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Social investment and job quality across European knowledge economies: only more or also better jobs?

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Abstract

The realisation of not just more, but also better jobs has been on the policy agenda for over twenty years. Considering that the idea that investments in human capital should enable the creation of both more and better jobs constitutes a central element of the social investment perspective, it is striking that job quality has hardly figured as a subject of study within the literature on social investment. The majority of studies focuses on employment and redistributive effects instead. This could be caused by the fact that job quality constitutes a multi-faceted concept with many dimensions, which creates several methodological challenges – particularly in a comparative context. Nevertheless, multiple indicators of job quality and its underlying dimensions have been developed by now. These are, however, mostly limited to either a single country or single cross-sections of data, thereby limiting the possibilities for comparisons between countries or over time. This paper therefore introduces new indices that facilitate the analysis of job quality through an internationally comparative framework over time. They are based on multiple dimensions such as earnings, discretion, work intensity, the work environment, and working hours. The indices are available for multiple cross-sections of European countries since 1995, which coincides with the period during which a 'social investment turn' can be observed in many countries. Bivariate correlations and regression analyses are used to assess the relationship between spending on social investment policies and job quality. The analyses indicate that social investment is positively associated with job quality. This holds for all the policies studied here: education, ECEC, and ALMPs.

Keywords: job quality, quality of work; social investment; knowledge economy

JEL classification: H52, H53, I38**,** J24, J81

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1. Introduction

Job quality has traditionally been a concern of scholars from various disciplines.[1] In a context of globalization, technological change, increasing rates of precarious work, a growing gig economy and changing work dynamics amidst the COVID-19 pandemic, job quality has arisen as a focal subject within academic studies and policy arenas alike.[2] The provision of 'good jobs' has even been described as the main challenge for capitalism when it comes to realising and improving social inclusion (Rodrik and Stantcheva 2021). The realisation of not just more, but also better jobs has been on the policy agenda for over twenty years. Following the adoption of the European Employment Strategy in 1997, the Lisbon Strategy of 2000 set the goal "to become the most competitive and dynamic knowledge-based economy in the world capable of sustainable economic growth with more and better jobs and greater social cohesion" (Council of the European Union 2000a). The subsequent Nice Summit explicated the European Social Agenda, which mentioned "improving job quality" as one of the main elements "to achieve full employment and mobilise the full potential of jobs available" (Council of the European Union 2000b). During the 2001 Laeken Summit, the European Council subsequently agreed upon a list of indicators to monitor the effectiveness of national policies with regard to the quality of work, the reduction of poverty, and social exclusion: the Laeken indicators.[3] The OECD adopted this focus on more and better jobs soon thereafter as witnessed by its 2003 Employment Outlook (OECD 2003) that posed the question whether increases in employment levels were also associated with improved job quality, or whether the former was possibly realised at the expense of the latter.

These events coincide with other events that have been of major importance for the agenda setting of the social investment strategy at the European level (Hemerijck 2022), which has gained considerable attention since the start of the 21st century. An important event in this context was the publication of *Why we need a New Welfare State* (Esping-Andersen 2002), which discusses the type of welfare state structure that could facilitate realisation of the goals explicated by the Lisbon Strategy. In it, Gallie (2002) argues that in order to enhance social inclusion and guarantee employability over the life-course, policies focused on employment

[1] The term 'job quality' is used interchangeably with the terms 'work quality' and 'quality of work' in this publication.

[2] See for instance: European Commission (2012), OECD (2014; 2018; 2019), the European Pillar of Social Rights (2017) and Antonucci and Corti (2020). Job quality has, however, also been put on the policy agenda of national governments as for instance reflected by WRR (2020) or national initiatives to developed measures and indexes (e.g. Irvine *et al*. 2018; Felstead *et al*. 2019; Steffgen *et al*. 2020).

[3] See Piasna *et al*. (2019) for an overview of the use and development of the concept 'job quality' in European employment policy since the adoption of the Lisbon Strategy.

growth should be accompanied by policies concerned with improving the quality of working life. Such a focus on inclusive growth is clearly reflected in the Europe 2020 Strategy, which aims to combat social exclusion and increase employment. In order to realise these goals, the European Commission launched the Social Investment Package in 2013, which reflects several of the policies already stressed by the Lisbon Strategy.

While job quality and social investment have received increasing attention over the past two decades, these subjects have hardly been studied in tandem. This is surprising given that, first and foremost, several scholars within the literature on social investment, most notably Nelson and Stephens (2012), have suggested that through investments in skills and human capital a social investment perspective can be pursued to realise not just more, but also better jobs.[4] Second, current policy objectives are to a large extent based on the idea that certain policies contribute to the realisation of better quality jobs. This premise is, for instance, clearly reflected in the Lisbon and Europe 2020 Strategy, but has hardly been assessed empirically. Such an assessment is plagued by various conceptual and methodological challenges, but the increasing availability of relevant data provides opportunities to address these. Even though job quality is likely to be affected by a wide variety of factors, this study therefore concentrates on the role of social investment policies specifically. It aims to contribute to the literature on social investment and job quality by, first, constructing more adequate and elaborate measures of job quality that, moreover, enable comparisons both between countries and over time and, second, empirically examining to what extent effort on social investment is associated to these measures of job quality.

The study is structured as follows. The next section discusses theoretical accounts on what constitutes a good job and identifies different dimensions associated with job quality. In addition, it describes how social investment policies might affect these dimensions. The subsequent section describes the manner in which job quality can be measured and presents the job quality indices constructed for this study after discussing the merits and drawbacks of existing indicators and indices. Next, developments in job quality throughout Europe are briefly discussed and the newly constructed job quality indices are related to government's effort on social investment. These results, which show that effort on social investment policies is positively associated with aggregate scores of job quality, are interpreted and followed by a discussion and conclusion.

[4] Note that this argument is also promulgated by scholars outside the literature on social investment. For example, policies that help workers acquire the skills required for good jobs constitute one of the three components of the strategy "of building a good jobs economy" described by Rodrik and Sabel (2020).

2. Literature review and theory

2.1 Job quality: what is it and how is it affected?

Job quality is a multi-faceted concept that lacks a single definition (e.g. Findlay *et al*. 2013). According to Muñoz de Bustillo *et al*. (2011b, p. 450) it is both a multidimensional and an elusive concept, because it refers to many different attributes of jobs and it concerns a concept that is generally understood, but hard to define precisely. US-oriented scholars have generally defined good jobs as the opposite of bad jobs, which are characterised by low earnings levels and a lack of social security coverage (Kalleberg *et al*. 2000; Acemoglu 2001). Others have studied job satisfaction as a proxy for job quality, which has a long tradition (e.g. Seashore 1974) but strong limitations for scholars interested in comparing jobs in terms of their different attributes and across countries given its subjective character. The use of composite indices or a system of indicators on objective job characteristics has therefore been considered to be a more fruitful approach to compare the quality of jobs (Muñoz de Bustillo *et al*. 2011b; Burchell *et al*. 2014).

Scholars from various disciplines have identified multiple dimensions of job quality (e.g. Green 2006; Gallie 2007; Holman 2013). Based on these studies, this study considers job quality to comprise the nature of the work tasks, the environment in which work is carried out as well as the security, opportunities and rewards it provides. The nature of the work tasks covers elements related to the intensity of the job, such as working at high speed or under pressure, and the level of personal discretion over jobs tasks. It also relates to the extent to which a job requires specific skills and the opportunities it offers to maintain and develop them. These elements have also been referred to as objective intrinsic characteristics of work (Muñoz de Bustillo *et al*. 2011b). The environment in which work is carried out relates to the conditions under which a job is performed and the manner in which they affect one's working life and interact with the non-working life. It covers physical and health-related risk at the workplace as well as social aspects, such as the prevalence of social relationships at work or experiences of adverse social behaviour. Related to this are the length and type of working hours, but also the forms of participation in workplace decisions and possibilities with regard to establishing a work-family balance. The security, opportunities and rewards provided by a job relate to elements such as contract type, possibilities for career advancement, and pay.

It is generally acknowledged that jobs are affected by wider trends such as globalization, technological change, and (associated) changes in the sectoral composition of the economy (e.g. Gallie 2007; Kalleberg 2009; Fernández-Macías 2012). Technological change has, for instance, lead to increased control over the labour process, thereby reducing the discretion enjoyed by

employees and increasing the pace of work (Green and McIntosch 2001). The relatively recent rise of the gig economy has generally offered workers more flexibility and autonomy, but is also associated with low pay and irregular working hours (Wood *et al*. 2019). In general, it might be useful to think of these factors in a framework of the demand for and supply of certain types of workers. While processes like automation and offshoring affect the demand for certain occupations and related skills (Ottaviano *et al*. 2013; Goos *et al*. 2014), processes such as the expansion of higher education affect the supply of skills found amongst the labour force (Ansell and Gingrich 2018). These dynamics have also been described as the 'race between education and technology' (Goldin and Katz 2008). The aforementioned studies have moreover shown that the effects of these factors are mediated by national institutions and policies, such as contract types, legal and social protection, representation, regulations on working hours, possibilities for training, and the provision of care. This study focuses on the supply side and concentrates on policies that have been discussed in relation to the literature on social investment specifically.

2.2 Previous studies on social investment and job quality

Social investment has been presented as a new perspective for the welfare state concerned with preparing, supporting and equipping individuals to participate in the knowledge economy and respond to the new social risks associated with it (Morel *et al*. 2012). Accordingly, it has been associated with policies that create, mobilise and preserve human capital (Palier *et al*. 2022; also see: Hemerijck 2017). Specific policies that have been considered in empirical work include: education, active labour market policies (ALMPs), early childhood education and care (ECEC), and home-help and care for the elderly and incapacitated (Bonoli 2013; Kvist 2013; Kuitto 2016; Bakker and Van Vliet 2022).

While there are several empirical studies on the redistributive and employment effects of social investment (e.g. Nelson and Stephens 2012; Van Vliet and Wang 2015; Sakamoto 2021; Bakker and Van Vliet 2022), there has been scant attention for the quality of employment realised through government effort on social investment policies within the literature on social investment. Apart from Nelson and Stephens (2012), Bakker and Van Vliet (2019), and Dengler (2019), scholars have so far not tended to directly associate social investment with indicators of job quality. Nelson and Stephens (2012) were the first scholars to empirically assess the association between the quality of jobs and social investment policy interventions by analysing whether social investment policies produce more and better jobs. Using pooled time series analyses for 17 OECD countries over the period 1972-1999 they examine the effect of various

policies related to the social investment strategy on employment in knowledge-intensive services. Specifically, they analyse whether spending on ALMPs, ECEC, and education and educational attainment is related to the share of employment in knowledge-intensive sectors, which they consider to be a useful measure of job quality, because jobs in these sectors "involve higher levels of workplace autonomy and relatively high wages" (p. 212). Nelson and Stephens find support for their theoretical expectation that the accumulation of human capital is associated with the expansion of good quality jobs and, moreover, show that social investment policies are positively associated with literacy skills of the adult population.

While the analysis by Nelson and Stephens (2012) constitutes a relevant contribution to examine the channel through which social investment policies affect the stock of human capital and thereby potentially result in higher employment levels and better quality jobs, their measure of the quality of employment has several limitations. Most importantly, the dimensions they identify (i.e. autonomy and wages) cover a limited selection of the different dimensions generally associated with job quality. In addition, it is questionable whether all the sectors classified as knowledge-intensive by Nelson and Stephens (2012) are actually characterised by high levels of autonomy and high wages.[5] While post and telecommunications, financial intermediation, and renting of machinery and equipment and other business activities are the sectors that have seen the greatest diffusion of ICT and consequently experienced the highest contribution of ICT to value-added growth (Wren 2013), the other predominantly face-to-face service sectors they include have experienced much lower value added growth following the ICT revolution. Moreover, studies have shown that while ICT can increase autonomy by increasing work scheduling and decision-making autonomy, it can simultaneously decrease autonomy through increased managerial control and its constant availability (Wang *et al*. 2020). Furthermore, sectors like education, health and social work are characterised by public provision and hence associated with different wage dynamics than other service sectors found in the private sector. In short, it is questionable whether relative growth of the knowledge-intensive sectors identified by Nelson and Stephens (2012) entails better job quality in practice.

Although Bakker and Van Vliet (2019) mainly analysed the association between effort on social investment policies and the level of employment, they also examined the relationship with indices of job quality. Using the European Job Quality Index (Leschke and Watt 2014) and a newly constructed relative job index based on data from the OECD job quality framework,

[5] Nelson and Stephens include the following sectors: transport (over water and by air; NACE Rev. 1.1 sections 61 and 62), post and telecommunications (64), financial intermediation (65-67), real estate (70), renting of machinery and equipment and other business activities (71-74), education (80), and health and social work (85).

they find positive correlations between average expenditures on a selection of multiple social investment policies over the period 1990-2010 and levels of job quality in 2010.

Unlike Nelson and Stephans (2012) and Bakker and Van Vliet (2019), who focus on the effect of different social investment policies, Dengler (2019) studies the effectiveness of one specific type of social investment policy, ALMPs, on various dimensions of job quality. Using administrative data from Germany, she finds that participation in One-Euro-Jobs (a publicly subsidised employment programme for recipients of unemployment assistance), classroom training, in-firm training, and vocational training increase the probability of holding a high-quality job. The different dimensions of job quality she considers include earnings, stability, type of employment (regular vs. atypical), and working conditions (classified as 'occupational exposure' and related to the physical work environment, work intensity, working time, and the social work environment).

2.3 Linking social investment policies to job quality

Despite the limited number of studies that empirically assess the relationship between social investment and job quality, there are several theoretical underpinnings linking human capital development following social investment policy interventions to better job quality. The associated mechanisms are strongly connected to the emergence of knowledge economies over the past decades. A knowledge economy can be defined as an economy that has "a greater reliance on intellectual capabilities than on physical inputs or natural resources" (Powell and Snellman 2004, p. 201). Such an economy is characterised by and, moreover, requires high levels of knowledge production and dissemination. Relevant policies in that regard include policies that invest in human capital. This study focuses on education, ECEC, and ALMPs specifically. These policies affect the stock of human capital found within a country. At the same time, the labour market asks for specific skills in order to participate. The interaction between this supply of skills, on the one hand, and the demand for skills, on the other hands, results in specific labour market outcomes observed within the knowledge economy, such as the types of jobs and their working conditions.

The role of education has become centre stage in today's knowledge economies, particularly as a result of technological change. It has traditionally been argued that technological change is skill-biased and thereby favours high-skilled workers in particular. Throughout the last two decades this thesis has been challenged, particularly following the introduction of the 'routine-biased technological change' hypothesis by Autor *et al*. (2003). In line with this hypothesis, several studies have shown that technology functions as a substitute

for routine jobs in which workers perform routine manual and cognitive tasks, whereas it complements (high-skilled) workers performing analytical activities and (low-skilled) workers providing interpersonal services (Spitz-Oener 2006; Oesch and Rodríquez-Menés 2011; Goos *et al*. 2014; Van Vliet *et al*. 2021). Technological change is therefore not only associated with employment growth in high-skilled occupations, but in low-skilled occupations as well and thereby leads to polarization instead of general upskilling of the labour force (see, however: Fernández-Macías 2012; Oesch and Piccitto 2019; Fernández-Macías and Hurley 2019).

Such a rapidly changing environment characterised by an increasing demand for skills asks for investments in education and training in order to expand the size of the stock of human capital as well as its quality (Van Vliet *et al*. 2021; Garritzmann *et al*. 2022). This holds particularly for middle-skilled workers who, without additional education or training, would be better suited to less complex (i.e. low-skilled tasks) that are, moreover, associated with worse working conditions such as involuntary part-time work (Peugny 2019; Van Doorn and Van Vliet 2022). In short, adequate education policies could improve workers' skills and thereby help them meet the demands of the knowledge economy and realise better employment outcomes. Put differently, investments in education and training can be expected to help individuals attain better quality jobs.

Other policies that are known to affect the quality of the stock of human capital concern education and care policies at the early stage of childhood. There is a wide array of empirical studies that provides evidence for positive effects of ECEC on children's development and outcomes at later ages (see Van Huizen and Plantenga (2018) for a meta-analysis). The main reason for this is related to the complementarity of investments in human capital over the life-course (Cunha and Heckman 2007; Hemerijck 2017). Skills acquired during early stages of the life-course through ECEC programmes increase the productivity and effectiveness of subsequent investments in skills, such as compulsory schooling and ensuing education. The provision of ECEC policies is therefore likely to accommodate the creation and development of skills that are demanded and rewarded by today's knowledge economies, and therefore related to better quality jobs.

Similar mechanisms can be expected in relation to the provision of certain ALMPs. ALMPs are generally concerned with investing in human capital and stimulating employment (Bonoli 2010). Policies that score high on both dimensions and thereby clearly reflect social investment aspects are placement services, counselling, job-search programmes and training. Based on an extensive meta-analysis, Card *et al*. (2018) conclude that ALMPs are generally associated with positive employment effects, including the quality of the job in terms of

earnings. Most studies, are, however, focused on the probability of (re)employment and associated earnings rather than the effects on other dimensions of job quality. Dengler (2019) constitutes an exception as she studies the effects of participation in different ALMPs in Germany on additional dimensions of job quality, including the working conditions of the job. She finds positive effects for the publicly subsidised One-Euro-Jobs programme and different forms of training. Hence, investments in ALMPs are likely to help individuals find better jobs and thereby improve overall job quality.

3. Data and measures

3.1 Existing indicators and frameworks

There are numerous comparative indicators and indices with regard to job quality (see Muñoz de Bustillo *et al*. (2011b) and Hauff and Kirchner (2022) for an overview), but most of the existing measures have limitations that restrict the extent to which job quality can be measured and compared over time. Most notably, the different contributions leave out relevant dimensions of job quality (such as wages, e.g. Fernández-Macías *et al*. 2014), include procedures instead of outcomes (such as collective interest representation, e.g. Leschke and Watt 2014; Piasna 2017), provide a system of indicators rather than a composite index (e.g. Green *et al*. 2013), or are available for a single or limited number of cross-sections (e.g. Erhel *et al*. 2012; Fernández-Macías *et al*. 2014; Cascales Mira 2021), which limits the extent to which they can be used to analyse the development of job quality over time. For that reason this study constructs its own job indices.

The main data source with regard to job quality at the European level concerns the European Working Conditions Survey (EWCS), which has been conducted at 5-year intervals by the European Foundation for the Improvement of Living and Working Conditions (Eurofound) since 1990.[6] This survey is commonly used by scholars interested in job quality as it provides a nationally representative sample of employees and self-employed persons in all EU and candidate member countries. Instead of completely creating indices from scratch, the jobs quality indices used in this study build on existing efforts: the Eurofound job quality framework (Eurofound 2012; 2017; 2021) and the OECD job quality framework (OECD 2014; Cazes *et al*. 2016), which provide multiple indicators for measuring and assessing job quality.[7]

[6] The exact waves correspond with 1990/1991, 1995/1996, 2000/2001, 2005, 2010, 2015. The seventh wave that was started in 2020 was not completed as face-to-face interviews were canceled amidst the COVID-19 pandemic. In 2021 telephone surveys have been conducted instead, but the data have not been released yet.

[7] See Antón *et al*. (2022) for a very recent example of a study that uses three dimensions from Eurofound's framework in a similar manner as this study to assess the affect of robot adoption on job quality.

The main advantage of these frameworks is that they are theoretically grounded, based on data available through the EWCS and, moreover, adopt a long-term perspective in order to monitor trends over time.

The latest version of Eurofound's job quality framework is based on seven dimensions: earnings, prospects (the likelihood of losing one's job and opportunities for career advancement), skills and discretion (the extent to which the job requires skills, indicated by aspects such as having to solve unforeseen problems and carrying out complex tasks, the access to training to developed these skills as well as the discretion enjoyed in applying them), work intensity (the level of work demands in the job), the physical environment (physical risks encountered at the workplace), the social environment (the extent to which workers experience supportive social relationships as well as adverse social behaviour at the workplace), and working time quality (the extent to which workers have long working hours, atypical working hours as well as their discretion over working time arrangements and the flexibility enjoyed with regard to working hours in order to realise a work-life balance) (Eurofound 2012; 2017). The OECD job quality framework is based on three dimensions: earning quality (a measure of hourly earnings across different parts of the earnings distribution), labour market security (a function of the risk of becoming unemployed and the level of insurance provided against unemployment), and the quality of the working environment, which is defined as the level of job strain experienced (having too many job demands vis-à-vis job resources) (OECD 2014).[8]

3.2 Constructing job quality indices

While the Eurofound and OECD job quality frameworks provide useful indicators with regard to job quality, they provide a system of indicators and not a composite index. This study aggregates data on the different dimensions of these frameworks into a composite index in line with the steps outlined in Muñoz de Bustillo *et al*. (2011a).[9] Data from the OECD job quality framework is available since 2005, whereas data on some of the dimensions of Eurofound's job quality framework extends back to 1995. It should, however, be noted that as a result of changes in the underlying questionnaires, not all items used to construct the dimensions are included in the different waves of the EWCS. Several questions used in the dimensions have been added over time, whereas others have disappeared. Similarly, the question related to earnings uses

[8] Job demands concern physical health risk factors, long working hours, and inflexibility of working hours, whereas job resources cover work autonomy and learning opportunities, training and learning, and opportunities for career advancement.

[9] Data on the frameworks are available from the EWCS integrated data file, 1991-2015, which can be accessed through the UK Data Archive [SN 7363], and the OECD job quality database.

different income brackets across countries and over time and is therefore not suited for comparisons between countries and over time.

As a result, Eurofound's dimensions of earnings, prospects and the social environment cannot be included for comparisons over time.[10] Besides, consistent data on the dimension of the physical environment is available since 2005 only. While no alternative data are available with regard to job prospects and the social environment, an alternative indicator for individual earnings has been used. Earnings are measured as average gross earnings per employee in 2015 constant purchasing power standards using data from the European Commission's AMECO database. Consequently, three job indices have been created based on data of Eurofound's job quality framework: one covering all seven dimensions that is available for only a single cross-section (2015), one spanning the period 2005-2015 based on indicators for the dimensions earnings, skills and discretion, work intensity, working time quality, and the physical environment, and one based on the aforementioned dimensions except for the physical environment spanning the time period 1995-2005.[11] Although the second index comprises an additional dimension and additional items for some of the other dimensions – and thereby more accurately captures the concept of job quality – the third index is also included, given that it covers an additional two cross-sections that coincide with the period during which a so-called social investment turn can be identified in different countries throughout Europe (e.g. Kuitto 2015; Ronchi 2018).

All indicators, except for earnings, are based on normalised scores for its underlying items and measured on a 0-1 scale. The score for work intensity (a negative dimension) has been inversed by subtracting the score from 1 in order to obtain a positive item suited for aggregation. Earnings have a theoretical lower bound of zero, but can theoretically be infinite. The highest level of average earnings at the country level throughout 1995-2015 is €58,750 (in 2015 PPS). For that reason earnings are measured by dividing the observed level of country average earnings by €60,000. The resulting scores run from 0.157 to 0.979. Weighting the different dimensions concerns an essentially arbitrary decision. Although many might consider some dimensions more important than others, all dimensions are therefore given equal

[10] Indicators for the social environment and job prospects are available for 2015 only.
[11] Some of the indicators used for the index that extends back to 1995 are based on fewer items than the index available since 2005, because some of the underlying questions were not included in previous waves.

weights.[12] The weighing schemes for the three job quality indices (JQIs) based on Eurofound's job quality framework are presented in Table 1.

Table 1: Weights applied to the dimensions of Eurofound's job quality framework

	I − 2015	II − 2005-2015	III − 1995-2015
Earnings	14.29%	20%	25%
Skills and discretion	14.29%	20%	25%
Work intensity	14.29%	20%	25%
Working time quality	14.29%	20%	25%
Physical environment	14.29%	20%	
Social environment	14.29%		
Prospects	14.29%		

A drawback of the OECD job quality framework is that it includes indicators related to the conditions of the labour market and national safety nets, which are not related to objective conditions at the level of individual workers. Indicators related to the labour market security dimension are therefore excluded. The remaining indicators used, as well as the respective weights assigned to them, are presented in Table 2. Earnings quality refers to the level and distribution of earnings. The dimension skills and discretion is an unweighted average of the extent to which workers experience autonomy with regard to the execution of their activities and the extent to which they are provided with learning opportunities at work, on the one hand, and the share of workers participating in training and learning activities, on the other hand. The dimension working hours is an unweighted average of the share of workers with long working hours and the share of workers experiencing inflexibility with regard to their working hours.[13] Physical environment relates to the degree to which a job entails risks that could affect workers' health. Last, the dimension prospects captures the extent to which workers experience opportunities for career advancement.

Earnings quality is based on gross hourly wages across three terciles of the earnings distribution, with different weights for the different terciles (65%, 25% and 10%) expressed in constant PPP (Cazes *et al*. 2016). The resulting values range from $4.42 to $31.43.[14] To obtain an indicator suited for aggregation the values were normalised by subtracting the minimum

[12] Sensitivity analyses in Muñoz de Bustillo *et al*. (2011a) moreover show that individual country scores are robust to alternative aggregation and weighting methods given the high correlations that exist between the individual dimensions.

[13] Long working hours are defined by the OECD as working more than 50 hours per week.

[14] For some countries data on earnings quality is based on survey rather than administrative data and hence not available on a yearly basis. In that case data for adjacent years is used (e.g. earnings quality based on the 2006 or 2014 Structure of Earnings Survey for 2005 or 2015).

value observed across the different cross-sections of data and dividing by the difference between the minimum and maximum amounts. This yields a score running from 0 to 1. Since the OECD indicators on physical risks and working hours are negatively phrased items, they have been inversed by subtracting the scores from 1 in order to obtain a positive item suited for aggregation.

Table 2: Weights applied to the indicators of the OECD's job quality framework

	Dimension	Subdimension
Earnings quality	20%	
Skills and discretion	20%	
Work autonomy and learning opportunities		10%
Training and learning		10%
Working hours	20%	
Long working hours		
Inflexibility of working hours		10%
Physical environment	20%	10%
Prospects	20%	

Despite differences in the number of dimensions included, the three job quality indices based on Eurofound's job quality framework are strongly correlated: the correlation coefficients are larger than 0.95 and significant at the 99% confidence level. The indices based on Eurofound's framework are also strongly correlated with the index based on the OECD job quality framework: the correlation coefficients are larger than 0.92 and significant at the 99% confidence level (see table A1 in the appendix). This suggests that the trade-off between the use of more indicators and dimensions vis-à-vis the availability of more cross-sections of data only marginally affects the extent to which the resulting indices measure the concept of job quality. For that reason, the descriptive analyses that follow mainly concentrate on JQI Eurofound III available for the period 1995-2015, because it provides the largest coverage in terms of countries and years.

4. Empirical analysis

4.1 Descriptive analysis

Table 3 presents country rankings based on their scores on the different indices over the period 1995-2015 (detailed information with country scores and summary statistics by job quality index is available in the appendix – see tables A2-A5). Even though the exact scores, developments and resulting ranks somewhat vary based on the index studied, a number of

patterns can be identified. It is possible to distinguish broad groups of countries in terms of job quality. The highest levels of job quality are observed in the Benelux countries, Nordic countries, and Switzerland. These countries are followed by a group of countries with intermediate levels of job quality, which comprises the British Isles (Ireland and the UK),

Table 3: Rankings of countries by job quality index score and year

JQI Eurofound I	JQI Eurofound II			JQI Eurofound III					JQI OECD		
2015	2005	2010	2015	1995	2000	2005	2010	2015	2005	2010	2015
LU	LU	LU	LU	LU	LU	LU	LU	LU	DK	DK	DK
BE	CH	DK	BE	NL	NL	CH	BE	BE	LU	NL	NO
CH	NL	BE	NL	BE	DK	BE	DK	NL	BE	NO	LU
DK	BE	NL	CH	DK	BE	NL	NL	CH	NL	LU	NL
NO	NO	NO	DK	DE	AT	NO	NO	DK	NO	BE	BE
IE	IE	FI	FI	FR	DE	DK	FI	FI	SE	FI	FI
NL	DK	AT	AT	IT	FR	IE	AT	FR	FI	SE	DE
FI	FR	IE	NO	FI	FI	FR	IE	AT	AT	DE	AT
AT	SE	SE	DE	SE	SE	FI	SE	NO	UK	AT	SE
UK	AT	UK	FR	IE	IT	SE	FR	DE	DE	IE	UK
DE	FI	FR	IE	ES	UK	AT	UK	IE	FR	UK	FR
SE	UK	DE	SE	AT	IE	UK	DE	SE	IE	FR	IE
MT	IT	IT	UK	UK	ES	IT	IT	UK	IT	IT	IT
FR	DE	ES	IT	PT	SI	DE	ES	IT	SI	ES	ES
SI	MT	PT	EE	GR	PT	HR	MT	EE	ES	SI	SI
IT	HR	MT	MT		MT	MT	PT	MT	CZ	PT	EE
EE	ES	EE	SI		EE	ES	EE	SI	EE	PL	CZ
PT	PT	SI	CZ		CZ	PT	SI	ES	GR	CZ	PT
ES	EE	LV	ES		HU	SI	LV	CZ	SK	SK	PL
CZ	SI	CZ	PT		CY	EE	CZ	SK	PT	EE	LV
LT	CY	LT	SK		GR	CY	LT	PT	PL	GR	SK
BG	LV	PL	LT		SK	LV	PL	LT	LV	HU	LT
HR	CZ	HR	LV		PL	LT	HR	PL	LT	LV	HU
SK	LT	SK	PL		LT	HU	SK	LV	HU	LT	GR
HU	PL	CY	HR		LV	PL	CY	HR			
LV	HU	HU	HU		BG	CZ	HU	HU			
PL	SK	GR	BG		RO	SK	GR	BG			
CY	GR	BG	CY			GR	BG	CY			
RO	BG	RO	GR			BG	RO	GR			
GR	RO		RO			RO		RO			

Notes: Data for countries that joined the EU with the 2004 and 2007 enlargements is available since 2000 under the Eurofound framework. Data for Croatia, Norway and Switzerland is available since 2005 under the Eurofound framework, but Switzerland is not included in 2010.
Data under the OECD framework is not available for Bulgaria, Croatia, Cyprus, Malta, Romania, and Switzerland.

countries from continental Europe (Austria, Germany, France), and Italy. The last group of countries with relatively low levels of job quality includes all of Southern, Central and Eastern Europe. This group could potentially be divided into two, because Spain, Portugal, Malta, Estonia, Slovenia, and to some extent Czechia score somewhat higher than the other countries found across these regions.

Besides these differences in the level of job quality, differences exist with regard to the development of job quality over time as well. Overall, job quality has increased, whereby increases observed in new EU member states (EU-13) are generally larger than increases in traditional EU member states (EU-15), thereby resulting in less variation in levels of job quality over time. This is probably the result of catchup and increasing European integration. Despite this pattern of upward convergence there are some signs of divergence among countries with relatively low levels of job quality. While countries such as Bulgaria, Czechia, Estonia, Latvia, Lithuania, Poland, Slovakia and Slovenia experienced relatively large increases, other countries like Croatia, Cyprus, Greece, Hungary, and Romania have seen a stagnation of increases in job quality or even experienced decreases. Moreover, the variance in levels of job quality has slightly increased between 2010 and 2015. This seems to be mainly caused by decreasing levels of job quality in some of the countries that were hit particularly hard by the economic crisis of 2008 and experienced fierce austerity in its aftermath, such as Greece, Portugal, and Spain, whereas most other countries continued to experience increases in their level of job quality.

4.2 Statistical analysis: correlations

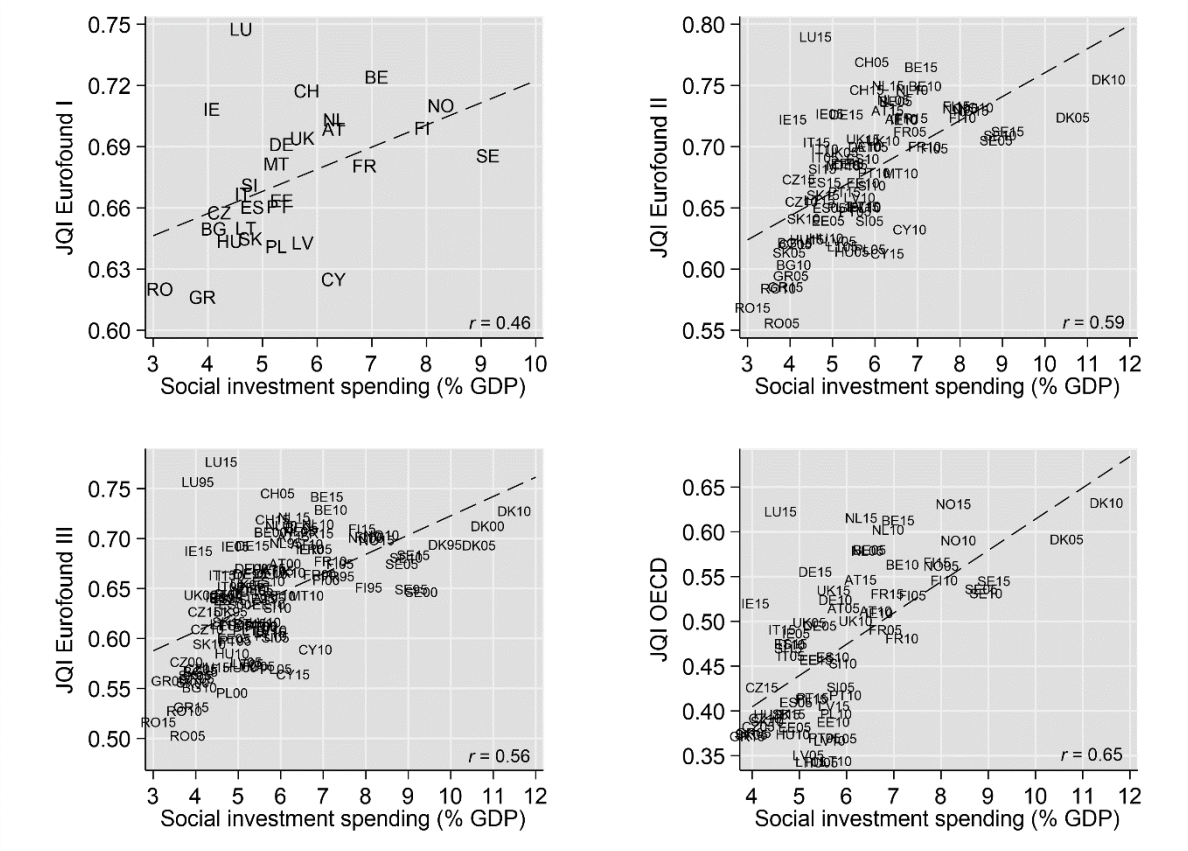
In order to examine whether social investment is associated with better jobs, the association between job quality and government's effort on social investment policies is tested statistically. Effort on social investment is measured as total expenditure on the previously discussed social investment policies as a percentage of GDP. The policies included are: government expenditure on primary, secondary and tertiary education (ISCED 1997 categories 10-60 and ISCED 2011 categories 1-8) and public expenditure on early childhood education and care (ECEC) and home help and accommodation services for families (SOCX categories 5-2-1 and 5-2-2), and social-investment oriented ALMPs (PES, employment incentives, supported employment and rehabilitation, and start-up incentives).[15] The indicators are adopted from Van Vliet *et al*. (2021)

[15] Expenditure on early childhood education and care predominantly consists of expenditure on pre-primary education. These data are not included for all years in the OECD social expenditure (SOCX) database (in most cases not before the introduction of ISCED 1997; Adema and Fron 2019). The OECD SOCX data has therefore been supplemented with data from alternative sources to create consistent series over time. For the sake of comparability, the correction for the age of entry into primary education using enrolment rates to obtain

who transformed ESSPROS data for non-OECD countries (Bulgaria, Croatia, Cyprus, Malta and Romania) into the SOCX format to enable consistent comparisons between all EU and OECD countries.

Given the relatively small number of observations for the different job quality indices, the analyses are executed using bivariate correlations. Figure 1 provides scatterplots and corresponding correlation coefficients for the four job quality indices and government spending on social investment policies.[16] The correlations presented in Figure 1 show that there is a relatively strong positive association between expenditure on social investment policies and the level of job quality. All correlations are significant at the 99% confidence level, except for the correlation using the index based on Eurofound's framework that is only available for 2015.

Figure 1: Correlations of job quality indices and social investment



expenditure corresponding to all children under the age of 6 (Adema and Fron 2019, pp. 10-11 and 48-49) is also undone, because expenditures on primary education are also included in our measure (see Van Vliet *et al*. 2021 for more details). Incorporating this correction implemented by the OECD would lead to the exclusion of expenditures on pre-primary education for 6-year-olds in certain countries and include expenditures on primary education for 5-year-olds twice in others.

[16] The four scatterplots in Figure 1 are also available individually in the appendix – see figures A1-A4.

The corresponding correlation coefficient is somewhat weaker and significant at the 95% confidence level, which is most likely the result of the substantially lower number of observations as this index is available for only a single cross-section. The presented correlations provide support for the hypothesis that generous effort on social investment policies may result in relatively higher levels of job quality.

Nevertheless, these correlations concern a rather basic analytical strategy that is able to capture only part of the underlying mechanisms. As the scatterplots indicate, Nordic countries are for instance the most generous spenders on social investment, but do not realise the highest levels of job quality. Other countries that devote considerably less resources to social investment, such as Ireland, the UK and the Benelux countries, attain similar or even higher levels of job quality. This shows that other factors matter as well. For that reason additional analyses have been conducted.

4.3 Statistical analysis: regressions

In order to test whether the positive correlations are not the result of other factors regression models are estimated. Since this study is interested in the question whether high expenditures on social investment policies are associated with high levels of job quality, the models simply pool all country-year observations. I aim to control for the broad trends discussed in the theoretical section. First, I control for the rise of the knowledge economy, which has been treated as a main driver of changes in job quality. The knowledge economy is measured as employment in knowledge-intensive sectors (KIS) as a share of total employment following Wren (2013) using data from the EU KLEMS database (Stehrer *et al*. 2019).[17]

Subsequent models control for wider trends that accommodate the rise of the knowledge economy and that are known to affect contemporary labour markets and individual jobs. Specifically, I control for deindustrialization, economic globalization, and the expansion of

[17] Using the 2009 EU KLEMS release (O'Mahony and Timmer 2009), Wren (2013) identified finance (NACE Rev. 1.1 sector J), business services (sector K), and transport and communications (sector I) as dynamic service sectors with relatively high levels of ICT intensity, rates of productivity growth, and international trade. Employment in these sectors has subsequently been used as an indicator of the knowledge economy (e.g. Hope and Martelli 2019), but these data are available up to 2007 only following the replacement of the NACE Rev. 1.1 industry classification by NACE Rev. 2 from 2008 onwards. The latest EU KLEMS release (Stehrer *et al*. 2019) provides data according to NACE Rev. 2 since 1995, but as a result of the new classification, the sectors identified by Wren (2013) are not identically available through NACE Rev. 2. NACE Rev. 1.1 sectors I, J, and K broadly correspond with NACE Rev. 2 sectors H, J, K, L, M, and N. My measure of knowledge-intensive employment does not include sectors H and L, because Wren (2013, Table 1.2) explicitly identifies financial intermediation (which excludes section 70 'real estate activities' of NACE Rev. 1.1 sector K and which corresponds with NACE Rev. 2 sector L) and post and telecommunications (which covers section 64 'post and telecommunications' of NACE Rev. 1.1 sector I only, thereby excluding sections 60 to 63, which concern transportation and storage and correspond with NACE Rev. 2 sector H) as sectors in which ICT capital contributed most to valued added growth.

ICT. Deindustrialization is measured following Iversen and Cusack (2000) using EU KLEMS sectoral employment data.[18] Economic globalization is measured using the KOF index of economic globalization, which captures both *de facto* and *de jure* aspects of trade and financial globalization (Gygli *et al*. 2019). ICT expansion is measured as gross fixed capital formulation (GFCF), or simply investments, in computing equipment, communications equipment, and computer software and databases available from the EU KLEMS database (Stehrer *et al*. 2019) and expressed as a percentage of GDP.

The results obtained by regressing scores for the four job quality indices on social investment expenditure while controlling for the aforementioned factors are presented in tables A6.1-A6.4 of the appendix.[19] The results of main interest, the coefficient estimates for social investment spending, are summarised in Figure 2. As the figure indicates, all models yield positive coefficient estimates for expenditures on social investment policies as a share of GDP. Except for the estimates obtained in relation to JQI Eurofound I, which is available for 2015 only and therefore based on a rather low number of observations (23 to 28), all estimates are statistically significant. The statistical significance of these coefficient estimates is not affected by the inclusions of indicators that capture growth of the knowledge economy, deindustrialization, globalization, and the expansion of ICT. Overall, the models provide robust evidence for a positive association between expenditure on social investment policies and job quality.[20]

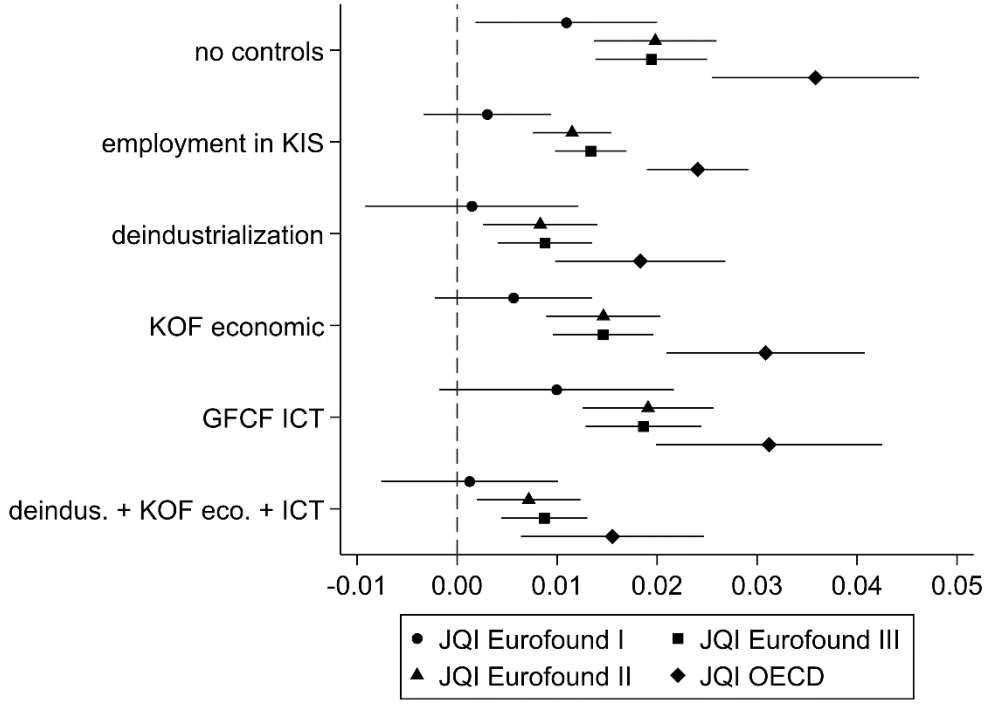
As the measure of spending on social investment policies combines expenditures on different policies, the preceding analyses do not provide any results with regard to the relative importance of specific policies. Moreover, the obtained associations may be driven by other factors that are concealed when using expenditures as a share of GDP, which is known to be sensitive to various factors, including a country's demography, overall wealth, and fluctuations in GDP. The analysis has therefore been expanded by estimating separate models for the three social investment policies discussed here using adjusted spending measures. Since policy expenditures are to a large extent driven by need, I follow previous work and use indicators that

[18] Specifically, the share of employment in NACE Rev. 2 sectors A (agriculture, forestry and fishing) and C (manufacturing) is subtracted from 100 to obtain an indicator of the extent to which the economy is deindustrialized.

[19] The models additionally include a dummy variable that captures a break in expenditures on pre-primary education applicable to some countries following the introduction of ISCED 2011. For these countries it is not possible to distinguish between expenditure on ISCED 2011 levels 01 (early childhood educational development; generally targeted at children below the age of 3 and not included in ISCED 1997) and 02 (pre-primary education).

[20] Further analyses that additionally control for GDP per capita (available upon request) show that the obtained results are also not affected when incorporating this indicator as a proxy for the state of the economy or wealth of a country.

Figure 2: Coefficient estimates and 95% confidence intervals for regressions of job quality on social investment spending by JQI and regression model



account for demographic and economic conditions (Van Vliet *et al*. 2021; Bakker and Van Vliet 2022). Specifically I use expenditures on primary, secondary and tertiary education per FTE student enrolled in the respective levels for effort on education.[21] Effort on ECEC is measured as expenditures on ECEC and home help and accommodation services for families per child below the age of compulsory entry into primary education. Last, expenditures on social investment-oriented ALMPs are corrected for the number of unemployed. All indicators are expressed as a share of GDP per capita to enable comparisons across countries and over time.

The results obtained by regressing scores for the four job quality indices on the three indicators capturing government's effort on the different social investment policies while controlling for the aforementioned factors are consecutively presented in tables A7.1-A7.4, A8.1-A8.4, and A9.1-A9.4.[22] These models indicate positive associations between these three policies and job quality that are consistent with the results presented in Figure 2 and thereby lend support for the mechanisms that link social investment policies to better jobs as described in the theoretical section. Through investments in education, ECEC, and ALMPs governments

[21] Hereby enrolment data, which corresponds with the school year, has been adjusted to correspond with the fiscal year in order to align with the expenditure data. For more details, see Van Vliet *et al*. (2021).
[22] The models using effort on ECEC additionally include a dummy variable to capture the break in expenditures on pre-primary education applicable to some countries following the introduction of ISCED 2011.

are able to accommodate the creation, development, and preservation of skills that are demanded and rewarded in contemporary knowledge economies.

It has been acknowledged in the social investment literature that most policies require relatively long time horizons to reveal their outcomes, particularly when it comes to their complementarity over the life-course (Hemerijck 2017). Since the aforementioned regression models estimate the association between policy efforts and levels of job quality using data for the same year of observation, they are not able to account for temporal lags between the provision of certain policies and the associated outcomes. Within the literature on social investment it has become quite conventional to model such temporal lags using lagged variables or cumulative averages. I implement both approaches for the three social investment policies. Following Sakamoto (2021) I use 10-year lags for effort on education. Since pre-primary education precedes general education, which in most countries starts above the age of 5, I use 15-year lags for effort on ECEC. For ALMPs I use 2-year lags, because Card *et al*. (2018) found that training and policies focused on private sector employment tend to have positive effects in the medium term, which corresponds with approximately two years after completion of the programme. For education and ECEC I additionally use cumulative average efforts in line with Nelson and Stephens (2012), which are calculated by dividing the sum of yearly efforts since the first year for which data are available by the number of years up to the year in question.[23] Since expenditures on ALMPs are less likely to have reinforcing effects over the life-course – they are mainly aimed at facilitating labour market transitions – I compute lagged averages that are the average of efforts throughout the current year and the four preceding years.

The results obtained by using these two alternative measures of effort on the three social investment policies are consecutively presented in tables A10.1-A10.4 up to A15.1-A15.4.[24] Note that these analyses use the adjusted spending measures that account for demographic and economic conditions. These additional analyses predominantly function as a robustness test of the previously discussed results. The results suggest that the previously discussed estimates are robust to the use of different indicators that more adequately account for temporal lags. With regard to education all statistically significant, positive coefficient estimates are replicated. The statistically significant, positive coefficient estimates obtained for effort on ECEC are replicated

[23] Since data on education expenditure are characterised by some gaps in the 1990s, partly due to the introduction of the ISCED 1997 classification as of 1998, linear interpolation is used to fill missing values for effort on education and ECEC before calculating cumulative averages.

[24] The models using cumulative average efforts on ECEC (tables A14.1-A14.4) additionally include a dummy variable to capture the break in expenditures on pre-primary education applicable to some countries following the introduction of ISCED 2011.

in all models but one when using 15-year lags. The positive coefficient estimates for ECEC are also reproduced when using cumulative averages, although some estimates fail to reach statistical significance. For effort on social investment-oriented ALMPs all statistically significant coefficient estimates are replicated.

5. Conclusion and discussion

Job quality has figured on the European policy agenda for over twenty years. Throughout this period it has been strongly associated with policies aimed at both increasing employment and improving job quality that are now generally known as social investment policies. While several studies have addressed the question whether social investment policies are associated with more jobs, few scholars have examined whether different social investment policies are also associated with better jobs. Existing studies leave room for more fine-grained assessment of the association between social investment policies and job quality across countries and over time, because they employ a measure of job quality that only implicitly captures some of the different aspects associated with it and, moreover, assume that jobs in knowledge-intensive sectors are by definition good quality jobs (Nelson and Stephens 2012), are based on only a single cross-sectional correlation (Bakker and Van Vliet 2019), or focused on only one specific type of social investment policy within a single country (Dengler 2019).

This study therefore adopts a broader definition of job quality that covers multiple dimensions grounded in previous theoretical and empirical work, but for which data is available for multiple cross-sections of all EU member states over the period 1995-2015. Using data on different dimensions of Eurofound's job quality framework and the OECD job quality framework four new job indices are created that differ in terms of scope and time coverage. Despite these differences the resulting indices are strongly correlated. They indicate that job quality has generally risen throughout Europe. Moreover, there are signs of upward convergence as the increases found in new EU member states, which had traditionally lower levels of job quality are, on average, larger than those found in the traditional EU member states. Between 2010 and 2015 this overall trend of convergence has, however, weakened, which is probably related to the differing economic conditions observed among EU member states during this period.

Bivariate correlations show that there are positive associations between expenditures on social investment policies and levels of job quality. These findings provide support for the argument that policies aimed at improving employability and reducing skills gaps, giving higher priority to lifelong learning, and making it easier to reconcile work and family in line with the

Lisbon Strategy are able to not only create more (e.g. Nelson and Stephens 2012; Bakker and Van Vliet 2022) but also better jobs. These positive associations are further examined using regression analyses that account for broad trends that affects labour markets and jobs, including the rise of the knowledge economy, deindustrialization, globalization, and the expansion of ICT. These analyses indicate positive associations between effort on education, ECEC, and ALMPs and job quality, whereby the findings are particularly robust for effort on education and ALMPs concerned with training and employment incentives.

It should be noted that the current findings have some limitations. While the results provide support for positive associations between social investment and job quality, the applied methodology is unable to identify and test specific causal mechanisms. Other limitations are mainly related to the measurement of job quality. The indices created here use an arbitrary number of dimensions and weights. Nevertheless, the sensitivity of the results to choices with regard to these elements of aggregation seems limited, because the results are very consistent across the different indices of job quality used in this study. An additional drawback is that while the underlying items are more objective than inherently subjective measures such as job satisfaction, they are to a large extent based on individual interpretations and, more importantly, perceptions. This is particularly true for items related to perceived inflexibility with regard to working hours, risks of job loss, and opportunities for career advancement.

Furthermore, the current analysis focuses on job quality at the country level by using individual level observations aggregated using weights to guarantee national representativeness. Focusing on country averages rather than specific groups of workers might have some drawbacks, especially when considering that particularly medium-skilled persons or workers with routine manual and cognitive tasks could be expected to benefit most from social investment policies, because their jobs are mostly affected by factors such as technological change. Besides, it is also known that workers without a permanent contact have less access to policies that are likely to positively influence job quality, such as family-friendly working time-arrangements (e.g. Chung 2018). Distinguishing the job quality indices by skill level, occupation or type of contract might therefore provide a fruitful avenue for future research to reveal specific patterns of job quality and associations with social investment policies across different types of workers.

Finally, it should be noted that some of the dimensions might be more sensitive to government efforts on the policies studies here than others. While government policy can certainly affect *de jure* working hours or physical working environment, these dimensions are not directly affected by effort on the policies studied here, which are predominantly concerned

with investments in human capital. Besides, the dimensions covered here can be affected by several other policies and institutions, such as leave arrangements, minimum wages, and employment protection legislation. These caveats notwithstanding, it is possible to identify patterns from the presented data and discussed results. These seems to suggest that certain constellations of government policies, including efforts on social investment policies, are positively associated with different dimensions of job quality. In other words, an adequate package of labour market regulations, social policies and related institutions can accommodate the realisation of high quality jobs. According to this study, education, ECEC and ALMPs are among these.

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Appendices

Table A1: Bivariate correlations between JQIs

	JQI Eurofound I	JQI Eurofound II	JQI Eurofound III	JQI OECD
JQI Eurofound I	1.000			
	(30)			
JQI Eurofound II	0.959***	1.000		
	(30)	(89)		
JQI Eurofound III	0.956***	0.997***	1.000	
	(30)	(89)	(131)	
JQI OECD	0.929***	0.924***	0.921***	1.000
	(24)	(72)	(72)	(72)

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; number of observations in parentheses

Table A2: JQI Eurofound I

	2015
Austria	0.699
Belgium	0.724
Bulgaria	0.650
Croatia	0.648
Cyprus	0.625
Czechia	0.658
Denmark	0.712
Estonia	0.664
Finland	0.699
France	0.681
Germany	0.691
Greece	0.616
Hungary	0.644
Ireland	0.708
Italy	0.667
Latvia	0.643
Lithuania	0.650
Luxembourg	0.748
Malta	0.682
Netherlands	0.703
Norway	0.710
Poland	0.641
Portugal	0.661
Romania	0.620
Slovakia	0.645
Slovenia	0.671
Spain	0.661
Sweden	0.686
Switzerland	0.717
United Kingdom	0.694
EU-15 average	0.690
EU-13 average	0.649
EU average	0.671
non-EU average	0.714
Standard deviation	0.033
Coefficient of variation	0.049

Notes: The EU-15 consists of the traditional, Western, Southern, and Northern European member states, whereas the EU-13 consists of the Central and East European countries that joined the EU with the 2004, 2007 and 2013 enlargements.
Even though the UK left the EU in 2020 it is grouped under the EU-15, because during the entire period of observation it was an EU member state.
Norway and Switzerland are grouped under non-EU countries.

Table A3: JQI Eurofound II

	2005	2010	2015	change 2005-2015
Austria	0.700	0.723	0.729	0.030
Belgium	0.737	0.749	0.765	0.028
Bulgaria	0.578	0.603	0.621	0.043
Croatia	0.652	0.641	0.647	−0.006
Cyprus	0.625	0.632	0.612	−0.012
Czechia	0.620	0.655	0.673	0.053
Denmark	0.724	0.755	0.745	0.021
Estonia	0.639	0.670	0.686	0.047
Finland	0.698	0.723	0.733	0.035
France	0.712	0.700	0.723	0.011
Germany	0.685	0.700	0.726	0.041
Greece	0.594	0.605	0.585	−0.009
Hungary	0.614	0.625	0.624	0.010
Ireland	0.727	0.722	0.722	−0.004
Italy	0.691	0.698	0.703	0.012
Latvia	0.623	0.658	0.651	0.028
Lithuania	0.618	0.651	0.656	0.038
Luxembourg	0.794	0.776	0.790	−0.005
Malta	0.657	0.678	0.684	0.028
Netherlands	0.738	0.746	0.750	0.012
Norway	0.731	0.732	0.729	−0.002
Poland	0.616	0.650	0.651	0.035
Portugal	0.647	0.679	0.663	0.016
Romania	0.556	0.584	0.568	0.013
Slovakia	0.613	0.641	0.660	0.047
Slovenia	0.639	0.668	0.682	0.042
Spain	0.650	0.690	0.671	0.021
Sweden	0.705	0.709	0.712	0.007
Switzerland	0.769		0.746	−0.023
United Kingdom	0.695	0.705	0.706	0.011
EU-15 average	0.700	0.712	0.715	0.015
EU-13 average	0.619	0.643	0.647	0.028
EU average	0.662	0.680	0.684	0.021
non-EU average	0.750		0.738	−0.012
Standard deviation	0.059	0.049	0.054	−0.005
Coefficient of variation	0.088	0.072	0.078	−0.009

Notes: The EU-15 consists of the traditional, Western, Southern, and Northern European member states, whereas the EU-13 consists of the Central and East European countries that joined the EU with the 2004, 2007 and 2013 enlargements.
Even though the UK left the EU in 2020 it is grouped under the EU-15, because during the entire period of observation it was an EU member state.
Norway and Switzerland are grouped under non-EU countries.

Table A4: JQI Eurofound III

	1995	2000	2005	2010	2015	change 2000-2015
Austria	0.640	0.675	0.668	0.694	0.702	0.027
Belgium	0.695	0.706	0.711	0.729	0.742	0.035
Bulgaria		0.506	0.522	0.551	0.567	0.061
Croatia			0.625	0.600	0.603	
Cyprus		0.566	0.584	0.589	0.564	−0.002
Czechia		0.576	0.569	0.609	0.627	0.050
Denmark	0.694	0.712	0.693	0.727	0.718	0.006
Estonia		0.581	0.600	0.634	0.651	0.070
Finland	0.651	0.658	0.674	0.702	0.709	0.051
France	0.662	0.664	0.689	0.677	0.705	0.041
Germany	0.664	0.670	0.649	0.665	0.693	0.023
Greece	0.531	0.557	0.560	0.562	0.531	−0.026
Hungary		0.571	0.572	0.585	0.571	0.000
Ireland	0.640	0.641	0.692	0.689	0.687	0.046
Italy	0.661	0.644	0.652	0.662	0.663	0.020
Latvia		0.532	0.576	0.616	0.606	0.074
Lithuania		0.542	0.574	0.608	0.614	0.072
Luxembourg	0.756	0.754	0.782	0.766	0.777	0.022
Malta		0.606	0.621	0.643	0.647	0.041
Netherlands	0.695	0.713	0.707	0.714	0.721	0.008
Norway			0.700	0.703	0.698	0.698
Poland		0.545	0.569	0.603	0.608	0.062
Portugal	0.598	0.612	0.612	0.643	0.615	0.002
Romania		0.476	0.502	0.527	0.516	0.040
Slovakia		0.556	0.563	0.594	0.616	0.061
Slovenia		0.633	0.601	0.630	0.644	0.011
Spain	0.640	0.634	0.613	0.657	0.638	0.004
Sweden	0.649	0.646	0.674	0.681	0.683	0.037
Switzerland			0.745		0.719	0.719
United Kingdom	0.627	0.643	0.654	0.666	0.670	0.027
EU-15 average	0.653	0.662	0.669	0.682	0.684	0.022
EU-13 average		0.557	0.575	0.599	0.603	0.045
EU average		0.616	0.625	0.644	0.646	0.030
non-EU average			0.723		0.708	
Standard deviation		0.069	0.067	0.058	0.064	−0.005
Coefficient of variation		0.112	0.106	0.090	0.098	−0.014

Notes: The EU-15 consists of the traditional, Western, Southern, and Northern European member states, whereas the EU-13 consists of the Central and East European countries that joined the EU with the 2004, 2007 and 2013 enlargements.
Even though the UK left the EU in 2020 it is grouped under the EU-15, because during the entire period of observation it was an EU member state.
Norway and Switzerland are grouped under non-EU countries.
The EU-13 and EU averages for 2000 exclude Croatia due to a lack of data.

Table A5: JQI OECD

	2005	2010	2015	change 2005-2015
Austria	0.515	0.511	0.546	0.032
Belgium	0.580	0.563	0.613	0.033
Czechia	0.382	0.391	0.426	0.044
Denmark	0.592	0.632	0.661	0.070
Estonia	0.382	0.388	0.457	0.075
Finland	0.529	0.546	0.566	0.037
France	0.490	0.481	0.530	0.040
Germany	0.495	0.524	0.555	0.060
Greece	0.375	0.385	0.372	−0.004
Hungary	0.342	0.374	0.396	0.053
Ireland	0.486	0.509	0.520	0.033
Italy	0.461	0.474	0.491	0.029
Latvia	0.350	0.367	0.405	0.055
Lithuania	0.343	0.344	0.396	0.053
Luxembourg	0.583	0.587	0.622	0.040
Netherlands	0.579	0.602	0.615	0.037
Norway	0.562	0.590	0.631	0.069
Poland	0.369	0.396	0.413	0.044
Portugal	0.370	0.417	0.415	0.045
Slovakia	0.373	0.388	0.396	0.023
Slovenia	0.426	0.453	0.469	0.043
Spain	0.409	0.460	0.475	0.065
Sweden	0.536	0.531	0.545	0.009
United Kingdom	0.498	0.500	0.535	0.036
EU-15 average	0.500	0.515	0.537	0.038
EU-13 average	0.371	0.388	0.420	0.049
EU average	0.455	0.471	0.496	0.041
Standard deviation	0.087	0.085	0.088	0.001
Coefficient of variation	0.190	0.180	0.176	−0.014

Notes: The EU-15 consists of the traditional, Western, Southern, and Northern European member states, whereas the EU-13 consists of the Central and East European countries that joined the EU with the 2004 enlargement (except for Cyprus and Malta).
Even though the UK left the EU in 2020 it is grouped under the EU-15, because during the entire period of observation it was an EU member state. Norway and Switzerland are grouped under non-EU countries.

Table A6: Bivariate correlations between JQIs and social investment

	Social investment spending (% GDP)
JQI Eurofound I	0.455**
	(28)
JQI Eurofound II	0.594***
	(79)
JQI Eurofound III	0.558***
	(109)
JQI OECD	0.648***
	(68)

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; number of observations in parentheses

Figure A1: JQI Eurofound I and social investment

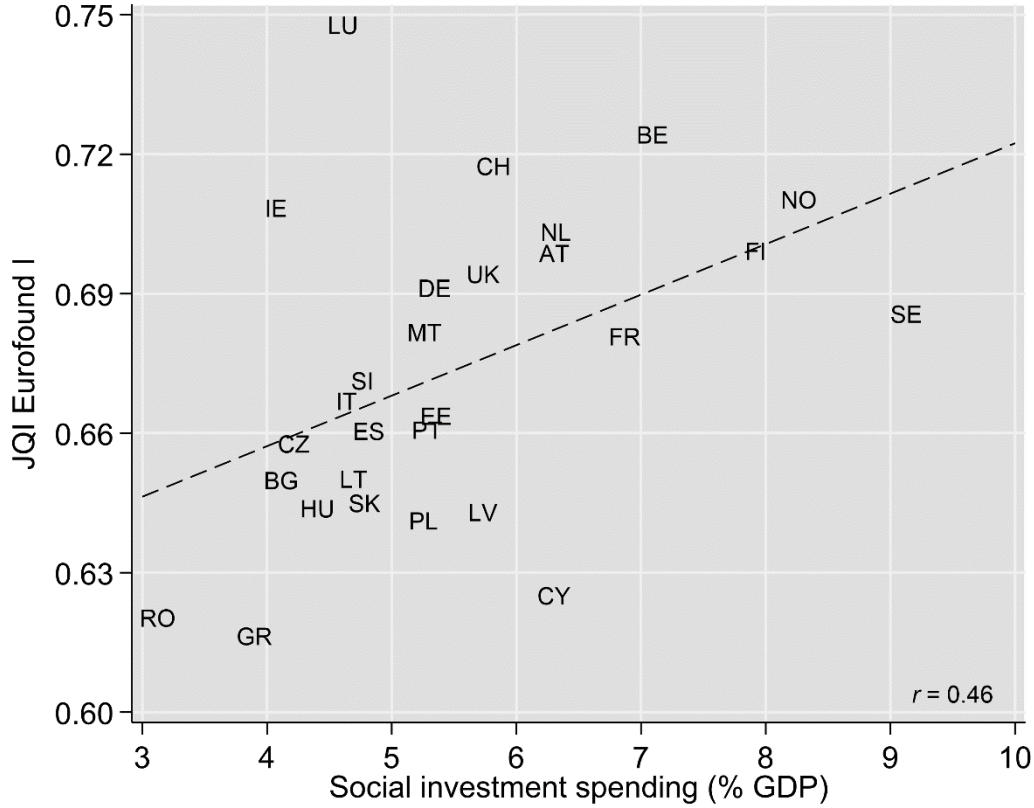

Figure A2: JQI Eurofound II and social investment

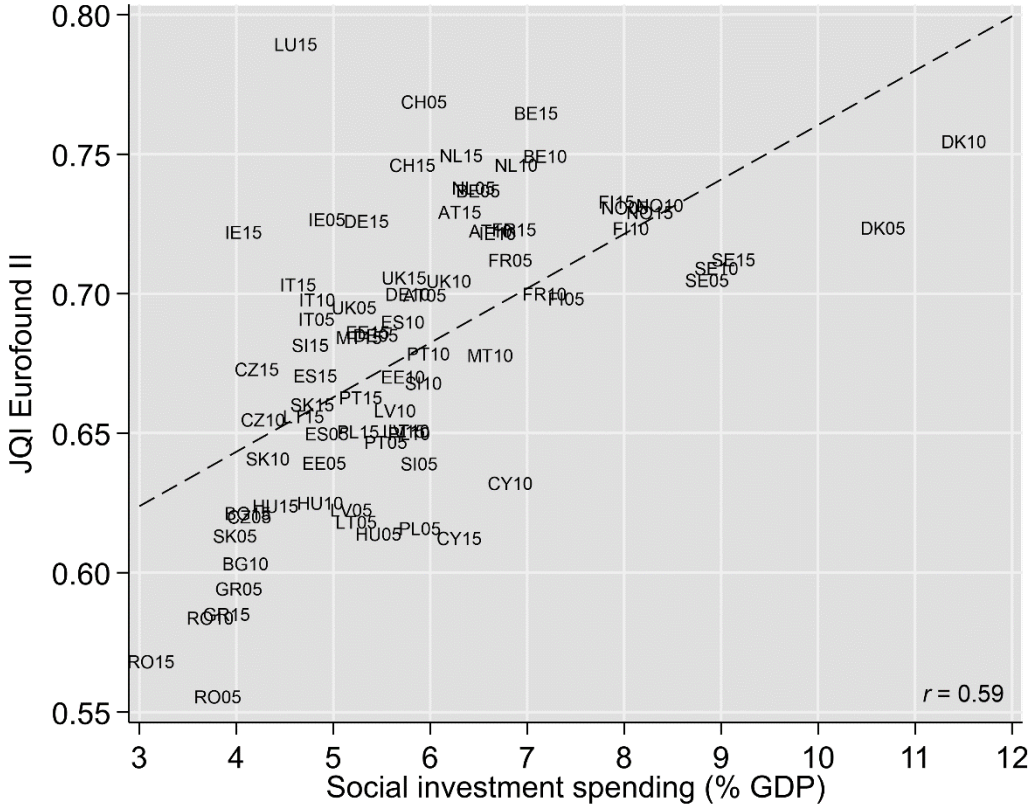

Figure A3: JQI Eurofound III and social investment

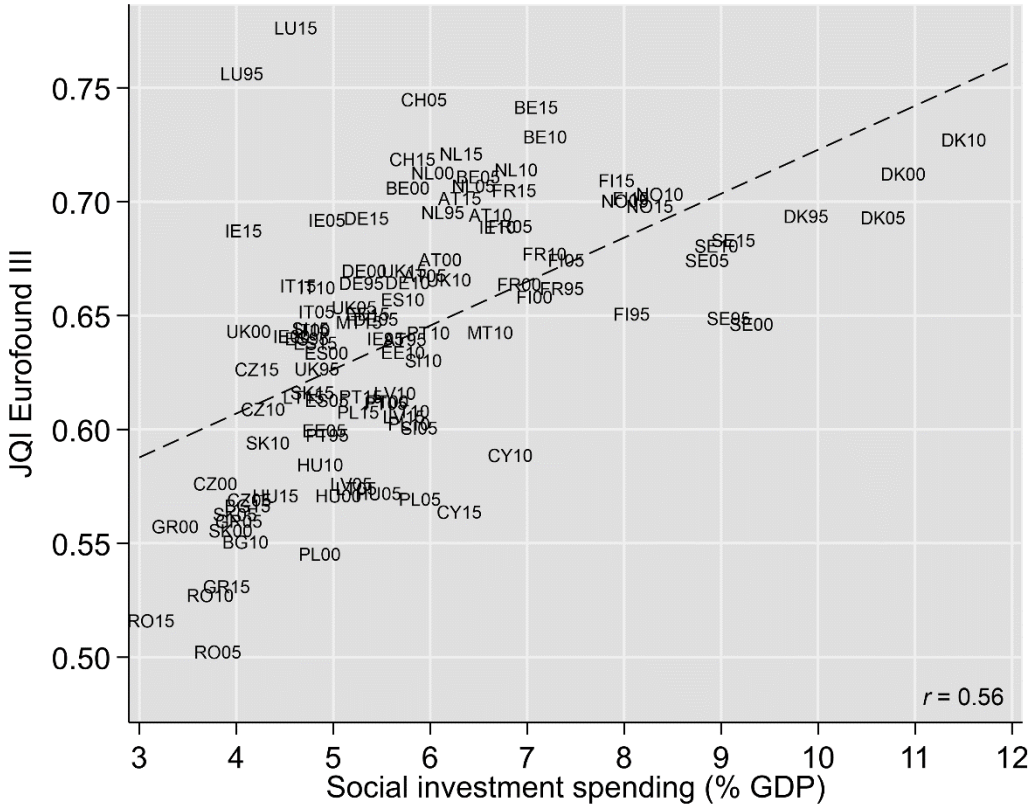

Figure A4: JQI OECD and social investment

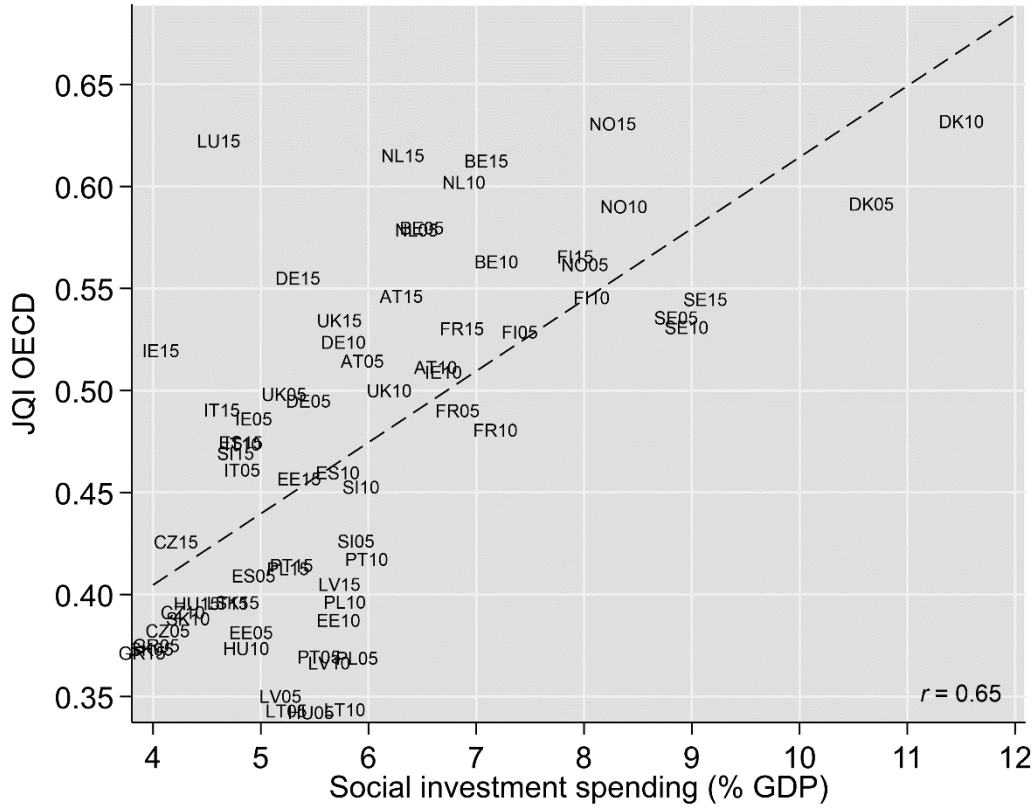

Table A6.1: Regressions of JQIs on social investment

Dependent variable:	JQI Eurofound I					
	(1)	(2)	(3)	(4)	(5)	(6)
SI spending	0.011**	0.003	0.001	0.006	0.010*	0.001
	(0.004)	(0.003)	(0.005)	(0.004)	(0.006)	(0.004)
Employment in KIS		0.005***				
		(0.001)				
Deindustrialization			0.002***			0.002**
			(0.001)			(0.001)
KOF economic				0.004***		0.003***
				(0.001)		(0.001)
GFCF ICT					−0.001	−0.006
					(0.008)	(0.005)
Constant	0.613***	0.569***	0.488***	0.360***	0.620***	0.324***
	(0.026)	(0.018)	(0.050)	(0.069)	(0.027)	(0.064)
Observations	28	26	26	28	23	23
R^2	0.207	0.715	0.399	0.507	0.187	0.682

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses; regression include a dummy to capture breaks in spending on pre-primary education following the introduction of ISCED 2011 in some countries

Table A6.2: Regressions of JQIs on social investment

Dependent variable:	JQI Eurofound II					
	(1)	(2)	(3)	(4)	(5)	(6)
SI spending	0.020***	0.012***	0.008***	0.015***	0.019***	0.007***
	(0.003)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)
Employment in KIS		0.007***				
		(0.001)				
Deindustrialization			0.003***			0.003***
			(0.000)			(0.000)
KOF economic				0.003***		0.002**
				(0.001)		(0.001)
GFCF ICT					−0.002	−0.002
					(0.007)	(0.005)
Constant	0.563***	0.501***	0.357***	0.326***	0.572***	0.276***
	(0.019)	(0.012)	(0.032)	(0.050)	(0.021)	(0.043)
Observations	79	74	74	79	64	64
R^2	0.355	0.781	0.629	0.518	0.383	0.732

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses; regression include a dummy to capture breaks in spending on pre-primary education following the introduction of ISCED 2011 in some countries

Table A6.3: Regressions of JQIs on social investment

Dependent variable:	JQI Eurofound III					
	(1)	(2)	(3)	(4)	(5)	(6)
SI spending	0.019***	0.013***	0.009***	0.015***	0.019***	0.009***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
Employment in KIS		0.008***				
		(0.001)				
Deindustrialization			0.004***			0.004***
			(0.000)			(0.000)
KOF economic				0.003***		0.002***
				(0.001)		(0.001)
GFCF ICT					−0.004	−0.006
					(0.006)	(0.004)
Constant	0.529***	0.445***	0.262***	0.288***	0.545***	0.199***
	(0.017)	(0.012)	(0.031)	(0.041)	(0.019)	(0.039)
Observations	109	104	104	109	91	91
R^2	0.311	0.744	0.628	0.499	0.335	0.708

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses; regression include a dummy to capture breaks in spending on pre-primary education following the introduction of ISCED 2011 in some countries

Table A6.4: Regressions of JQIs on social investment

Dependent variable:	JQI OECD					
	(1)	(2)	(3)	(4)	(5)	(6)
SI spending	0.036***	0.024***	0.018***	0.031***	0.031***	0.016***
	(0.005)	(0.003)	(0.004)	(0.005)	(0.006)	(0.005)
Employment in KIS		0.012***				
		(0.001)				
Deindustrialization			0.008***			0.007***
			(0.001)			(0.001)
KOF economic				0.004***		0.003**
				(0.001)		(0.001)
GFCF ICT					−0.002	0.001
					(0.012)	(0.008)
Constant	0.258***	0.128***	-0.248***	−0.063	0.290***	-0.371***
	(0.033)	(0.018)	(0.067)	(0.093)	(0.038)	(0.101)
Observations	68	65	65	68	57	57
R^2	0.426	0.877	0.706	0.523	0.386	0.700

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses; regression include a dummy to capture breaks in spending on pre-primary education following the introduction of ISCED 2011 in some countries

Table A7.1: Regressions of JQIs on education

Dependent variable:	JQI Eurofound I					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on education	0.002	−0.001	−0.000	0.001	0.002*	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.006***				
		(0.001)				
Deindustrialization			0.002**			0.001*
			(0.001)			(0.001)
KOF economic				0.003***		0.002*
				(0.001)		(0.001)
GFCF ICT					0.004	−0.001
					(0.006)	(0.005)
Constant	0.618***	0.598***	0.520***	0.395***	0.603***	0.397***
	(0.032)	(0.021)	(0.049)	(0.077)	(0.029)	(0.071)
Observations	26	24	24	26	21	21
R^2	0.102	0.618	0.305	0.365	0.218	0.537

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A7.2: Regressions of JQIs on education

Dependent variable:	JQI Eurofound II					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on education	0.005***	0.001*	0.001	0.004***	0.005***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.008***				
		(0.001)				
Deindustrialization			0.004***			0.003***
			(0.000)			(0.001)
KOF economic				0.003***		0.001**
				(0.001)		(0.001)
GFCF ICT					0.005	0.004
					(0.007)	(0.005)
Constant	0.545***	0.519***	0.361***	0.308***	0.528***	0.279***
	(0.027)	(0.018)	(0.032)	(0.053)	(0.028)	(0.044)
Observations	78	73	73	78	62	62
R^2	0.251	0.674	0.578	0.438	0.338	0.700

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A7.3: Regressions of JQIs on education

