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High Performance Workplace Practices and Job Satisfaction: Evidence from Europe

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ABSTRACT

High Performance Workplace Practices and Job Satisfaction: Evidence from Europe*

Using individual data from the European Survey on Working Conditions (ESWC) covering all EU member states, this study aimed at contributing to our understanding of the effects of High Performance Workplace Organizations (HPWOs) on worker's job satisfaction. The estimation results show that a higher involvement of workers in HPWOs is associated with higher job satisfaction. This positive effect is dominated by the involvement of workers in flexible work systems, indicating that workers particularly value the opportunities associated with these systems, such as an increased autonomy over how to perform their tasks, and increased communication with co-workers. Being involved in team work and job rotations as well as supporting human resource practices appear to contribute relatively little to the increased job satisfaction from being involved in HPWOs.

JEL Classification: J24, J5, L23, M11

Keywords: High Performance Workplace Organization, job satisfaction

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1 Introduction

A number of surveys suggest that the organization of work changed dramatically in the 1980s and 1990s. Increased global competition and the rapid developments in information technology induced managers to rethink the way work usually has been organized, leading to an increasing adoption of so-called "innovative", "high-performance", "new", or "flexible" workplace organizations.[1] The main feature of these High Performance Workplace Organizations (HPWO) is a change from a *Tayloristic* work organization, characterized by task specialization, a pyramidal hierarchical structure, and a centralization of responsibilities, to a *Holistic* organization featuring flat hierarchical structures, job rotation, self-responsible teams, multi-tasking, a greater involvement of lower-level employees in decision-making, and the replacement of vertical by horizontal communication channels. These innovative workplace systems are often accompanied by complementary human resource management practices. In addition, firms relying on innovative workplace systems often give employees the appropriate incentives to participate in decision-making through the use of alternative payment schemes. Furthermore, these firms often implement special training measures and appropriate hiring strategies to ensure a workforce with the necessary skills to work in these innovative organizations through employer provided training and appropriate hiring strategies.

The main premise of HPWOs is that firms can achieve higher flexibility, higher product quality, and higher performance while remaining cost competitive by inducing workers to work harder and using the skills and information of their employees more effectively through moving decision authorities closer to those who have the relevant information. It has further been hypothesized that HPWOs are "win-win" systems that do not only benefit employers but also their employees through higher wages and increased job satisfaction.

Within the field of industrial relations, the diffusion of HPWOs and the determinants of their adoption as well as the effects of HPWOs on firm performance received considerable attention.[2] There is, however, very little hard evidence with regard to the hypothesis that these innovative organizations also increase the welfare of workers. A small but growing literature, which is based almost exclusively on U.S.

[1] See, among others, the surveys by Ichniowski, Kochan, Levine, Olson, and Strauss (2000), Snower (1999), OECD (1996, 1999), and Godard and Delaney (2000).

[2] A critical review of this literature is given by Godard and Delaney (2000).

data, is concerned with the effects of HPWOs on workers. Most of them analyze the wage and employment effects of HPWOs, and some investigate the effects of these innovative workplace systems on work-related health problems and the risk of occupational hazards.[3] The results of these studies provide no clear picture on the overall effects of HPWOs on an employee's utility from working. On the one hand, studies tend to find that flexible workplace practices are associated with wage gains – especially for skilled workers – leading to an increase in worker's welfare. On the other hand, utility seems to be reduced through an increase in work-related health problems.

Only a few studies investigate the effects of HPWOs on workers' overall utility measured by self-reported job satisfaction. Using data from the U.S., Appelbaum, Bailey, Berg, and Kalleberg (2000), Bailey, Berg, and Sandy (2001), Freeman and Kleiner (2000), and Freeman, Kleiner, and Ostroff (2000) find significant positive effects of being involved in HPWOs on worker's well-being. Based on a telephone survey of 508 employees in Canada collected in 1997, Godard (2001) studies the effects of innovative workplace practices on an extensive number of indicators for a workers' well-being. His findings indicate that a moderate use of HPWOs increases a workers' "belongingness", empowerment, task involvement, job satisfaction, esteem, commitment, and citizenship behavior. With increasing levels of HPWO-adoption, however, these relationships weaken and in some cases – especially in the case of self-esteem and job satisfaction – even become negative.

To my knowledge, there is no comparable evidence on the effect of HPWOs on worker's job satisfaction for European countries. The aim of this paper is to bridge the gap in the current knowledge by investigating the effects of flexible workplace systems and supplementary human resource practices such as employer provided training and performance related pay schemes on worker's utility using the *European Survey on Working Conditions* (ESWC), a representative survey of workers in the European Union collected in the year 2000.

