Social Science Research 49 (2015) 70–80

Contents lists available at ScienceDirect

Social Science Research

journal homepage: www.elsevier.com/locate/ssresearch

The skill-divide in job quality: A cross-national analysis of 28 countries ☆

Haya Stier *

Tel Aviv University, Israel

ARTICLE INFO

Article history:
Received 12 February 2013
Revised 5 May 2014
Accepted 17 July 2014
Available online 2 August 2014

Keywords:
Job quality
Job attributes
Skill divide
Technological developments
Cross-national analysis

ABSTRACT

This study focuses on the skill divide in job quality and the role of social institutions in structuring the relation of workers' qualifications to the attributes of their jobs. Four measures of job quality are examined: job security, job achievement, job content and work schedule flexibility. The study is based on the 2005 ISSP module on work orientations and encompasses 28 countries. Obtained through multilevel modeling, the findings show that low-skilled workers are disadvantaged in all aspects of job quality. However, skill inequality in the quality of employment depends on countries' characteristics, with declining inequality in countries at higher levels of technological development and to some extent also in times of technological growth. At times of high unemployment, skill disparities in job security widen while on other measures of job quality they decline. Under high market regulation, the low skilled enjoy better job security but on other measures, skill inequalities increase.

1. Introduction

Research on market inequality has concentrated mainly on earnings and occupational positions of individuals and social groups as the main stratifying indicators. Recently more attention has been paid to the quality of employment in a broader sense, in order to understand stratification forces as related to the world of work. In recent years, many countries witnessed a widening wage inequality and deterioration in work conditions (Clark, 2005; DiPrete, 2005). The increase in income inequality in most labor markets is attributed to several processes, among which the most pronounced is the rise in knowledge-based technologies that have changed the demand for workers with different levels of skills, and have affected their productivity (Autor et al., 1998; Howell, 2002; Morris and Western, 1999). The technological transformation, which resulted in growing demand for formal skills (Kalleberg, 2007), was accompanied also by increasing international competition and a general decline in the manufacturing sector (Burtless, 1995). These changes brought about worsening market conditions for workers with low levels of education and skills (e.g., DiPrete et al., 1997; DiPrete, 2002; Sherer, 1996; Gallie, 2007b).

The current paper focuses on the quality of employment by raising two questions. The first concentrates on the association between workers' skills and their job quality and asks how low-skilled workers fare compared to other workers on a variety of job attributes. Wages, which economists see as the main indicator of job quality, do not capture all aspects of work, so other measures of job characteristics such as working conditions, health risks or satisfaction with various job features

☆ This study was supported by Israel Science Foundation, Grant No. 323/10. I would like to thank Efrat Herzberg and Dina Maskileyson for their valuable research assistance and helpful comments.

* Address: Department of Labor Studies, Tel Aviv University, Ramat Aviv, Tel Aviv 69978, Israel.
E-mail address: Haya1@post.tau.ac.il

http://dx.doi.org/10.1016/j.ssresearch.2014.07.008
0049-089X/

must be considered to gain a better grasp of what makes a "good job" (European Commission, 2008; Munoz de Bastillo et al., 2011). These characteristics include objective and subjective measures of jobs, such as job security, opportunities for skill enhancement and career advancement, job discretion, job satisfaction and, with the growing number of dual-earner families, issues of work-life balance (Clark, 2005, 2009; Handel, 2005; Gallie, 2007a; Green, 2006; European Commission, 2008; Esser and Olsen, 2011).

The second question concentrates on the conditions, at the country level, under which workers with lower formal qualifications have access to decent employment. Prior studies documented important country differences in employment characteristics and work conditions associated with institutional arrangements, mainly labor market structures and workers' power (e.g., Gallie, 2007a,b; Gallie, 2009; Esser and Olsen, 2011; European Commission, 2008; Muhlau, 2009). While these studies demonstrate the effect of institutional arrangements on the general level of work quality, they do not examine directly diversity in employment quality among different groups of workers. The current research builds on these prior studies by examining the role of technology and other characteristics in determining the relationship between formal skills, obtained through the educational system, and job attributes.

1.1. Inequality in workers' qualifications and job quality

The labor market position of low-educated workers has deteriorated in recent decades. As several studies show, low-skilled workers are prone to experiencing job insecurity and unemployment (Solga, 2002; Gesthuizen et al., 2011) and are more likely to be in low status jobs. The increasing significance of skills, especially those acquired through the educational system, is seen as a product of the major technological developments of the last four decades (Powell and Snellman, 2004; Violante, 2008). These developments resulted in a shift from manual to knowledge-based work and have led to a deterioration of job opportunities available to workers with lower education and low skills (Katz and Autor, 1999; Blau and Kahn, 2002; Atkinson, 2003; Tahlin, 2007; Appelbaum et al., 2003). Today employment growth is highest in high-skilled occupations, which usually demand academic education. Such occupations are characterized by high-paying jobs and good working conditions (Spitz-Oener, 2006). Furthermore, jobs filled in the past by high school graduates have become automated, leading to a further decline in the demand for workers with lower education (Maxwell, 2008). These trends may have increased competition, especially at the bottom of the occupational distribution. This is especially the case under harsh economic conditions, when those with higher education enter low-skilled jobs as their own market prospects deteriorate (Wolbers et al., 2001; Gesthuizen et al., 2011).

The educational expansion evident in most countries brought about a general trend of up-skilling of the entire workforce (e.g., Gallie et al., 1998). However, a closer look at different classes and occupational groups reveals a growing polarization based on skills. While skilled manual and non-manual laborers have benefited from the technological changes, semi-skilled and unskilled workers have not (Tahlin, 2007). Especially important in gaining access to good jobs are formal skills, both because cognitive skills are mostly relevant to the knowledge-based technologies, and because low educational achievements, especially in a context of expanded education, send negative signals to employers (Kalleberg, 2007; Solga, 2002).

In addition, globalization processes have further increased market competition because technological advances foster the transfer of more routine work to countries around the world, creating pressures for a reduction in production costs and higher flexibility in the work process (Appelbaum et al., 2003; Mills et al. 2008). These changes, accompanied by the large supply of cheap migrant labor, have mainly affected the demand for less educated workers and their bargaining power, especially in countries where high education is more prevalent. Lastly, these changes have led to the establishment of new work arrangements, which, while allowing employers to cope with growing competition and providing them with badly needed flexibility, have eroded the postwar contract with labor and increased job insecurity (Rubin, 1995).

As a result of these processes, work conditions and the jobs available to workers with different qualifications have changed as well. However, it is not entirely clear who benefited the most from the new organization of labor markets. There is a general "optimistic view" regarding the content of jobs, and their quality, in an economy based on highly developed technologies (Green 2006; Handel 2005). This is because the new jobs are expected to provide a better utilization of skills and abilities, and workers are assumed to take part in complex production processes. Moreover, these are jobs that provide opportunities for learning, thus further enhancing workers' skills. Yet, the question to be asked is whether all workers benefit from the technological developments in a similar way. Indeed, high level of technology requires high level of skills but the effect on the quality of jobs is more complex: while some of the jobs are improved, others may become more routinized and demand lower levels of skills (Green, 2006). One consequence is a polarization of skills, with improved access to the better jobs for workers who acquire higher level of education and skills while worsening work conditions for those who do not have the necessary qualifications. Hence, it is expected that high-skilled workers will enjoy better work conditions, on all job attributes, than those who have low qualifications.

1.2. Country variation in job quality and workers' qualifications

The technological and organizational changes discussed above have been perceived as uniformly affecting all capitalist markets, resulting in a growing polarization of labor market opportunities and outcomes based on education and skills (Blau and Kahn, 2002). However, recent studies suggest that the consequences of technological changes and global processes are more complex and depend on the nature of specific labor markets (e.g., Hall and Soskice, 2001; Gallie, 2007a, b; DiPrete,

2005; DiPrete et al., 2006; Doellgast et al., 2009; Gebel and Giesecke (2011)). Labor markets vary substantially in the general level of technological development and in the types of technologies employed (Archibugi and Coco, 2005). This variety also affects the organization of work, the demand for skills and, consequently, the types of jobs available to workers with low or no qualifications.

The current study focuses in particular on the role of technology as it affects inequality between workers with different qualifications in several dimensions of job quality. Technology, more than other characteristics at the country level, is closely related to the demand for formal skills and therefore has a direct effect on skill inequality in the quality of employment. As stated above, in markets that adopted knowledge-based technologies the demand for highly educated employees is high, with few opportunities left for low-educated workers. This is both because low-skilled jobs disappeared and because workers with an intermediate level of education who could not enter the highly technical jobs replaced the low-educated workers in jobs that demand a lower level of technological skills (Gesthuizen et al., 2011). Hence, the level of technology is expected to increase the overall quality of employment, but also to increase disparities along qualification lines in the quality of employment. Inequality is expected to further increase in times of technological growth, as the demand for highly skilled workers rises.

In addition to technological development, countries differ as well in other characteristics which might affect work conditions (Gallie, 2007a, b; Hall and Soskice, 2001; Gesthuizen et al., 2011; Gebel and Giesecke 2011). Past research has confirmed the effect of market regulation and unions, as well as economic conditions, on the quality of employment. For example, Pontusson et al. (2002) found that high levels of unionization, centralized wage bargaining, and a large public sector reduce inequality by boosting the wages of unskilled workers (for similar findings on union membership, see Clark, 2005; Maxwell, 2008). Gebel and Giesecke (2011) demonstrate the importance of market deregulation in affecting the conditions under which workers with low qualifications gain access to better and more secured jobs; Other studies emphasize the importance of work contracts (Gallie et al., 1998; Rubery et al., 2002), skill specificity, workers' power as indicated by union membership (Esser and Olsen, 2011), unemployment rates (Clark, 2005; Erlinghagen, 2008), and the structure of wages (Blau and Kahn, 1995; Diekhoff et al., 2007. The current study controls for the levels of regulation and unemployment, with the expectation that in more regulated labor markets skill-based inequality in job quality will be lower than in more competitive markets. It is further expected that under harsh economic conditions, job quality will deteriorate while inequality in work conditions on the basis of skills will increase, specifically due to a decline in job quality for those with low education and qualifications.

2. Data and method

The methodology in the current study combines macro- and micro-level research, as it attempts to explain relationships at the individual level embedded in specific institutional contexts. On the micro level, the study is based on the 2005 ISSP module on work orientation, which provides a detailed account of job attributes (http://www.issp.org). Data were collected from national probability samples in participating countries, and include detailed information on job values, job characteristics, perceptions and outcomes of job characteristics, as well as extensive background information on participants. The high quality of comparative attitude data, along with comparative social and demographic information, makes it possible to study job quality by multidimensional as well as specific measures, within and between social contexts (for quality evaluation of the 2005 module see ISSP monitoring report (Scholz et al., 2008)). The dataset covers 28 countries for which macro-level data was available: Australia, Belgium (Flanders), Bulgaria, Canada, Cyprus, the Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Israel, Japan, Latvia, the Netherlands, New Zealand, Norway, Portugal, Russia, Slovenia, South Africa, Spain, Sweden, Switzerland, Taiwan, the United States and the United Kingdom. The study encompasses the employed population in each of these countries (a total of 18,000 men and women), as measures of job quality pertain only to those holding a job at the time of the survey. Self-employed were excluded from the analysis because their job quality is determined by other factors than those discussed above.[1] For the macro-level data, I used published reports and statistics of formal international organizations such as the OECD publications, and other international reports as outlined below. The data pertain to the economic and technological characteristics as well as industrial relations of the early 2000s to represent the actual settings faced by workers.

2.1. Variables

The dependent variable is job quality, for which several job characteristics are considered key indicators (Clark, 2005; Handel, 2005; Gallie, 2003,2007a). Four measures of different aspects of the jobs were examined in this study: job security, job achievement, job content, and job flexibility. Job security was measured in extrapolation from respondents' answers to the following question:

To what extent, if at all, do you worry about the possibility of losing your job? (Answers were recoded to range from (1) I do not worry at all, to (4) I worry a great deal.)

[1] Excluding the self-employed did not change the findings, but three of the countries – the Philippines, South Korea and Mexico were dropped because a large part of their labor force is self-employed (mostly in farming).

I used perceived characteristics of the current job to build a multifaceted concept of job quality. These included quality of pay, promotion prospects, job autonomy, whether the job is interesting, and whether the job enhances skills. Respondents were asked to state to what extent each of the following statements applied to their main job (answers ranged from (1) strongly agree, to (5) strongly disagree)

a. My income is high.
b. My opportunities for advancement are high.
c. My job is interesting.
d. I can work independently.
e. My job gives me a chance to improve my skills.

A preliminary factor analysis (not shown here) including these five items yielded two factors. The first pertains to work rewards termed here as "job achievements", and includes items *a* and *b* ($r = 0.46$); and the second factor, which I termed 'job content", includes items c through e (*Cronbach's* $\alpha = 0.70$)[2]. Two indices were constructed to denote the **achievement** and **content** dimensions, by averaging the relevant items. They are recoded so that each ranges from 1 (low quality) to 5 (high quality).

Lastly, job time **flexibility** was measured by applying factor analysis to the information from the following three questions ($\alpha = 0.63$)[3]:

1. Does the respondent decide on the starting and ending time of work? (1 = employer decides ... 3 = respondent decides)
2. Does the respondent decide how to organize the daily work? (1 = respondent is free to decide ... 3 = respondent is not free to decide)
3. How difficult would it be to take an hour or two off during working hours, to take care of personal or family matters? (1 = not difficult at all ... 4 = very difficult).

Again, a high score implies a high level of flexibility in work organization (one element of a high quality job).

2.2. Independent variables

2.2.1. Micro-level variables

The main *independent variable* of interest is *formal skill level*, which is measured at the individual level by educational qualifications. The ISSP provides comparable as well as country-specific measures on education, one that refers directly to qualification, and another that indicates years of schooling. The latter was used to create a set of dummy variables that differentiate three categories of formal skills: high, intermediate, and low. The "high skill" category included those with 13 years of schooling and above; "intermediate skills" includes those with 11–12 years of schooling; and "low skilled" include those who have 10 years of schooling or less.[4] The models controlled for other individual-level characteristics as well: age (measured in years); marital status (1 = married, 0 = otherwise); employment in the public sector (1); union membership (1); and whether respondent has authority (1). All models pertaining to all employees also controlled for gender. A description of them (means or percentage) is presented in the Appendix, Table A1.

Several indicators were considered for measuring the macro-level characteristics. The technological level of a country, a key indicator in the current study, was based on the ArCo Technological Capabilities Index (Archibugi and Coco, 2004; Archibugi and Coco, 2005), which takes into account three dimensions of technology: *innovative activity* (based on patents registration and scientific publications); *technology infrastructure*; and the level of *human capital*. Because it was constructed for two decades (1990s and 2000s), I used the 2000s measure to denote the level of technological development and the growth rate (in percentage) from the past to the more recent period to capture the technological change. The index of labor market regulation was obtained from the Fraser Institute (Gwarthy et al., 2010). This measure is composed of five indicators (including hiring and firing regulations; minimum wage; centralized collective bargaining; work-hours regulations; and conscription). Low regulation, for example, means that the market determines wages and establishes the conditions of hiring and firing. The measure was recoded so that high value indicates high regulation (ranging between 1 and 9). Last, unemployment rate was used to indicate the economic conditions in a country (OECD publications).[5] The figures pertain to the early 2000s to capture the environment in which respondents work. The correlation between the four variables is relatively low, ranging from −0.020 between technology and market regulation to −0.387 between unemploy-

[2] To test for comparability of these constructs across countries, a measurement equivalence analysis was conducted (see Davidov 2009). The results show that the constructs are comparable across countries (SRMR = 0.02, CFI = 0.98, RMSEA = 0.01 and P close = 1).

[3] In all countries the three items formed one factor with high and consistent loadings.

[4] Different categorization based on the qualification variable or a specific combination for each country yielded similar results.

[5] Other macro-level characteristics were considered and tested in preliminary analyses. These included measures of wage inequality, union density and union coverage, practices of minimum wage, and GDP. Due to the high correlation of these measures with the ones used in the analyses, and the relatively small number of countries, only a few indicators were eventually used in the models.

ment and the level of technology. The values of these macro-level variables for each country and the correlation matrix are presented in the Appendix, Table A2.

2.3. Method of analysis

The study was based on multilevel modeling which allows to test for micro and macro-level effects and their interaction. This method allows to model simultaneously the effects of societal-level characteristics on job quality measures while controlling for individual-level characteristics (Bryk and Raudenbush, 1992). More importantly, this method allows testing for whether the individual-level effect of skills on job quality differ cross-nationally, and how this variation is associated with country-level characteristics. Thus, a two-level model allows the researcher to define any number of individual-level variables as random variables, which are then regressed on the societal-level variables.