Dependent variable:	JQI Eurofound III					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on education	0.005***	0.003***	0.002**	0.004***	0.005***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.008***				
		(0.001)				
Deindustrialization			0.004***			0.003***
			(0.000)			(0.000)
KOF economic				0.004***		0.002***
				(0.001)		(0.001)
GFCF ICT					0.007	0.002
					(0.007)	(0.004)
Constant	0.502***	0.441***	0.257***	0.250***	0.490***	0.164***
	(0.024)	(0.017)	(0.032)	(0.042)	(0.025)	(0.038)
Observations	107	102	102	107	88	88
R^2	0.238	0.659	0.586	0.470	0.296	0.694

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A7.4: Regressions of JQIs on education

Dependent variable:	JQI OECD					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on education	0.012***	0.006***	0.007***	0.011***	0.010***	0.007***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Employment in KIS		0.013***				
		(0.001)				
Deindustrialization			0.008***			0.006***
			(0.001)			(0.001)
KOF economic				0.005***		0.003**
				(0.001)		(0.001)
GFCF ICT					0.001	0.003
					(0.012)	(0.008)
Constant	0.185***	0.108***	−0.300***	−0.198*	0.223***	−0.447***
	(0.050)	(0.031)	(0.068)	(0.107)	(0.051)	(0.103)
Observations	64	61	61	64	53	53
R^2	0.358	0.771	0.699	0.489	0.352	0.704

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A8.1: Regressions of JQIs on ECEC

Dependent variable:	JQI Eurofound I					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ECEC	0.001	0.002**	0.001	0.001	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.005***				
		(0.001)				
Deindustrialization			0.002***			0.002***
			(0.001)			(0.001)
KOF economic				0.004***		0.003***
				(0.001)		(0.001)
GFCF ICT					0.006	−0.006
					(0.007)	(0.005)
Constant	0.658***	0.560***	0.475***	0.333***	0.653***	0.313***
	(0.016)	(0.015)	(0.048)	(0.069)	(0.022)	(0.062)
Observations	29	27	27	29	24	24
R^2	0.075	0.733	0.439	0.518	0.069	0.693

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses; regression include a dummy to capture breaks in spending on pre-primary education following the introduction of ISCED 2011 in some countries

Table A8.2: Regressions of JQIs on ECEC

Dependent variable:	JQI Eurofound II					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ECEC	0.002**	0.002***	0.002**	0.002***	0.002*	0.001**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.008***				
		(0.001)				
Deindustrialization			0.004***			0.003***
			(0.000)			(0.000)
KOF economic				0.005***		0.003***
				(0.001)		(0.001)
GFCF ICT					0.002	−0.002
					(0.009)	(0.005)
Constant	0.654***	0.526***	0.326***	0.277***	0.652***	0.205***
	(0.013)	(0.011)	(0.034)	(0.051)	(0.020)	(0.044)
Observations	86	81	81	86	70	70
R^2	0.070	0.750	0.590	0.451	0.064	0.699

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses; regression include a dummy to capture breaks in spending on pre-primary education following the introduction of ISCED 2011 in some countries

Table A8.3: Regressions of JQIs on ECEC

Dependent variable:	JQI Eurofound III					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ECEC	0.003***	0.002***	0.002**	0.002***	0.002**	0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.009***				
		(0.001)				
Deindustrialization			0.005***			0.004***
			(0.000)			(0.001)
KOF economic				0.004***		0.002***
				(0.001)		(0.001)
GFCF ICT					0.005	−0.000
					(0.008)	(0.005)
Constant	0.613***	0.478***	0.237***	0.277***	0.607***	0.142***
	(0.011)	(0.011)	(0.034)	(0.039)	(0.018)	(0.039)
Observations	124	119	119	124	105	105
R^2	0.074	0.701	0.555	0.438	0.071	0.641

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses; regression include a dummy to capture breaks in spending on pre-primary education following the introduction of ISCED 2011 in some countries

Table A8.4: Regressions of JQIs on ECEC

Dependent variable:	JQI OECD					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ECEC	0.007***	0.005***	0.003**	0.006***	0.006***	0.003**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Employment in KIS		0.013***				
		(0.001)				
Deindustrialization			0.009***			0.008***
			(0.001)			(0.001)
KOF economic				0.006***		0.004***
				(0.001)		(0.001)
GFCF ICT					−0.012	−0.001
					(0.015)	(0.009)
Constant	0.402***	0.206***	−0.289***	−0.096	0.432***	−0.460***
	(0.021)	(0.019)	(0.073)	(0.098)	(0.033)	(0.098)
Observations	72	69	69	72	61	61
R^2	0.205	0.771	0.657	0.430	0.191	0.693

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses; regression include a dummy to capture breaks in spending on pre-primary education following the introduction of ISCED 2011 in some countries

Table A9.1: Regressions of JQIs on ALMPs

Dependent variable:	JQI Eurofound I					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ALMPs	0.001***	0.001***	0.001**	0.001***	0.001**	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employment in KIS		0.005***				
		(0.001)				
Deindustrialization			0.002***			0.002***
			(0.001)			(0.001)
KOF economic				0.003***		0.002**
				(0.001)		(0.001)
GFCF ICT					−0.001	−0.007
					(0.006)	(0.004)
Constant	0.656***	0.582***	0.500***	0.394***	0.659***	0.371***
	(0.007)	(0.010)	(0.043)	(0.059)	(0.015)	(0.059)
Observations	30	28	28	30	24	24
R^2	0.288	0.794	0.521	0.589	0.308	0.720

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A9.2: Regressions of JQIs on ALMPs

Dependent variable:	JQI Eurofound II					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ALMPs	0.003***	0.002***	0.002***	0.002***	0.003***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employment in KIS		0.007***				
		(0.001)				
Deindustrialization			0.004***			0.003***
			(0.000)			(0.000)
KOF economic				0.004***		0.002***
				(0.001)		(0.001)
GFCF ICT					−0.006	−0.005
					(0.007)	(0.004)
Constant	0.641***	0.547***	0.379***	0.348***	0.656***	0.285***
	(0.007)	(0.008)	(0.030)	(0.042)	(0.016)	(0.039)
Observations	85	80	80	85	69	69
R^2	0.429	0.825	0.704	0.645	0.424	0.789

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A9.3: Regressions of JQIs on ALMPs

Dependent variable:	JQI Eurofound III					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ALMPs	0.002***	0.001***	0.001***	0.002***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employment in KIS		0.008***				
		(0.001)				
Deindustrialization			0.005***			0.004***
			(0.000)			(0.000)
KOF economic				0.004***		0.002***
				(0.000)		(0.000)
GFCF ICT					−0.006	−0.007*
					(0.007)	(0.004)
Constant	0.605***	0.496***	0.270***	0.313***	0.620***	0.189***
	(0.007)	(0.009)	(0.031)	(0.037)	(0.016)	(0.037)
Observations	118	113	113	118	98	98
R^2	0.337	0.764	0.673	0.570	0.330	0.746

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A9.4: Regressions of JQIs on ALMPs

Dependent variable:	JQI OECD					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ALMPs	0.005***	0.003***	0.003***	0.004***	0.005***	0.003***
	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)
Employment in KIS		0.011***				
		(0.001)				
Deindustrialization			0.007***			0.006***
			(0.001)			(0.001)
KOF economic				0.004***		0.002***
				(0.001)		(0.001)
GFCF ICT					−0.011	−0.003
					(0.009)	(0.007)
Constant	0.403***	0.254***	−0.141**	0.067	0.429***	−0.230***
	(0.011)	(0.012)	(0.061)	(0.079)	(0.023)	(0.084)
Observations	72	69	69	72	61	61
R^2	0.544	0.887	0.790	0.640	0.584	0.812

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A10.1: Regressions of JQIs on education (lagged)

Dependent variable:	JQI Eurofound I					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on education$_{t-10}$	0.003**	0.001	0.001	0.002**	0.003**	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.005***				
		(0.001)				
Deindustrialization			0.002***			0.001**
			(0.001)			(0.001)
KOF economic				0.003***		0.002***
				(0.001)		(0.001)
GFCF ICT					0.007	−0.002
					(0.005)	(0.004)
Constant	0.603***	0.567***	0.496***	0.358***	0.591***	0.349***
	(0.028)	(0.022)	(0.046)	(0.066)	(0.025)	(0.057)
Observations	28	26	26	28	23	23
R^2	0.201	0.590	0.385	0.507	0.353	0.711

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A10.2: Regressions of JQIs on education (lagged)

Dependent variable:	JQI Eurofound II					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on education$_{t-10}$	0.004***	0.003***	0.002*	0.003***	0.003***	0.002***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.008***				
		(0.001)				
Deindustrialization			0.004***			0.003***
			(0.001)			(0.001)
KOF economic				0.004***		0.003***
				(0.001)		(0.001)
GFCF ICT					0.010	−0.000
					(0.007)	(0.004)
Constant	0.601***	0.499***	0.332***	0.305***	0.588***	0.173***
	(0.025)	(0.020)	(0.047)	(0.068)	(0.025)	(0.053)
Observations	65	60	60	65	52	52
R^2	0.163	0.644	0.500	0.375	0.239	0.713

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A10.3: Regressions of JQIs on education (lagged)

Dependent variable:	JQI Eurofound III					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on education$_{t-10}$	0.004***	0.003***	0.002**	0.004***	0.004***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.009***				
		(0.001)				
Deindustrialization			0.005***			0.004***
			(0.001)			(0.001)
KOF economic				0.004***		0.003***
				(0.001)		(0.001)
GFCF ICT					0.012	0.000
					(0.008)	(0.005)
Constant	0.545***	0.427***	0.229***	0.208**	0.528***	0.060
	(0.029)	(0.024)	(0.054)	(0.079)	(0.029)	(0.062)
Observations	65	60	60	65	52	52
R^2	0.184	0.642	0.518	0.384	0.267	0.716

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A10.4: Regressions of JQIs on education (lagged)

Dependent variable:	JQI OECD					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on education$_{t-10}$	0.008***	0.007***	0.006***	0.008***	0.007***	0.006***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Employment in KIS		0.014***				
		(0.001)				
Deindustrialization			0.009***			0.008***
			(0.001)			(0.001)
KOF economic				0.006***		0.004***
				(0.001)		(0.001)
GFCF ICT					0.012	0.004
					(0.012)	(0.007)
Constant	0.286***	0.076**	−0.388***	−0.148	0.287***	−0.604***
	(0.042)	(0.029)	(0.079)	(0.122)	(0.045)	(0.101)
Observations	57	54	54	57	48	48
R^2	0.302	0.810	0.725	0.446	0.319	0.779

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A11.1: Regressions of JQIs on ECEC (lagged)

Dependent variable:	JQI Eurofound I					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ECEC$_{t-15}$	0.001	0.002**	0.001	0.001	0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.005***				
		(0.001)				
Deindustrialization			0.003***			0.002***
			(0.001)			(0.001)
KOF economic				0.004***		0.003**
				(0.001)		(0.001)
GFCF ICT					0.003	−0.003
					(0.008)	(0.005)
Constant	0.670***	0.568***	0.438***	0.369***	0.665***	0.274***
	(0.013)	(0.017)	(0.068)	(0.080)	(0.020)	(0.080)
Observations	27	25	25	27	22	22
R^2	0.022	0.673	0.367	0.388	0.021	0.608

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A11.2: Regressions of JQIs on ECEC (lagged)

Dependent variable:	JQI Eurofound II					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ECEC$_{t-15}$	0.002**	0.003***	0.002*	0.002*	0.003**	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.007***				
		(0.001)				
Deindustrialization			0.005***			0.003***
			(0.001)			(0.001)
KOF economic				0.005***		0.003***
				(0.001)		(0.001)
GFCF ICT					−0.004	−0.003
					(0.009)	(0.006)
Constant	0.681***	0.544***	0.314***	0.322***	0.684***	0.138*
	(0.011)	(0.015)	(0.068)	(0.059)	(0.019)	(0.069)
Observations	60	55	55	60	50	50
R^2	0.070	0.686	0.418	0.438	0.094	0.635

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A11.3: Regressions of JQIs on ECEC (lagged)

Dependent variable:	JQI Eurofound III					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ECEC$_{t-15}$	0.002**	0.003***	0.002*	0.001*	0.003**	0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.009***				
		(0.001)				
Deindustrialization			0.006***			0.004***
			(0.001)			(0.001)
KOF economic				0.005***		0.004***
				(0.001)		(0.001)
GFCF ICT					−0.004	−0.008
					(0.009)	(0.006)
Constant	0.645***	0.488***	0.173**	0.248***	0.649***	0.053
	(0.011)	(0.016)	(0.074)	(0.056)	(0.020)	(0.070)
Observations	72	67	67	72	62	62
R^2	0.069	0.669	0.438	0.467	0.087	0.627

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A11.4: Regressions of JQIs on ECEC (lagged)

Dependent variable:	JQI OECD					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ECEC$_{t-15}$	0.006***	0.006***	0.003***	0.004***	0.006***	0.003**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)
Employment in KIS		0.012***				
		(0.001)				
Deindustrialization			0.009***			0.008***
			(0.001)			(0.001)
KOF economic				0.007***		0.004***
				(0.001)		(0.001)
GFCF ICT					−0.005	−0.000
					(0.014)	(0.008)
Constant	0.449***	0.237***	−0.296***	−0.079	0.453***	−0.509***
	(0.019)	(0.023)	(0.092)	(0.103)	(0.031)	(0.105)
Observations	56	53	53	56	49	49
R^2	0.166	0.727	0.647	0.445	0.195	0.728