The paper is structured as follows. A brief discussion of theoretical arguments on the link between HPWOs and workers well-being is given in the next section. Section 3 presents the data set and the econometric strategy used to estimate the effects of

[3]See Bauer and Bender (2002) and Bauer and Bender (2004) for a survey of the literature on the wage and employment effects of HPWOs, and Askenazy (2001) and Fairris and Brenner (2001) for a more detailed discussion of the literature of the effects of HWPOs on work-related health issues.

HPWO-involvement on job satisfaction. Section 5 provides a detailed description of the measurement of HPWOs, and section 5 presents the empirical results. The paper closes with a short summary.

2 Theoretical Considerations on the Link between HPWOs and Job Satisfaction

The aim of this paper is to investigate the effects of flexible workplace practices on an individual's utility from working using the literature on job satisfaction as a starting point.[4] Following Clark and Oswald (1996), it is assumed that an individual's utility from working is nested in the total utility function as follows

$$U = U(U_w, U_v) \ , \tag{1}$$

where U_w is utility from work and U_v is utility derived from other sources. Utility from work can be expressed as

$$U_w = U_w[Y, \bar{Y}, H, X, J, E, Z] \ , \tag{2}$$

where Y is the absolute wage, $\bar{Y}$ is an individual's relative or comparison wage, i.e., the wage a worker could earn if employed elsewhere, and H is the number of hours worked. Usually it is assumed that U_w is positively related to Y and negatively correlated with H. Furthermore, the higher an individuals' comparison wage $\bar{Y}$ relative to the absolute wage Y, the lower will be U_w. Individual characteristics are captured by the vector X, and job and employer characteristics are subsumed in the vectors J and E, respectively. Indicators for the involvement of individuals in HPWOs are denoted by the vector Z.

A key characteristic of HPWOs is the replacement of traditional, Tayloristic workplace organizations with a Holistic organization. These innovative organizations

[4]Following the seminal work of Hamermesh (1977) and Freeman (1978), a growing literature has been concerned with the determinants of job satisfaction. Within this literature, studies analyzed the effects of race and racial harassment (Bartel 1981; Shields and Wheatley-Price 2002), age (Clark, Oswald, and Warr 1996), gender (Clark 1997; Shields and Ward 2001; Ward and Sloane 2000), educational mismatch Allen and van der Velden (2001), self-employment (Blanchflower and Oswald 1998; Blanchflower 2000; Blanchflower, Oswald, and Stutzer 2001; Frey and Benz 2002),and actual and relative wages (Capelli and Sherer 1988; Clark and Oswald 1996; Sloane and Williams 1996) on job satisfaction. Other studies focused on the effects of employer characteristics such as trade union status (Bender and Sloane 1998; Gordon and Denisi 1995) and firm size (Idson 1990). An analysis of the change in job satisfaction over time using German and U.S. data is given by Hamermesh (2001). A recent survey of the literature is provided by Frey and Stutzer (2002).

provide nonmanagerial employees with the opportunity to participate in decision-making, to work in self-managed teams, to enhance their skills through job rotation, and give them greater autonomy over the way they perform their tasks. These systems are further associated with a higher level of communication with co-workers, employees outside the work groups and sometimes with customers. It is often assumed that employees value these new opportunities, leading to a direct increase in overall job satisfaction. Appelbaum, Bailey, Berg, and Kalleberg (2000), for example, argue that the opportunity to participate in decision-making leads to *(i)* the creation of trust between employees and their supervisors and *(ii)* workers experiencing their jobs as challenging and otherwise intrinsically rewarding. Trust and intrinsic rewards are in turn positively related to high organizational commitment, high job satisfaction, and low work-related stress. Several authors, however, have argued that some characteristics of HPWOs may have direct negative effects on worker's job satisfaction (Askenazy and Caroli 2002). Team work, for example, decreases the control of a worker over the pace of work and may increase peer pressure, which in turn increases the potential of conflicts among coworkers. Furthermore, managers might use organizational changes to intensify or speed up work.

Another line of argument why HPWOs directly increase workers' job satisfaction is based on the concept of *procedural utility*, which means that individuals not only value outcomes as usually assumed in economic theory, but also the conditions and processes leading to these outcomes (Frey, Benz, and Stutzer 2002). According to this concept, individuals prefer independence in decision-making, autonomy and relatedness to being subject to the traditional Tayloristic hierarchical decision making. Hence, to the extend that HPWOs decrease hierarchical levels and increase the possibilities of self-determination, these systems should have a direct positive effect on job satisfaction. Evidence that supports this hypothesis is provided by Frey and Benz (2002), who compare the job-satisfaction of self-employed and dependent employees using data from Germany, Switzerland and the UK. They show that individuals value independence and dislike hierarchy over and above the outcomes associated with the employment status.

In addition to these direct effects, there may be indirect effects of HPWOs on job satisfaction through their impact on wages and working conditions. Empirical results from studies on the wage effects of HPWOs tend to show that these work systems are associated with higher wages, suggesting that HPWOs indirectly increase U_w

through their positive effect on Y. It has been shown, for example, that boredom reduces alertness and hence increases the risk of workplace accidents. Therefore, to the extent that innovative workplace practices make work more diversified and potentially more interesting, they should also contribute to increasing overall job satisfaction in an indirect way (Askenazy and Caroli 2002). Increased working time-flexibility may further have positive effects on worker's job satisfaction, since it increases their ability to coordinate their leisure time better with those of other family members.[5]

Theoretical and empirical studies in ergonomics, sociology, psychology and occupational medicine suggest that several features of HPWOs may have detrimental effects on workers by increasing work-related health problems and the risk of occupational hazards.[6] Job rotation and an increased responsibility of employees for product quality increases the pace of work; job rotation and rapid model changes facilitated by flexible production processes reduce the possibilities of workers to improve safety through work routines and learning-by-doing; and an increased responsibility of workers for product quality shift their attention from the work routine to the product. Ergonomists have shown that these characteristics of HPWOs are causally related to increased workplace hazards (Askenazy 2001; Brenner, Fairris, and Ruser 2004). Increased working-time flexibility associated with the adoption of HPWOs may further lead to an alternation of short and long working days. Because occupational risks increase more than proportionally with the number of hours worked per day, these changes in working time schedules may lead to an increased average risk of workplace injuries (Askenazy and Caroli 2002).

Overall, theoretical considerations do not provide an unequivocal picture of the link between HWPOs and workers' overall utility from working. Furthermore, HPWOs are considered to have both direct as well as indirect effects on job satisfaction through their indirect effects on non-monetary job characteristics such as work-related health or occupational accidents. In order to identify the direct effects of HPWOs on job satisfaction, the empirical analysis will control for a vast number of variables that are expected to include indirect effects of HPWOs on job satisfaction.

[5]See Hamermesh (2002) for an analysis of the timing of work and the timing of leisure in a family context.

[6]See Askenazy (2001) and Fairris and Brenner (2001) for a more detailed discussion of this literature.

3 Data and Econometric Approach

The impact of HPWOs on worker's well-being is analyzed by using the *European Survey on Working Conditions* (ESWC) for the year 2000, which has been collected by the European Foundation for the Improvement of Living and Working Conditions in 15 member countries of the European Union. To my knowledge, this is the only available data set that provides information on the involvement of individuals in HPWOs covering all EU-member countries.[7] With the exception of Luxembourg, around 1,500 workers were interviewed by face-to-face interviews in each country; in Luxembourg, only around 500 workers were interviewed.

The ESWC provides a representative sample of the employed or self-employed population above age 15. Unemployed, retired persons, housewives, and students were excluded from the sample.[8] The data set provides detailed information on the nature of the work, physical work factors, work organization, working time, psychosocial factors at the workplace, income, and some socioeconomic characteristics of the individuals surveyed. The survey further provides detailed information on both work systems as well as supporting human resource management practices.

For the following analysis, all self-employed individuals, civil servants, individuals older than 65 as well as all individuals working in the non-profit sector, in the agriculture, the mining sector, and the army were excluded from the original sample. I further excluded all individuals with missing information on one of the variables used, leading to a final sample of 10,693 observations. Across the 15 EU member countries the available sample sizes range from 286 individuals for Luxembourg to 915 observations for the Netherlands. All descriptive statistics and regressions have been weighted using the weights provided by the data producer.[9]

The participants in the ESWC were asked to rank their overall job satisfaction (S) on the following four-point scale:

[7] There are some individual data sets for single European countries that provide information on a person's involvement in particular innovative workplace practices. Such a data set is, for example, used by Askenazy and Caroli (2002) to study the link between flexible workplace practices and job-related health status for French workers.

[8] A detailed description of the sample design is given by the European Foundation (2001). Green and McIntosh (2001) use earlier waves if the ESWC to investigate the intensification of labor effort in Europe.

[9] A detailed description of the weighting procedure is given by the European Foundation (2001).

$$S = \begin{cases} 0 & \text{if not at all satisfied,} \\ 1 & \text{if not very satisfied,} \\ 2 & \text{if fairly satisfied,} \\ 3 & \text{if very satisfied.} \end{cases}$$

Within the job-satisfaction context discussed in section 2, the self-reported measure of overall job satisfaction available in the ESWC is assumed to be a proxy for the utility of an individual derived from working (U_w).

Table 1 provides descriptive statistics on the distribution of job satisfaction across the 15 countries considered. Relatively little variance could be observed across countries. Most workers report that they are fairly satisfied with the working conditions in their main job. The highest average level of job satisfaction could be observed in Denmark, Ireland, and the Netherlands. The lowest average job satisfaction is reported by workers in the South European countries of Greece, Italy, Spain, and Portugal.

Because of the ordinal nature of the dependent variable, ordered probit models are estimated to determine the level of overall job satisfaction reported by an individual in terms of a latent variable S^* and the observed level of job satisfaction S as follows:

$$\begin{aligned} S_i^* &= X_i'\beta + \epsilon_i, \\ S &= j \text{ if } \mu_j < S^* \leq \mu_{j+1} \text{ for } j = 0, ..., 3, \quad \epsilon_i \sim N(0,1), \end{aligned} \tag{3}$$

where X_i is a vector of covariates, and β is a parameter vector to be estimated. Equation (3) describes an individual's unobserved propensity for job satisfaction S^* conditional on the vector of exogenous variables. The μ_j are constant threshold parameters to be estimated that determine the movement along the job satisfaction index. Defining four indicator variables d_{ij} such that

$d_{ij} = 1$ if $S_i = j$,

$d_{ij} = 0$ if $S_i \neq j$,

it is straightforward to obtain estimates of the parameter vectors β and μ_j using maximum likelihood estimation based on the log-likelihood function

$$\mathcal{L}(\beta; Y_i, X_i) = \sum_{i=1}^{N} \sum_{j=0}^{3} d_{ij} ln \left[\Phi(\mu_{j+1} - X_i'\beta) - \Phi(\mu_j - X_i'\beta)\right] \tag{4}$$

(McKelvey and Zavoina 1975; Maddala 1983; Greene 2000).

It must be stressed at this point that the following estimation results may suffer from selection bias induced by workers' heterogeneity. I tried to mitigate this

problem by controlling for a large number of covariates. In particular, apart from different HPWO-indices that will be described in more detail in the next section, the following estimations control for a vast number of other potential determinants of worker job satisfaction, including the socioeconomic characteristics of an individual such as age, job tenure, five occupation dummies, marital status, gender, number of children below age 15 living in the household, as well as various variables describing the job and the firm of an individual. The latter group of covariates includes variables describing whether an individual is employed on a fixed term contract, her usual hours of work, whether an individual usually works on Saturdays or Sundays, the number of days during the last month she worked more than 10 hours a day, whether she supervises other workers, whether the person is involved in shift-work, a dummy variable that takes the value one if a respondent works more than a quarter of his total working time on a PC, whether the firm of an individual is owned by the state, four firm-size dummies, and six industry dummies. Detailed definitions of all variables and descriptive statistics are given in the appendix.

Nevertheless, in a technical sense the coefficients reported in the following section only identify the average treatment effect of being involved in HPWOs under the ignorability of treatment-assumption.[10] Basically it is assumed that the large number of control variables removes all unobservable effects that are correlated with both the involvement in HPWOs and Y_i. As this is a fairly strong assumption, it must be acknowledged that there remains the possibility that the coefficients reported below are biased due to self-selection.[11]

4 HPWO Involvement in Europe

In the empirical part of this chapter, self-reported job satisfaction is regressed on different indices describing the involvement of an employee in HWPOs. The construction of these indices, which will be described below, follows as closely as possible Appelbaum, Bailey, Berg, and Kalleberg (2000) in order to facilitate the comparison with the US. This section further provides a descriptive analysis of the involvement of workers in HPWOs in the EU member countries.

[10] See Rosenbaum and Rubin (1983), and the discussion in Heckman, Lalonde, and Smith (1999) and Wooldridge (2002).

[11] A referee pointed out that another source of bias may arise due to the use of subjective dependent and independent variables, if individuals, for example, do not independently report their perception of their autonomy on the job and their job satisfaction.

The empirical analysis will focus on the following four indices: (i) a *Work System-Index*; (ii) a *Skill Index* ; (iii) an *Incentive Index*; and (iv) a composite index describing an individual's overall involvement in HPWOs, which will be referred to as the *HPWO Scale*. A detailed description of the construction of these indices together with descriptive statistics for all components is provided in the Appendix.

The *Work System-Index* aims to measure the opportunity of workers to participate in substantive decision-making and the degree of autonomy of workers concerning the way they perform their job. The index is based on four main components: the autonomy of an individual in decision-making, the degree of horizontal and vertical communication, team-work, and a job design that involves job rotation. The index for the autonomy of an individual in decision-making is based on the responses of a worker to the questions concerning the discretion of a worker to choose or change the order of tasks, the methods of work, and the speed or rate of work. In addition, this index considers whether a worker assesses the quality of his own work and whether the job involves the solution of unforeseen problems by the worker himself. Based on this information, an autonomy index has been derived as the sum of these five dummy-variables divided by five.[12]

Conditional on being able to discuss working conditions within the workplace of an individual in general, the second component of the *Work System-Index*, the index for the degree of horizontal and vertical communication, is based on the responses to five questions concerning the exchange of views and problems with colleagues, superiors, and/or staff representatives. Furthermore, this index includes information on whether this exchange of view takes place on a regular and/or formal basis. Similar to the autonomy index, the communication index varies between 0 and 1. Those individuals, who indicate that they are not able to discuss working conditions within the workplace in general, have been assigned a 0 for all components of this index. The last two components of the *Work System-Index* describe whether the job of an individual involves team-work and job rotation. Based on the indices measuring the autonomy of an individual in decision-making, the extent of vertical and horizontal communication, team work and job rotation, a composite index describing the involvement of an individual in a flexible work system is derived as the sum of these four components divided by 4. This final *Work System-Index* ranges between 0 and

[12]It should be noted that I experimented with different procedures to derive the indices described in this section. For example, I created the indices using a principal component analysis. The basic results presented below, however, are very robust towards a change in the statistical procedure of constructing the different indices.

1.

The ESWC also allows me to analyze the incidence of human resource practices that support the functioning of flexible workplace systems. As noted in the introduction, innovative work systems are often accompanied by incentive systems that encourage employees to participate in HPWOs and human resource management practices that ensure an appropriately skilled workforce.

In order to take over responsibilities, to perform multiple tasks and to be able to react in a flexible way to a changing environment, workers need the appropriate skills to do so. In principle, a firm can follow two strategies to ensure that its workforce has the necessary skills to work in a HPWO: It can hire workers with the appropriate skills and/or it can provide incumbent workers with training that allows them to obtain the skills needed to work in a flexible organization. Unfortunately, the ESWC only allows to construct a variable indicating whether an individual participated in employer provided training. Therefore, the skill-index is derived from information on the number of days of training paid for or provided by the employer in the past 12 month. Similar to the all other indices used in the empirical analysis, the skill-index has been standardized to values between 0 and 1.

A firm using flexible work systems has to provide workers with incentives to participate in these systems. In particular, the firm has to give its workers incentives to invest in the skills necessary to work in these innovative systems, to provide discretionary effort, and to make decisions that are in the interest of the firm. One way to give workers incentives to participate in flexible work systems is the installation of various forms of pay for performance systems. The ESWC provides substantial information on the components of the wages of the individuals sampled. Based on information about whether an individual participates in profit-sharing schemes, receives income from company shares, or receives group bonuses, an incentive-index is derived that takes values between 0 and 1.

Finally, I derived a composite index of the involvement of an individual in HPWOs, which is defined as the sum of the *Work System-Index*, the *Skill Index*, and the *Incentive Index* divided by three. The resulting *HPWO Scale* varies between 0 and 1, and is rising with an increasing involvement of an individual in innovative workplace organizations.

Descriptive statistics of the four different indices for the sample used in this chapter are provided in Table 2. The average value of the work-system index across the

15 countries is 0.562. The Scandinavian countries Denmark, Finland, and Sweden together with UK, Ireland, Austria, the Netherlands, and Luxembourg show values of the work-system index that are above this average. Workers in the Southern European countries Greece, Portugal, Spain, and Italy followed by workers from Germany show a relatively low involvement in flexible work systems. Based on the skill-index, the UK, Denmark, and Spain rank highest, and Greece, Italy, Belgium, France, and Germany rank lowest as far as employer-provided training is concerned. The calculated incentive index indicates that incentive payments are most common in the UK, Finland, Sweden, and France, whereas only few workers in the Southern European countries of Portugal, Greece, and Spain as well as workers from Denmark receive some type of incentive payments.

The composite HPWO-scale suggests that innovative workplace organizations appear to be more common in the Scandinavian countries, the UK, Ireland, the Netherlands, Austria, and Luxembourg if compared to the Southern European countries, