source: European Working Conditions 2005, 2010, 2015 (Employees).

As can be seen in Table 7, the differences in scores between men and women were very small in each of the three years both for all regions and generally within regions. Moreover, with the exception of the Nordic and South Eastern countries, both sexes experienced an increase in ICJQ jobs between 2005 and 2015.

The significance of changes in gender differences is shown in the regression analysis in Table 8. Overall, taking all regions together, there was no significant change in sex differentials with respect to ICJQ either in the period of the economic crisis or in the period of the recovery. Moreover, the picture remains the same when controls are introduced for age, class and industry. Sex differentials also remained unchanged in most regions. The exceptions are in the case of the Continental and South East countries, where there was some deterioration in women's relative position and the Central East countries where their position improved compared to men.

Table 8 Table 5 Change in ICJQ Differentials by Sex 2005-15: Year 2010 & 2015 Interactions for Female Employees relative to Male Employees

	Year 2010 Interaction Coeffs		Year 2015 Interaction Coeffs		Year 2015 Interaction Coeffs with controls	
North West	-0.08	n.s.	0.00	n.s.	0.06	n.s.
Nordic	-0.02	n.s.	-0.09	n.s.	-0.02	n.s.
Continental	0.07	(*)	0.01	n.s.	-0.07	(*)
Mediterranean	-0.12	n.s.	-0.03	n.s.	0.04	n.s.
N. East	0.09	n.s.	0.01	n.s.	0.00	n.s.
C. East	-0.06	n.s.	0.12	n.s.	0.18	**
S. East	-0.01	n.s.	-0.11	n.s.	-0.28	**
All Regions	-0.01	n.s.	-0.02	n.s.	-0.01	n.s.

Note: Source EWCS 2005, 2010, 2015. Interaction coefficients derived from separate regressions for employees for each region (all years), with countries weighted by size. Significant positive coefficients indicate a reduction of differentials, significant negative coefficients indicate an increase. Sig:  $p < 0.001 = ***$ ;  $p < 0.01 = **$ ;  $p < 0.05 = *$ ;  $p < 0.10 = .$  Sig:  $p < 0.001 = ***$ ;  $p < 0.01 = **$ ;  $p < 0.01 = *$ ;  $p < 0.10 = (*)$ . Controls for age, class, and industry structure. Unweighted Ns with controls: North West 5014; Nordic 9461; Continental 18479; Mediterranean 8622; N. East 5606; C. East 9984; S. East 3458.

In general, the evidence suggests that men and women were equally likely to be in ICJQ jobs and that there was little change in their relative access to such jobs over the period 2005 to 2015.

## *Age*

Concern about the quality of the working environment of different age groups has been influenced by two considerations. The first is an increased awareness that early labour market experiences may leave a long-lasting imprint on workers' careers (De Vreyer et al. 2000). Access to jobs that encourage the generation and implementation of new ideas may then be important in affecting the longer-term attitudes to work of young employees. The second is the recognition that the sustainability of pension systems, given current demographic trends, requires an extension of working life. A longer working life raises the issue of the sustainability of work among older workers given current working conditions. Unless older employees are in jobs that encourage them to develop their skills and make an active contribution to workplace change, they are likely to become increasingly marginalised in an economy driven by increasingly rapid technological change. Previous research has shown that both young and older workers suffer from distinctive disadvantages in employment: younger workers experience particularly high levels of work intensity, poorer physical work conditions and less contractual security than prime-aged workers, while older workers are less likely to have employers willing to invest in their training (Eurofound, 2012). Did such disadvantages translate into poorer access for young and older workers to innovation-conducive jobs?

To assess the trends with respect to innovative-conducive job quality (ICJQ), employees have been grouped into four age categories: those under 25, those aged between 25 and 34, those aged between 35 and 49 and those aged 50 or older. Table 9 shows that in all regions young workers were much less likely to be in innovation-conducive jobs than prime aged employees (35-49 years olds). However, in the North West, Continental, the Central East and South East regions young adults (under 25) benefited from an increase of ICJQ over the period 2005 to 2010 and, in all regions other than the Nordic and the South East, older workers (aged 50+) also experienced an increase.