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A112.1: Regressions of JQIs on ALMPs (lagged)

Dependent variable:	JQI Eurofound I					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ALMPs$_{t-2}$	0.002***	0.001***	0.001***	0.001***	0.002***	0.001**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employment in KIS		0.004***				
		(0.001)				
Deindustrialization			0.002***			0.001**
			(0.001)			(0.001)
KOF economic				0.003***		0.002**
				(0.001)		(0.001)
GFCF ICT					−0.001	−0.006
					(0.006)	(0.004)
Constant	0.652***	0.586***	0.514***	0.418***	0.657***	0.384***
	(0.007)	(0.010)	(0.042)	(0.056)	(0.014)	(0.058)
Observations	30	28	28	30	24	24
R^2	0.418	0.809	0.572	0.649	0.388	0.742

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A12.2: Regressions of JQIs on ALMPs (lagged)

Dependent variable:	JQI Eurofound II					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ALMPs$_{t-2}$	0.002***	0.001***	0.001***	0.002***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employment in KIS		0.007***				
		(0.001)				
Deindustrialization			0.004***			0.003***
			(0.000)			(0.000)
KOF economic				0.004***		0.002***
				(0.001)		(0.001)
GFCF ICT					−0.005	−0.004
					(0.007)	(0.004)
Constant	0.647***	0.549***	0.381***	0.353***	0.660***	0.277***
	(0.007)	(0.008)	(0.032)	(0.044)	(0.016)	(0.041)
Observations	84	79	79	84	68	68
R^2	0.397	0.815	0.679	0.614	0.382	0.768

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A12.3: Regressions of JQIs on ALMPs (lagged)

Dependent variable:	JQI Eurofound III					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ALMPs$_{t-2}$	0.002***	0.001***	0.001***	0.002***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employment in KIS		0.008***				
		(0.001)				
Deindustrialization			0.004***			0.004***
			(0.000)			(0.000)
KOF economic				0.004***		0.002***
				(0.000)		(0.000)
GFCF ICT					−0.006	−0.007*
					(0.007)	(0.004)
Constant	0.606***	0.498***	0.276***	0.315***	0.621***	0.190***
	(0.007)	(0.009)	(0.033)	(0.037)	(0.016)	(0.039)
Observations	116	111	111	116	96	96
R^2	0.344	0.757	0.659	0.581	0.334	0.737

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A12.4: Regressions of JQIs on ALMPs (lagged)

Dependent variable:	JQI OECD					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ALMPs$_{t-2}$	0.004***	0.003***	0.002***	0.003***	0.004***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employment in KIS		0.011***				
		(0.001)				
Deindustrialization			0.007***			0.006***
			(0.001)			(0.001)
KOF economic				0.005***		0.003***
				(0.001)		(0.001)
GFCF ICT					−0.008	−0.001
					(0.010)	(0.007)
Constant	0.412***	0.255***	−0.153**	0.058	0.433***	−0.260***
	(0.011)	(0.013)	(0.065)	(0.082)	(0.024)	(0.089)
Observations	72	69	69	72	61	61
R^2	0.504	0.868	0.761	0.610	0.536	0.786

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A13.1: Regressions of JQIs on education (cumulative averages)

Dependent variable:	JQI Eurofound I					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on education$_{cum.avg.}$	0.004***	0.001	0.001	0.002**	0.003***	0.002**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.004***				
		(0.001)				
Deindustrialization			0.002**			0.001*
			(0.001)			(0.001)
KOF economic				0.003***		0.002**
				(0.001)		(0.001)
GFCF ICT					0.004	−0.002
					(0.005)	(0.004)
Constant	0.586***	0.568***	0.500***	0.387***	0.578***	0.377***
	(0.028)	(0.021)	(0.044)	(0.062)	(0.024)	(0.058)
Observations	29	27	27	29	23	23
R^2	0.265	0.596	0.396	0.499	0.434	0.690

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A13.2: Regressions of JQIs on education (cumulative averages)

Dependent variable:	JQI Eurofound I					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on education$_{cum.avg.}$	0.006***	0.003***	0.002***	0.005***	0.006***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.008***				
		(0.001)				
Deindustrialization			0.003***			0.003***
			(0.000)			(0.000)
KOF economic				0.004***		0.002***
				(0.001)		(0.001)
GFCF ICT					0.007	0.004
					(0.006)	(0.004)
Constant	0.531***	0.491***	0.346***	0.290***	0.523***	0.246***
	(0.024)	(0.016)	(0.032)	(0.046)	(0.025)	(0.039)
Observations	85	80	80	85	68	68
R^2	0.313	0.720	0.586	0.513	0.377	0.729

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A13.3: Regressions of JQIs on education (cumulative averages)

Dependent variable:	JQI Eurofound III					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on education$_{cum.avg.}$	0.006***	0.004***	0.003***	0.005***	0.006***	0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.008***				
		(0.001)				
Deindustrialization			0.004***			0.003***
			(0.000)			(0.000)
KOF economic				0.004***		0.002***
				(0.001)		(0.000)
GFCF ICT					0.006	0.002
					(0.006)	(0.004)
Constant	0.484***	0.417***	0.245***	0.239***	0.481***	0.148***
	(0.022)	(0.015)	(0.031)	(0.039)	(0.023)	(0.035)
Observations	117	112	112	117	97	97
R^2	0.297	0.715	0.605	0.516	0.338	0.719

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A13.4: Regressions of JQIs on education (cumulative averages)

Dependent variable:	JQI OECD					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on education$_{cum.avg.}$	0.012***	0.008***	0.008***	0.011***	0.010***	0.008***
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Employment in KIS		0.013***				
		(0.001)				
Deindustrialization			0.008***			0.007***
			(0.001)			(0.001)
KOF economic				0.005***		0.003***
				(0.001)		(0.001)
GFCF ICT					0.006	0.000
					(0.011)	(0.007)
Constant	0.180***	0.062**	−0.363***	−0.194**	0.205***	−0.524***
	(0.042)	(0.024)	(0.061)	(0.091)	(0.045)	(0.080)
Observations	69	66	66	69	58	58
R^2	0.427	0.849	0.770	0.561	0.413	0.802

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A14.1: Regressions of JQIs on ECEC (cumulative averages)

Dependent variable:	JQI Eurofound I					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on $ECEC_{cum.avg}$	0.000	0.002**	0.001	0.000	−0.000	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.005***				
		(0.001)				
Deindustrialization			0.002***			0.002***
			(0.001)			(0.001)
KOF economic				0.004***		0.003***
				(0.001)		(0.001)
GFCF ICT					0.007	−0.005
					(0.007)	(0.005)
Constant	0.672***	0.557***	0.470***	0.342***	0.661***	0.314***
	(0.016)	(0.016)	(0.049)	(0.072)	(0.022)	(0.063)
Observations	29	27	27	29	24	24
R^2	0.019	0.728	0.431	0.471	0.063	0.692

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses; regression include a dummy to capture breaks in spending on pre-primary education following the introduction of ISCED 2011 in some countries

Table A14.2: Regressions of JQIs on ECEC (cumulative averages)

Dependent variable:	JQI Eurofound II					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on $ECEC_{cum.avg}$	0.001	0.002***	0.002**	0.001	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.009***				
		(0.001)				
Deindustrialization			0.004***			0.003***
			(0.000)			(0.001)
KOF economic				0.005***		0.003***
				(0.001)		(0.001)
GFCF ICT					0.007	−0.001
					(0.009)	(0.005)
Constant	0.672***	0.521***	0.318***	0.285***	0.658***	0.199***
	(0.013)	(0.012)	(0.035)	(0.053)	(0.020)	(0.044)
Observations	86	81	81	86	70	70
R^2	0.012	0.750	0.581	0.407	0.025	0.691

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses; regression include a dummy to capture breaks in spending on pre-primary education following the introduction of ISCED 2011 in some countries

Table A14.3: Regressions of JQIs on ECEC (cumulative averages)

Dependent variable:	JQI Eurofound III					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on $ECEC_{cum.avg}$	0.002***	0.002**	0.001	0.001	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Employment in KIS		0.010***				
		(0.001)				
Deindustrialization			0.005***			0.004***
			(0.000)			(0.001)
KOF economic				0.005***		0.002***
				(0.001)		(0.001)
GFCF ICT					0.008	0.000
					(0.008)	(0.005)
Constant	0.628***	0.475***	0.227***	0.281***	0.612***	0.136***
	(0.011)	(0.011)	(0.035)	(0.040)	(0.018)	(0.039)
Observations	126	121	121	126	106	106
R^2	0.020	0.701	0.549	0.402	0.036	0.633

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses; regression include a dummy to capture breaks in spending on pre-primary education following the introduction of ISCED 2011 in some countries

Table A14.4: Regressions of JQIs on ECEC (cumulative averages)

Dependent variable:	JQI OECD					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on $ECEC_{cum.avg}$	0.005**	0.005***	0.002*	0.003*	0.005**	0.002
	(0.002)	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)
Employment in KIS		0.014***				
		(0.001)				
Deindustrialization			0.010***			0.008***
			(0.001)			(0.001)
KOF economic				0.007***		0.004***
				(0.001)		(0.001)
GFCF ICT					−0.005	0.002
					(0.016)	(0.010)
Constant	0.433***	0.198***	−0.308***	−0.082	0.440***	−0.490***
	(0.023)	(0.021)	(0.074)	(0.107)	(0.034)	(0.099)
Observations	72	69	69	72	61	61
R^2	0.078	0.760	0.645	0.318	0.096	0.675

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses; regression include a dummy to capture breaks in spending on pre-primary education following the introduction of ISCED 2011 in some countries

Table A15.1: Regressions of JQIs on ALMPs (cumulative lags)

Dependent variable:	JQI Eurofound I					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ALMPs$_{t-4-t}$	0.002***	0.001***	0.001***	0.001***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employment in KIS		0.004***				
		(0.001)				
Deindustrialization			0.002***			0.001**
			(0.001)			(0.001)
KOF economic				0.003***		0.002**
				(0.001)		(0.001)
GFCF ICT					−0.002	−0.007
					(0.006)	(0.004)
Constant	0.652***	0.587***	0.520***	0.419***	0.658***	0.385***
	(0.007)	(0.010)	(0.043)	(0.060)	(0.014)	(0.057)
Observations	29	27	27	29	24	24
R^2	0.434	0.801	0.574	0.645	0.398	0.748

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A15.2: Regressions of JQIs on ALMPs (cumulative lags)

Dependent variable:	JQI Eurofound II					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ALMPs$_{t-4-t}$	0.002***	0.001***	0.001***	0.002***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employment in KIS		0.007***				
		(0.001)				
Deindustrialization			0.004***			0.003***
			(0.000)			(0.001)
KOF economic				0.004***		0.002***
				(0.001)		(0.001)
GFCF ICT					−0.004	−0.005
					(0.007)	(0.004)
Constant	0.649***	0.551***	0.382***	0.378***	0.661***	0.263***
	(0.007)	(0.009)	(0.037)	(0.047)	(0.015)	(0.047)
Observations	78	73	73	78	63	63
R^2	0.413	0.800	0.651	0.596	0.388	0.746

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A15.3: Regressions of JQIs on ALMPs (cumulative lags)

Dependent variable:	JQI Eurofound III					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ALMPs$_{t-4-t}$	0.002***	0.001***	0.001***	0.002***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Employment in KIS		0.008***				
		(0.001)				
Deindustrialization			0.005***			0.004***
			(0.000)			(0.001)
KOF economic				0.004***		0.002***
				(0.000)		(0.001)
GFCF ICT					−0.005	−0.008*
					(0.007)	(0.004)
Constant	0.609***	0.498***	0.267***	0.324***	0.623***	0.171***
	(0.007)	(0.010)	(0.037)	(0.038)	(0.016)	(0.042)
Observations	109	104	104	109	90	90
R^2	0.337	0.749	0.638	0.570	0.316	0.725

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

Table A15.4: Regressions of JQIs on ALMPs (cumulative lags)

Dependent variable:	JQI OECD					
	(1)	(2)	(3)	(4)	(5)	(6)
Effort on ALMPs$_{t-4-t}$	0.004***	0.003***	0.003***	0.004***	0.004***	0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)
Employment in KIS		0.011***				
		(0.001)				
Deindustrialization			0.007***			0.006***
			(0.001)			(0.001)
KOF economic				0.004***		0.003***
				(0.001)		(0.001)
GFCF ICT					−0.009	−0.002
					(0.010)	(0.007)
Constant	0.411***	0.255***	−0.161**	0.077	0.435***	−0.283***
	(0.011)	(0.014)	(0.068)	(0.082)	(0.023)	(0.093)
Observations	68	65	65	68	57	57
R^2	0.518	0.856	0.769	0.617	0.546	0.796

Notes: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; standard errors in parentheses

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