For all measures, regression analysis was used, within the framework of hierarchical linear modeling. Such a model can be represented by a set of equations, as follows:

$$(\text{job quality})_{ij} = \beta_{0j} + \beta_{1j}(\text{low skills})_{ij} + \beta_{2j}(\text{high skills})_{ij} + \beta X + \varepsilon_{ij} \quad (1)$$

The first is a within-country equation where the job quality of individual i in country j is the dependent variable; β_{0j} denotes the (country specific) intercept; β_{1j} and β_{2j} represent the effect of the skill variable (two dummy categories) 'low skills' and 'high skills' and the vector X denotes all other individual-level control variables, β represents their coefficients, and ε_{ij} is the error term. In this equation, both the intercept and the skill coefficients (β_{0j}, β_{1j}, and β_{2j}, respectively) are allowed to vary cross-nationally, while the effects of the control variables are constrained to be the same across countries. I explain between-country variation with the country-level characteristics, as presented in Eqs. (2)–(4).

$$\beta_{0j} = \gamma_{00} + \gamma_{01}(\text{Technology level})_j + \gamma_{02}(\text{Technology growth}) + \ldots + v_{oj} \quad (2)$$

$$\beta_{1j} = \gamma_{10} + \gamma_{11}(\text{Technology level})_j + \gamma_{12}(\text{Technology growth}) + \ldots + v_{1j} \quad (3)$$

$$\beta_{2j} = \gamma_{20} + \gamma_{21}(\text{Technology level})_j + \gamma_{22}(\text{Technology growth}) + \ldots + v_{2j} \quad (4)$$

In Eqs. (2)–(4) the β coefficients derived from Eq. (1) constitute the dependent variables. In Eq. (2) the variation in work quality across countries (variation in the intercept) is modeled as a function of contextual factors (e.g., technology level and technology growth; unemployment rate and level of regulation). A positive sign of γ_{01}, for example, supports the claim that in countries with higher level of technology workers enjoy better quality jobs.

In Eqs. (3) and (4) country differences in the effect of worker's skills on job quality (country-specific coefficient β_{1j} and β_{2j}) are modeled as a function of the countries' characteristics. Here, a negative sign of γ_{11} indicates that technology reduces the job quality of workers with the specific skill level (in comparison to workers with intermediate skills). The other variables included in the model are interpreted in a similar way.

3. Findings

Table 1 presents the average values of the four quality indicators by skill level. The table shows substantial differences in job quality according to skills (except for the difference in time flexibility between low and medium levels of skills, all other differences are significant at the 0.05 level), where highly skilled workers enjoy a higher level of job quality on all measures while low-skilled workers have the lowest quality. For example, the differences in job security range between a score of 3.25 for the highly skilled compared to 3.00 for the low-skilled, with intermediate skills in between with 3.04. The same pattern can be seen in job achievement, job content (a gap of around 0.34 in favor of the highly skilled) and time flexibility. Workers with an intermediate level of skills are closer to the low-skilled on all measures suggesting that the pattern of skill differences is not entirely linear.

Table 1
Means (standard deviations) of job quality indicators by formal skills.

	Job security*	Job achievement*	Job content*	Time flexibility**
High skills	3.25 (1.04)	2.81 (0.91)	3.92 (0.76)	0.11 (0.96)
Intermediate Skills	3.04 (0.98)	2.62 (0.91)	3.67 (0.81)	−0.11 (1.00)
Low skills	3.00 (0.90)	2.51 (0.91)	3.58 (0.88)	−0.09 (1.06)
N	19,668	19,466	19,241	19,430

* Differences between each pair of skills are significant at the 0.05 level.
** Differences between High skills and all others are significant at the 0.05 level.

Table 2
Variance components of the two-level models by quality indicators.

	Job security	Job achievement	Job content	Time flexibility
Total working population				
Level 2	0.130	0.034	0.071	0.074
Level 1	0.806	0.822	0.597	0.920
% variation due to level 2	13.9	4.0	10.6	7.4
Skill slope	Chi Square			
Low skill	61.63*	84.32*	160.17*	93.01*
High skill	61.16*	92.85*	109.10*	69.11*
Skill slope controlling for individual-level variables				
Low skill	49.44*	68.14*	108.98*	90.46*
High skill	64.07*	83.25*	100.51*	64.92*

* $P < 0.05$.

To test the hypotheses regarding the conditions under which education-based skill inequality narrows (or widens), I next applied the multilevel analysis. My main interest here is in examining the effect of the macro-level indicators on skill inequality in the different measures of job quality. Before moving on to examine these parameter estimates, Table 2 presents the results of the analysis of variance across the two levels.

As Table 2 shows, most of the variation in job quality emerges between individuals. Variation in job achievement at the country level is relatively low (less than 5%, but the country effect is significant), while in all other indicators it ranges from 7.4% to 14%. The variation in the skill slopes, the main interest of this paper, is significant across countries in all indicators of job quality. Furthermore, as the lower panel of the table shows, cross-country variation in the effect of skills remains significant even after the inclusion of individual-level covariates. In other words, this analysis suggests a substantial country-variation in skill inequality, which could then be explained by the macro-level indicators.

Table 3 sets out the results for job security, job achievement, job content and time flexibility. For each indicator, the model includes the main effect of the macro-level indicators, and an interaction effect between the macro-level indicators and skills, controlling for individual-level variables. Turning first to the effect of workers' skills on the different measures of job quality, the table suggests, as expected, that independent of all individual and country characteristics, highly skilled workers have a clear and significant advantage in all measures of job quality compared to workers with intermediate level of skills (the reference category) – they have higher job security (column 1, $\beta = 0.081$), higher achievements (column 2, $\beta = 0.185$), better job content (column 3, $\beta = 0.175$) and more time flexibility ($\beta = 0.180$). Low-skilled workers have the lowest quality in all measures. Differences between low- and high-skilled workers (not shown here) were also significant in all measures.

The main interest of this paper is in the effect of the macro-level characteristics on education-based skill inequality in job quality. In these models, macro-level variables entered as both main and interaction effects, therefore the "effect on the intercept" indicates outcomes for workers with an intermediate skill level (the reference group of the skill variable), and the interaction effects (effects on the slopes) pertain to the deviation of each skill group from the main effect. Turning first to the technological level, the general expectation was that technological level and technological growth will be associates with a higher level of job quality, on all measures. I further expected a growing polarization between workers on the basis of their skills in countries with high level of technology. The findings provide only partial support for these expectations. First, as expected, a high level of technological development benefits workers in terms of job security ($\gamma = 1.453$), job content ($\gamma = 1.259$) and time flexibility ($\gamma = 1.488$), with no significant effect only on job achievement. However, as opposed to the initial expectation, technology affects the differences in job quality between workers possessing different levels of skills in only two measures: job content and time flexibility. In job content, the effect is not in the expected direction – the gap between workers with different levels of skills narrows with an increase in the level of technology, as the highly skilled have lower quality in their job content compared to those in the middle ($\gamma = -0.400$), while those with low skills have better quality jobs ($\gamma = 0.490$). Higher level of technology reduces the time flexibility of low skilled workers ($\gamma = -0.310$) although the effect is significant only at the 0.7 level) indicating a growing disparity between workers with high and intermediate level of skills and those at the bottom. The effect of technology is summarized in Fig. 1, which presents the predicted values of job quality on the three measures – job security, job content and time flexibility, in selected countries that represent different levels of technology. The countries are ordered by the level of technology with South-Africa at the lowest extreme and Sweden at the highest. The Figure shows that in general the quality of jobs is higher and skill inequality is lower in countries with higher technological levels. The figure also shows that the effects are much more pronounced in countries with lower level of technology, indicating that at a certain level the job quality of all workers becomes quite similar. This is especially true in the case of job security and job content (panels A and B of the figure). It may indicate that the results are mainly affected by the work conditions in countries with relatively lower level of technology.

Table 3
Results of a multilevel regression predicting job quality among employees in 28 countries.

	Job security	Job achievement	Job content	Time flexibility
Intercept	3.007	2.534	3.544	−0.065
	(0.044)	(0.041)	(0.044)	(0.042)
Low skills	−0.044	−0.116*	−0.129*	−0.093*
	(0.023)	(0.02)	(0.016)	(0.024)
High skills	0.081*	0.185*	0.175*	0.180*
	(0.019)	(0.019)	(0.015)	(0.019)
Female	0.002	−0.185*	−0.009	−0.144*
	(0.017)	(0.013)	(0.018)	(0.018)
Age	0.000	−0.009*	0.001	0.010*
	(0.001)	(0.001)	(0.001)	(0.001)
Married	0.068*	0.077*	0.058*	0.061*
	(0.018)	(0.016)	(0.013)	(0.017)
Children	−0.041*	0.013	0.025	0.049*
	(0.017)	(0.018)	(0.016)	(0.015)
Public	0.084*	0.006	0.070*	−0.246*
	(0.031)	(0.038)	(0.016)	(0.032)
Authority	0.137*	0.371*	0.266*	0.333*
	(0.022)	(0.026)	(0.027)	(0.036)
Union membership	−0.087*	0.011	−0.039*	−0.297*
	(0.023)	(0.023)	(0.014)	(0.036)
Hours of work	−0.001	0.006*	0.004*	0.002*
	(0.001)	(0.001)	(0.001)	(0.001)
Intercept				
Tech level	1.453*	0.195	1.259*	1.488*
	(0.366)	(0.304)	(0.327)	(0.261)
Tech growth	0.010*	0.002	0.001	0.009*
	(0.004)	(0.003)	(0.004)	(0.003)
Unemployment	−0.005	0.017~	0.018*	0.016*
	(0.014)	(0.009)	(0.007)	(0.008)
Regulation	−0.024	−0.024	−0.007	0.002
	(0.044)	(0.030)	(0.041)	(0.033)
Low-qualification slope				
Tech level	0.127	0.080	0.490*	−0.309~
	(0.158)	(0.216)	(0.139)	(0.164)
Tech growth	0.001	0.000	0.001	0.000
	(0.002)	(0.002)	(0.001)	(0.001)
Unemployment	−0.014*	−0.018*	−0.019*	−0.030*
	(0.003)	(0.003)	(0.003)	(0.003)
Regulation	0.037*	0.008	−0.008	−0.010
	(0.019)	(0.013)	(0.012)	(0.018)
High-qualification slope				
Tech level	−0.285	−0.237	−0.400*	−0.117
	(0.226)	(0.179)	(0.156)	(0.156)
Tech growth	0.001	−0.003	−0.004*	−0.004
	(0.002)	(0.002)	(0.001)	(0.002)
Unemployment	−0.009	−0.025*	−0.027*	−0.024*
	(0.006)	(0.004)	(0.003)	(0.005)
Regulation	0.024	0.058*	0.044*	0.031~
	−0.027	−0.017	−0.017	−0.017
X^2 Intercept	374.45*	295.29*	401.22*	218.79*
X^2 Low skills	27.57	37.06*	30.08	39.59*
X^2 High skills	54.28*	44.23	41.19*	37.65*

* $p < 0.05$.
~ $P < 0.10$.

Above and beyond the level of technology, technological growth further increases job quality in the case of job security ($\gamma = 0.010$) and time flexibility ($\gamma = 0.009$), but reduces the skill inequality in job content, as it affects negatively the quality of highly skilled workers compared to all other workers.

The economic conditions, measured by the rate of unemployment, have a significant effect on skill inequality in all measures of job quality. The effect is consistent across these measures, in that it reduces the job quality of low-skilled workers, as could be expected ($\gamma = -0.014$ in job security, −0.018 in job achievement, −0.019 in job content, and -.030 in time flexibility). However, the findings also show that in countries with a higher level of unemployment, the job achievements, job content and time flexibility of the highly skilled workers declines as well, in comparison to workers

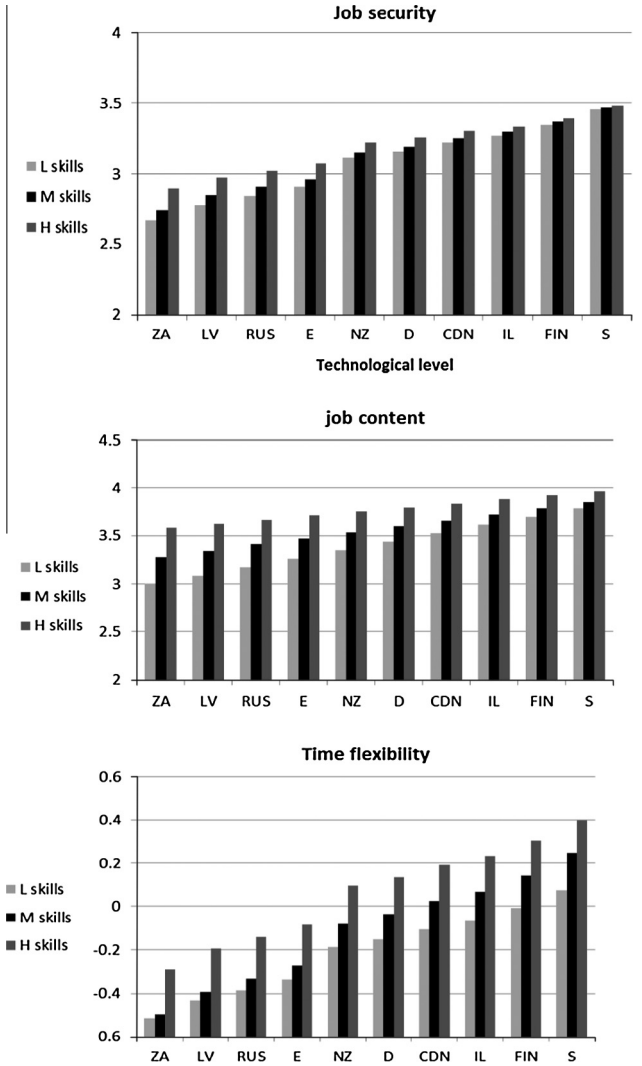

Fig. 1. Predicted job quality values by level of technology. ZA = South Africa, LV = Latvia, RUS = Russia, E = Spain, NZ = New Zealand, D = Germany, CDN = Canada, IL = Israel, FIN = Finland, S = Sweden.

with an intermediate level of skills. This decline means that under harsh economic conditions the gap between highly and intermediate skilled workers narrows, with less favorable work conditions for the strongest group in the labor market (the unemployment effect is −0.025 in job achievement, −0.027 in job content and −0.024 in time flexibility, while the effect on the intercept (e.g., workers with intermediate skills) is positive). In other words, inequality is reduced at the top of the distribution, but increases at the bottom, so the jobs of the low-skilled become worse compared to the rest of the labor force. Finally, the effect of market regulation is not consistent across measures – there is no significant effect on the job quality of workers with intermediate skills (the intercept) but regulation increases job security of low skilled workers ($\gamma = 0.037$) while other workers are not affected. High regulation is associated with higher job achievement, better content of jobs and more time flexibility for the highly skilled but has no effect on those at the bottom. In other words, regulation increases polarization based on workers' qualifications in the latter measures while it reduces the gap in terms of job security.

While the main interest of this paper lies in macro effects on job quality, some individual-level relationships deserve mention. First, there are no significant gender differences in the overall level of job security and job content, but women lag behind men in their achievement and time flexibility. Second, job quality is higher in all measures for married workers and those holding positions of authority. Job security and job content are higher also for public sector employees, but the latter have lower time flexibility than other workers. Job security tends to be lower for those who have children at home and for workers who are union members. Older workers have lower job achievements, but those working longer hours

perceive their jobs as providing better wages and opportunities for advancement. Longer hours are also associated with better job content and higher time flexibility. Time flexibility is higher also among older workers and among parents, but tends to be lower for union members, probably due to the type of occupations most likely to be unionized.

4. Summary and conclusions

Workers' skills are important in determining opportunities in the labor market, in terms of both the availability and quality of jobs. In this study I have examined inequality in various employment attributes to ascertain the conditions under which workers with lower formal qualifications have access to decent employment. I investigated whether workers with low skills, who usually have low wages, suffer from further disadvantages, or if they are compensated by other job attributes such as job security or other aspects of the job such as autonomy, interest, skill enhancement or flexibility in work schedules and the organization of the working day. The findings show that low-skilled workers lag behind those with higher skills in every aspect of their employment. They have lower job security, and their jobs provide fewer opportunities for achievement, worse job content and less flexibility.

However, the findings indicate that inequalities between workers who possess different levels of skills are not uniform across labor markets. In countries at a higher level of technological development, workers usually enjoy better work conditions: their jobs are more secure, and offer better content in terms of autonomy, interest and skill enhancement, and greater control over the organization of the daily tasks. This finding supports the claim that the upgrading of jobs affects those at the bottom, too (Handel, 2005). Furthermore, a higher level of technological development is associated with narrowing gaps in job content between workers with different levels of skills. This finding means that labor markets in countries with highly developed technologies offer better-quality jobs in terms of interest, autonomy and skill enhancement for the entire labor force, not only those with the skills in high demand. It is important to keep in mind, nonetheless, that this does not mean that low-skilled workers have better job opportunities in the labor market, since the study population includes only those who were employed at the time of the survey.

The level of technology notwithstanding, technological growth also affects the quality of employment. When the economy changes in this respect, workers enjoy better job security and higher time flexibility, but skill inequality is hardly affected. Interestingly, technology had no bearing on job achievement, that is, workers perceive their wages and opportunities for advancement as depending more on their own skills and market position and less on the general structure of production.