With respect to employees under the age of 25, the interaction analysis, both with and without controls, confirms that there was some overall tendency towards convergence with the ICJQ scores of prime-aged workers (Table 10). However, this overall effect was driven largely by developments in the North West and (without compositional controls) in the Continental regions. In most regions, there was no significant change in the relative position of young workers compared to prime-aged workers.

Finally, as can be seen in Table 11, there was some indication that, taking all regions together, the relative position of older workers (50+) may have declined a little during the period of economic recession (2005 to 2010) but this decline was reversed in the subsequent period of recovery. Within regions the general picture is of no change, with two exceptions. In both the Continental and Mediterranean countries, taking account of compositional factors, the position of older workers improved compared to that of prime aged workers, an improvement that occurred in the period of the economic recovery.

Table 9 Innovation-Conducive Job Quality (ICJQ) Scores by Age

		2005	2010	2015	Change 2005-15	N
North West	under 25	2.66	2.80	3.00	0.34	554
	25-34	3.25	3.22	3.52	0.27	1232
	35-49	3.31	3.34	3.47	0.16	2181
	50+	3.14	3.16	3.34	0.19	1480
Nordic	under 25	2.89	2.84	2.88	0.00	831
	25-34	3.51	3.55	3.40	-0.10	1949
	35-49	3.64	3.63	3.62	-0.02	3950
	50+	3.60	3.65	3.54	-0.05	3756
Continental	under 25	2.47	2.51	2.75	0.28	1664
	25-34	2.98	2.87	3.07	0.09	4746
	35-49	2.97	2.97	3.08	0.11	9011
	50+	2.88	2.83	3.08	0.20	5622
Mediterranean	under 25	2.14	2.43	2.10	-0.05	1289
	25-34	2.60	2.73	2.56	-0.04	3446
	35-49	2.72	2.81	2.70	-0.02	5629
	50+	2.65	2.70	2.71	0.07	3567
N. East	under 25	2.64	2.91	2.55	-0.10	456
	25-34	2.83	2.85	2.87	0.04	1347
	35-49	2.75	2.54	2.88	0.14	2474
	50+	2.59	2.60	2.69	0.09	2309
C. East	under 25	2.16	2.40	2.47	0.31	268
	25-34	2.63	2.91	2.84	0.21	992
	35-49	2.60	2.73	2.74	0.14	1787
	50+	2.56	2.57	2.58	0.02	1283
S. East	under 25	2.37	2.36	2.44	0.08	266
	25-34	2.55	2.43	2.63	0.08	925
	35-49	2.52	2.36	2.51	-0.01	1820
	50+	2.54	2.32	2.45	-0.10	1259
All Regions	under 25	2.41	2.56	2.71	0.30	5835
	25-34	2.89	2.90	3.01	0.12	16375
	35-49	2.93	2.96	3.01	0.08	30086
	50+	2.89	2.86	3.00	0.11	21429

Source: European Working Conditions Surveys (EWCS) 2005, 2010, 2015. Employees.

While changes in age related differences in ICJQ were relatively modest in most European regions, overall there is no evidence of polarization. In most regions, the position of younger employees remained unchanged. Similarly, there were no regions in which the position of older workers grew worse and in two regions it improved.



Table 10 Change in ICJQ Differentials by Age 2005-15: Year 2010 & 2015 Interactions for under 25s (ref aged 35-49)

	Year 2010 Interaction Coeffs		Year 2015 Interaction Coeffs		Year 2015 Interaction Coeffs with controls	
North West	0.11	n.s	0.17	*	0.26	**
Nordic	-0.03	n.s.	0.02	n.s.	0.03	n.s.
Continental	0.03	n.s.	0.17	(*)	0.04	n.s
Mediterranean	0.20	*	-0.02	n.s.	-0.02	n.s.
N. East	0.47	n.s.	-0.24	n.s.	-0.03	n.s.
C. East	0.11	n.s	0.17	n.s.	0.29	n.s
S. East	0.15	n.s.	0.09	n.s.	-0.01	n.s.
All Regions	0.13	**	0.22	***	0.18	***

Note: Source EWCS 2005, 2010, 2015. Coefficients derived from separate regressions for employees for each region (all years), with countries weighted by size. Significant positive coefficients indicate a reduction of differentials, significant negative coefficients an increase. Sig:  $p < 0.001$ \*\*\*;  $p < 0.01$ \*\*;  $p < 0.05$ \*;  $p < 0.10$ . Controls for sex, class composition, contract status and industry structure. Unweighted Ns with controls: North West 5014; Nordic 9461; Continental 18479; Mediterranean 8622; N. East 5606; C. East 9984; S. East 3458.

Table 11 Change in ICWE Differentials by Age 2005-15: Year 2010 & 2015 Interactions for employees aged 50+ (ref aged 35-49)

	Year 2010 Interaction Coeffs		Year 2015 Interaction Coeffs		Year 2015 Interaction Coeffs with controls	
North West	-0.01	n.s.	0.03	n.s.	0	n.s.
Nordic	-0.07	n.s.	-0.03	n.s.	-0.04	n.s.
Continental	-0.06	n.s.	0.09	*	0.09	*
Mediterranean	-0.03	n.s.	0.09	n.s.	0.15	*
N. East	0.22	n.s.	-0.05	n.s.	0.01	n.s.
C. East	-0.13	n.s.	-0.13	n.s.	-0.09	n.s.
S. East	-0.06	n.s.	-0.09	n.s.	-0.15	n.s.
All Regions	-0.06	(*)	0.03	n.s.	0.03	n.s.

Note: Source EWCS 2005, 2010, 2015. Coefficients derived from separate regressions for each region (all years), with countries weighted by size. Significant positive coefficients indicate a reduction of differentials, significant negative coefficients an increase. Sig:  $p < 0.001$ \*\*\*;  $p < 0.01$ \*\*;  $p < 0.05$ \*;  $p < 0.10$ . Controls

for sex, class composition, and industry structure. Unweighted Ns with controls: North West 5014; Nordic 9461; Continental 18479; Mediterranean 8622; N. East 5606; C. East 9984; S. East 3458.

### *Contract Status*

With the growth of flexibility theories from the 1990s, the disadvantages associated with contract status have been central to discussions about social divisions in the workforce (Rosenberg, 1989; Beatson, 1995; Kalleberg, 2011). Some scenarios have envisaged increased polarization predominantly around the lines of standard and non-standard contracts. The position of temporary workers, as a marginal or peripheral workforce, has been particularly salient in this respect. Arguably, the improvement in the work and employment conditions of the core of permanent employees is made possible through the existence of a growing category of temporary workers that can be used to bear the costs of market uncertainty. Although trend data is still scarce, evidence on job quality suggests that temporary workers suffer from cumulative disadvantage, although its extent varies between countries (OECD, 2017).

Table 12 Innovation-Conducive Job Quality (ICJQ) Scores among Permanent and Temporary Employees 2005-2015

		2005	2010	2015	Ch 2005-15	Unwtd Ns
N. West	Permanent	3.31	3.30	3.45	0.14	4082
	Temporary	3.21	2.93	3.23	0.02	460
Nordic	Permanent	3.61	3.60	3.60	-0.01	9036
	Temporary	3.19	3.15	2.83	-0.36	998
Continental	Permanent	2.98	2.97	3.15	0.17	17952
	Temporary	2.38	2.32	2.54	0.16	1970
Mediterranean	Permanent	2.75	2.90	2.86	0.11	6869
	Temporary	2.23	2.25	2.17	-0.06	1703
N. East	Permanent	2.79	2.75	2.84	0.05	5630
	Temporary	2.36	2.22	2.36	0.00	630
C. East	Permanent	2.67	2.84	2.84	0.17	9483
	Temporary	2.25	2.36	2.39	0.14	1848
S. East	Permanent	2.56	2.40	2.56	0.00	3573
	Temporary	2.26	2.22	2.44	0.18	448
All Regions	Permanent	2.96	3.00	3.12	0.16	56625
	Temporary	2.49	2.39	2.45	-0.04	8057

Source: EWCS 2005, 2010, 2015

It can be seen in Table 12 that temporary workers indeed had substantially lower innovation-conducive job quality scores than permanent employees, both overall, taking all regions together, and in each separate region at each point in time. This was not only due to their greater insecurity. A more detailed analysis (not shown) confirmed that, with the single exception of the South East region in 2010, temporary workers were still disadvantaged relative to permanent in all regions and in all years when security was excluded from the index. The pattern then is one of systematic disadvantage for temporary workers.

Turning to the trends over time, it is notable that permanent employees did not see a decline in their level of ICJQ between 2005 and 2010 either in the EU overall or in five of the seven regions, despite the economic crisis. Indeed, in the Mediterranean and Central East countries, their ICJQ scores rose considerably. The only regions where there was some decline in the ICJQ scores of permanent employees were the North East and South East. In contrast, temporary workers experienced a decline in their ICJQ scores both overall and in five of the regions (the exceptions being the Mediterranean and Central East countries).

The changes in the position of temporary workers relative to permanent employees that were statistically significant can be seen in Table 13. Apart from in South Eastern Europe, the coefficients are uniformly negative, indicating a deterioration over time in the position of temporary workers relative to those in regular jobs. However, although the negative effect for temporary workers is highly significant for all regions taken together, it is only significant for the North West, the Nordic and the Mediterranean countries when the regions are considered separately. The timing of the deterioration of the relative position of temporary workers varied between regions. It was relatively continuous across time in the Mediterranean countries, but primarily in the period of the economic crisis in the North West and primarily in the period of economic recovery in the Nordic countries. Further examination of the data (not shown) reveals that the increased differential in ICJQ between permanent and temporary workers was driven in the North West countries primarily by an improvement in the level of ICJQ among those in permanent jobs, while there was little change in that of temporary workers. In the Nordic and Mediterranean countries, however, polarization was accentuated by a declining level of ICJQ among temporary workers.

Additional analyses (not shown) also reveal that a considerable part of the deterioration of the position of temporary workers can be attributed to their growing insecurity. Temporary work has been depicted variously as offering a bridge into better work or a trap into extended labour market insecurity. However, over this period at least it appears to have become increasingly experienced as a source of entrapment. If security is excluded from the index of innovation-conducive job quality, the deterioration in temporary workers' relative position between 2005 and 2015, when other factors are controlled, is still evident when all regions are taken together, as well as for the North West and Nordic countries taken separately. But there is a sharp reduction both in the coefficients (approximately halved) and in significance levels. In the Mediterranean countries, moreover, the whole of the increase in disadvantage of temporary workers in innovation-conducive job quality can be accounted for by their increased insecurity.

Table 13 Contract Differentials in Innovation-Conducive Job Quality (ICJQ): Year Interactions for temporary

	Year 2010 Interaction Coeffs		Year 2015 Interaction Coeffs		Year 2015 Interaction Coeffs with controls	
N. West	-0.27	**	-0.12	n.s.	-0.36	***
Nordic	-0.05	n.s.	-0.36	***	-0.35	**
Continental	-0.06	n.s.	-0.02	n.s.	-0.05	n.s.
Mediterranean	-0.15	*	-0.18	**	-0.15	*
N. East	-0.11	n.s.	-0.06	n.s.	-0.04	n.s.
C. East	-0.06	n.s.	-0.03	n.s.	-0.01	n.s.
S. East	0.13	n.s.	-0.01	n.s.	0.03	n.s.
All Regions	-0.14	***	-0.19	***	-0.20	***

Note: Source EWCS 2005, 2010, 2015. Coefficients derived from separate regressions for each region (all years), with countries weighted by size. Significant positive coefficients indicate a reduction of differentials, significant negative coefficients an increase. Sig:  $p <= 0.001 = ***$ ;  $p <= 0.01 = **$ ;  $p <= 0.05 = *$ ;  $p <= 0.10$ . Controls for age, sex, class composition and industry structure. Unweighted Ns with controls: North West 5014; Nordic 9461; Continental 18479; Mediterranean 8622; N. East 5606; C. East 9984; S. East 3458.

Overall, the relative position of employees on temporary contracts deteriorated over both periods. The growing insecurity of temporary workers was a major, although generally not the only, factor underlying their increasing disadvantage.

## Conclusion

There has been a growing literature that has argued that, in advanced economies, employers are seeking to improve aspects of job quality in the interest of greater productivity and innovation. But there has been little examination of the extent to which jobs with these features are distributed across the workforce and whether they tend to accentuate previous divisions between relatively advantaged and disadvantaged categories of worker or reduce such inequalities in work quality. This working paper addresses this issue focusing on a particular subset of job quality characteristics that have been cited as favouring greater motivation and capacity among employees to develop new ideas and to cooperate in innovative changes to work processes. These characteristics are task control (or control over the immediate job task), the ability to use initiative in work, formal and informal learning opportunities and job security. Indicators of these characteristics were used to construct a

measure of overall 'innovation-conducive job quality' (ICJQ) that was shown to correlate not only with measures of motivation but also with reports of innovative work behaviour and of innovation in work organizations. The measure was then used to assess changes in distributional effects between 2005 and 2010 with respect to European region, occupational class, gender, age and contract status.

There was confirmation for the view that such jobs were becoming increasingly prevalent in the overall European workforce in the period 2005 to 2010. They increased both during the economic crisis and, even more significantly, in the period of economic recovery. The patterns at the regional level were diverse. There was an overall growth of such jobs between 2005 and 2010 in the North West, the Continental, the Mediterranean and Central East countries. The only evidence for a significant decline of such jobs was in South East Europe over the period of the economic crisis (although this effect had disappeared by 2015) and in the Nordic countries (if one controlled for changes in workforce composition). The regions differed substantially however in the prevalence of jobs with innovation-conducive job quality. In each time period, they were most common in the Nordic countries and least common in the South East countries. A notable finding of the analysis, however, is that there was a degree of regional convergence between 2005 and 2015, with a reduction of the gap between the Nordic and several other regions. This convergence was evident both for the other EU-15 regions and for the Central East countries.

Turning to potential sources of difference between employees related to personal characteristics, it is notable that there was no evidence that women were generally less likely to be in jobs with innovation-conducive job quality than men. This lack of difference was already evident in 2005 and it remained unchanged across the period up to 2015. It is the case for all regions with respect to the unadjusted sex differences. However, if account is taken of workforce composition in terms of age, class and industry sector, there was a deterioration in women's relative position with respect to men in the South East countries (and at a marginal level of significance in the Continental countries), and an improvement of their relative position in the Central East countries. The general lack of differences by sex in innovation-conducive job quality is perhaps surprising given the evidence of the disadvantage women experience with respect to pay and career opportunities. But it is consistent with other evidence on the lack of gender differences in intrinsic job quality (OECD, 2017). It may be related to the fact that women are more likely to be in jobs where the very nature of the work involves direct interaction with other people (pupils, people in need of care, customers). The unpredictability of such interpersonal work is likely to favour significant discretion to the employee.

With respect to age, younger workers were systematically disadvantaged with respect to innovation conducive job quality in comparison to prime aged workers. The analysis indicated that younger workers (under 25 year olds) improved their position between 2005 and 2015 relative to prime aged workers (35 to 49 year olds) in the European regions taken as a whole, but the trend largely reflected improvements in the North West and Continental countries. In most regions, there was no change in the disadvantage experienced by younger

workers. Older workers' access to ICJQ jobs was also lower than that of prime aged workers (although the difference was considerably less marked than for younger workers). Moreover, their disadvantage also remained largely unchanged over the period, although there was some improvement in the Continental and in the Mediterranean countries (once changes in workforce composition were taken into account). While there are plausible arguments as to why one might expect relatively young and old workers to be vulnerable to a deterioration in their work conditions both in periods of economic crisis and of rapid technological change, there may be offsetting factors. Changes in both the level and content of education may increase the value of young employees to employers and the prolongation of careers of those above the age of 50 may enhance the experience of older workers and hence employers' interest in retaining them.

While differentials with respect to personal characteristics remained either stable or improved across the period, differentials by class and contract status proved more problematic. The period of the economic crisis led to a significant deterioration of the relative position of the low skilled both overall and in the Continental, Mediterranean and Central East countries. However, with the exception of the Continental countries, the increase in class differentials was generally reversed in the period of economic recovery. These trends largely reflected changes in the job characteristics of the low skilled with ICJQ scores declining between 2005 and 2010 and rising again in the period 2010 to 2015 (the pattern of change across time among managers and professionals was more varied). The quality of jobs of the low skilled appears then to be particularly sensitive to labour market conditions. The changing pattern of class differentials fits well theories of the cyclical nature of employer workforce strategies with respect to class (Ramsay, 1977), with lower level employees bearing the brunt of coercive organizational change in periods of economic downturn but experiencing more accommodative management policies in tighter labour markets.

In contrast to the pattern of the low skilled, there was evidence of a deterioration in the relative position of those on temporary contracts both in the period of the economic crisis and in that of the recovery. This deterioration largely reflected the changing position of temporary workers in the EU-15 countries – in particular in the North West and Mediterranean countries (and in the Nordic countries in the period 2010 to 2015). An important, but not the only, factor in this growing disadvantage was a decline in security. There was no significant change in the relative position of temporary workers in the East European countries. The reasons for this pattern of change for temporary workers needs further research. It is a finding however consistent with other research. For instance, in both Britain and France, a study drawing on workplace surveys found a negative association between the use of temporary work and productivity growth (Askenazy et al. 2016). This is what would be expected if a focus on flexibility and short-term cost savings leads to working conditions that are unfavourable for long-term innovation. Askenazy et al. also point out that, at least in the case of France, there were importance changes since the great recession in the nature of temporary work – in particular, the resort by employers to temporary contracts of shorter duration. Very short duration contracts are especially unlikely to allow for the types of task discretion and

knowledge acquisition, let alone the job security, that has been shown to be conducive to employee's capacity or willingness to innovate.

Overall, then, the evidence supports the view that there has been an increase in the prevalence of jobs with innovation-conducive job quality (ICJQ) in Europe in recent years. This increase has had quite distinct implications for different types of workforce inequality. It has been associated with a reduction in regional inequalities, relative stability in inequalities related to personal characteristics such as sex or age, a cyclical effect with respect to inequalities of class and a sustained deterioration in the position of temporary workers in the EU-15 countries. Interpretation of these trends must be largely speculative. While the cross-sectional data upon which the analysis is based is invaluable for examining broad trends, it does not permit rigorous exploration of the factors affecting these trends. Individuals are not followed over time and sample numbers are too small to allow for detailed investigation of the potential impact of compositional changes within the different categories of employee that have formed the basis of comparison.

There are, however, three broad conclusions that can be drawn from the analyses that have relevance for policy. The first is that, on the basis of the evidence for the period 2005 to 2015, initiatives to improve working conditions in a way that is likely to enhance the innovative capacity of employees have proved to be heavily constrained by pre-existing structures of social inequality. Despite a significant overall increase in the prevalence of innovation-conducive jobs, the social distribution of such jobs has remained in general unchanged. More optimistic predictions of the knowledge-based economy, whereby the growing requirements for high performance and innovation would translate into a greater utilisation of the capacities of the broader workforce and a convergence in the job quality of different categories of employee have not come to pass. It is clear that, if change is to take place, it will not be through some deterministic effect of changing technologies or production processes, but will require active and sustained intervention through public policy. Second, although policy discussion has focused heavily in recent decades on ways of increasing competitiveness through increasing flexibility in the use of the workforce, it should be recognized that the pursuit of certain forms of flexibility, in particular the use of short-term contracts, may reduce longer-term productivity by undermining the types of work conditions that help stimulate innovation. Policy initiatives, then, will need then to focus on the enhancement of job quality. Third, there are grounds to think that policies to enhance job quality can make a difference. The prevalence of innovation-conducive jobs varies substantially between different European regions. In particular, it is notable that the Nordic countries stand out as having had a significant advantage in this respect throughout the period, even if there has been some narrowing of differentials over time. This cannot be explained in terms of differences in workforce or industry composition. It is most plausibly attributable to quite distinctive policy orientations that have placed improvements in the quality of work high on the policy agenda.

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