The effect of economic hardship (measured by unemployment rate) was found as detrimental to low skilled workers. Not only are their employment prospects worse than those who are more qualified (Gesthuizen et al., 2011), but the jobs they do find are of the lowest quality. However, harsh economic conditions also affect the highly skilled who lose some of their advantages in the labor market. To summarize, macro-level characteristics of countries have complex and not necessarily consistent effects on job quality and on inequalities among different groups of workers. There is an important debate in the literature as to whether the changes occurring in most Western (and non-Western) labor markets have harmed or improved the quality of employment, and whether the effect is similar for all workers (Handel, 2005). The findings of the current study suggest that in general technological developments improve the quality of employment, while economic hardship impairs work conditions.

Appendix A

See Tables A1 and A2.

Table A1
Descriptive statistics for independent variables at the individual level. *Source:* ISSP 2005.

	Mean or % (standard error)
% Females	51%
Age	41.08
	(11.86)
Married	61%
Children	46%
Public sector	35%
% with authority	30%
% union members	35%
Work hours	39.24
	(11.58)
N	18,600

Table A2
Macro-level variables by Country. *Source:* Technology and technological growth obtained from Archibugi and Coco (2005); unemployment – OECD (2001); market regulation level – fraser 2010.

	Technology index	% Technological growth (last decade)	Unemployment rate	Regulation score
Country				
Australia	0.684	21.9	5.1	1.9
Belgium (Flanders)	0.642	22.7	8.4	3.3
Bulgaria	0.449	3.2	10.1	3.0
Canada	0.742	9.4	6.8	1.5
Cyprus	0.440	14.4	5.3	5.0
Czech Republic	0.475	9.9	7.9	3.1
Denmark	0.704	20.6	4.8	3.4
Finland	0.831	35.2	8.4	4.3
France	0.604	21.0	8.8	3.0
Germany	0.682	15.0	11.1	5.2
Hungary	0.469	16.8	7.2	2.5
Ireland	0.567	26.0	4.3	2.6
Israel	0.751	12.2	9.0	4.3
Japan	0.721	26.8	4.4	1.7
Latvia	0.439	3.7	8.7	3.1
Netherlands	0.683	19.7	5.1	2.9
New Zealand	0.645	13.3	3.7	2.3
Norway	0.724	24.6	4.6	4.3
Portugal	0.450	30.0	4.6	3.7
Russia	0.480	3.4	7.2	3.4
Slovenia	0.507	23.1	5.7	4.4
South Africa	0.372	11.1	26.4	2.4
Spain	0.516	25.8	9.2	2.9
Sweden	0.867	27.2	7.7	4.8
Switzerland	0.799	8.7	4.4	1.6
Taiwan	0.665	52.6	4.1	3.2
United Kingdom	0.673	19.8	4.6	1.4
United States	0.747	12.6	5.1	1.0
Correlation matrix				
Technology		0.308	−0.387	−0.020
Technology growth			−0.254	0.196
Unemployment				0.106

References

Appelbaum, E., Bernhardt, A., Murnane, R.J. (Eds.), 2003. Low Wage America: How Employers Are Reshaping Opportunities in the Workplace. Russell Sage Foundation, New York.

Archibugi, D., Coco, A., 2004. A new indicator of technological capabilities for developed and developing countries (ArCo). World Develop. 32 (4), 629–654.

Archibugi, D., Coco, A., 2005. Measuring technological capabilities at the country level: a survey and a menu for choice. Res. Policy 34, 175–194.

Atkinson, A. 2003. Income and inequality in OECD countries: data and explanation (CESIfo Working Paper No. 881), University of Munich, Munich.

Autor, D., Katz, L.F., Krueger, A.B., 1998. Computing inequality: have computers changed the labour market? Quarterly J. Econo. 113, 1169–1213.

Blau, F.D., Kahn, L.M., 1995. The gender earnings gap: some international evidence. In: Freeman, R.B., Katz, L.F. (Eds.), Differences and Changes in Wage Structures. The University of Chicago Press, Chicago, pp. 105–143.

Blau, F.D., Kahn L.M. 2002. At Home and Abroad: U.S. Labor Market Performance in International Perspective. New York: Russell Sage.

Bryk, A.S., Raudenbush, S.W., 1992. Hierarchical Linear Models. Sage, Newbury Park, CA.

Burtless, G., 1995. International trade and the rise in earnings inequality. J. Econo. Lit. 33, 800–816.

Clark, A.E., 2005. Your money or your life: changing job quality in the OECD countries. Brit. J. Indust. Relat. 43 (3), 377–400.

Clark, A.E., 2009. Work, jobs and well-being across the millennium. IZA Discussion Paper No. 3940. SSRN: <http://ssrn.com>.

Davidov, E., 2009. Measurement equivalence of nationalism and constructive patriotism in the ISSP: 34 countries in a comparative perspective. Polit. Anal. 17, 64–82.

Diekhoff, M., Jungblut, J.-M., O'Connell, P.J., 2007. Job related training in Europe: Do institutions matter? In: Gallie, D. (Ed.), Employment Regimes and the Quality of Work. Oxford University Press, Oxford, pp. 77–104.

DiPrete, T., 2002. Life course risks, mobility regimes, and mobility consequences: A comparison of Sweden, Germany, and the United States. Am. J. Sociol. 108 (2), 267–309.

DiPrete, T., 2005. Labor market, inequality, and change: a European perspective. Work Occup. 32 (2), 119–139.

DiPrete, T., de Graaf, P.M., Luijkx, R., Bloosfeld, H.-S., 1997. Collectivist versus individualist mobility regimes? Structural change and job mobility in four countries. Am. J. Sociol. 103 (2), 318–358.

DiPrete, T., Goux, D., Maurin, E., Quensel-Vallee, A., 2006. Work and pay in flexible labor markets: a generalized perspective on institutional evolution and inequality trends in Europe and the U.S. Res. Social Mob. Stratif. 24, 311–332.

Doellgast, V., Holtgrewe, U., Deery, S., 2009. The effects of national institutions and collective bargaining arrangements on job quality in front-line service workplaces. Indust. Labor Relat. Rev. 62 (4), 489–509.

Erlinghagen, M., 2008. Self-perceived job insecurity and social context: a multi-level analysis of 17 European countries. Euro. Sociol. Rev. 24 (2), 183–197.

Esser, I., Olsen, K.M., 2011. Perceived job quality: autonomy and job security within a multi-level framework. Euro. Sociol. Rev. http://dx.doi.org/10.1093/esr/jcr009.

European Commission. 2008. Employment in Europe 2008. Chapter 4: Measuring the Quality of Employment in the EU. Luxembourg: office for Official Publications of the European Communities.
Gallie, D., 2003. The quality of working life: is Scandinavia different? Euro. Sociol. Rev. 19 (1), 61–79.
Gallie, D., 2007a. Production regimes, employment regimes, and the quality of work. In: Gallie, Duncan. (Ed.), Employment Regimes and the Quality of Work. Oxford University Press, Oxford, pp. 1–34.
Gallie, D., 2007b. Production regimes and the quality of employment in Europe. Annu. Rev. Sociol. 33, 85–104.
Gallie, D., 2009. Institutional regimes and employees influence at work: a European comparison. Cambridge J. Reg., Econ. Soc. 1–15. http://dx.doi.org/10.1093/cjeres/rsp010.
Gallie, D., White, M., Cheng, Y., Tomlinson, M., 1998. Restructuring the Employment Relationship. Clarendon Press, Oxford.
Gebel, M., Giesecke, J., 2011. Labor market flexibility and inequality: the changing skill-based temporary employment and unemployment risks in Europe. Social Forces 90 (1), 17–40.
Gesthuizen, M., Solga, H., Kunster, R., 2011. Context matters: economic marginalisation of low-educated workers in cross-national perspective. Euro. Sociol. Rev. 2 (2), 264–280.
Green, F., 2006. Demanding Work: The Paradox of Job Quality in the Affluent Economy. Princeton University Press, Princeton.
Gwarthy, J., Hall, J., Lawson, R., 2010. Economic Freedom of the World. Annual report. The Fraser Institute.
Hall, P.A., Soskice, D., 2001. Varieties of Capitalism: The Institutional Foundations of Comparative Advantage. Oxford University Press, Oxford.
Handel, M.J., 2005. Trends in perceived job quality, 1989 to 1998. Work Occup. 32 (1), 66–94.
Howell, D.R., 2002. Increasing earnings inequality and unemployment in developed countries: markets, institutions, and the 'unified theory'. Polit. Soc. 30, 193–243.
Kalleberg, A.L., 2007. The Mismatched Worker. W.W. Norton & Company, New York.
Katz, L.F., Autor D.H., 1999. Changes in the wage structure and earnings inequality. In: Ashenfelter, O., Card D., (Eds.), Handbook of Labor Economics, vol. 3A, Amsterdam: North Holland, pp. 1463–1555.
Maxwell, N.L., 2008. Wage differentials, skills, and institutions in low-skill jobs. Indust. Labor Relat. Rev. 61 (3), 394–409.
Mills, M., Blossfeld, H.-P., Buchholz, S., Hofäcker, D., Bernardi, F., Hofmeister, H., 2008. Converging divergences?: an international comparison of the impact of globalization on industrial relations and employment careers". Int. Sociol. 2008 (23), 561.
Morris, M., Western, B., 1999. Inequality in earnings at the close of the twentieth century. Annu. Rev. Sociol. 25, 623–657.
Muhlau, P., 2009. Gender inequality and job quality in Europe. Manage. Revue 22 (2), 114–131.
Munoz de Bastillo, R., Fernandez-Macias, E., Anton, J.-I., Esteve, F., 2011. Measuring More than Money: The Social Economics of Job Quality. Edward Elgar, Cheltenham, UK.
OECD, 2001. Employment Outlook. OECD, Paris.
Pontusson, J., Rueda, D., Way, C., 2002. Comparative political economy of wage distribution: the role of partisanship and labour market institutions. Brit. J. Polit. Sci. 32, 281–308.
Powell, W.W., Snellman, K., 2004. The knowledge economy. Annu. Rev. Sociol. 30, 199–220.
Rubery, J., Earnshaw, J., Marchington, M., Cooke, F.L., Vincente, S., 2002. Changing organizational forms and the employment relationship. J. Manage. Stud. 39 (5), 645–672.
Rubin, B.A., 1995. Flexible accumulation: the decline of control and social transformation. Res. Soc. Stratif. Mob. 14, 297–323.
Scholz, E., Harkness, J., Faaß, T., 2008. ISSP Study Monitoring 2005. GESIS GESIS-ZUMA, Germany (report No. 4/2008) (<http://www.issp.org>).
Sherer, P.D., 1996. Toward an understanding of the variety in work arrangements: the organization and labor relationship framework. J. Organ. Behav. 3, 99–122.
Solga, H., 2002. Stigmatisation by negative selection: explaining less-educated people's decreasing employment opportunities. Euro. Sociol. Rev. 18, 159–178.
Spitz-Oener, A., 2006. Technical changes, job tasks, and rising educational demands: looking outside the wage structure. J. Labor Econo. 24 (2), 235–270.
Tahlin, M., 2007. Skills and wages in European labour markets: structure and change. In: Gallie, D. (Ed.), Employment Regimes and the Quality of Work. Oxford University Press, Oxford, pp. 35–76.
Violante, G.L., 2008. Skill-biased technical change. In: Durlauf, S.N., Blume, L.E., (Eds.). The New Palgrave Dictionary of Economic, second. Edition. Eds. Palgrave Macmillan.
Wolbers, M.H.J., De Graaf, P.M., Ultee, W., 2001. "Trends in the occupational returns to educational credentials in the Dutch labour market: changes in structures and in the association? Acta Sociol. 44, 5–19.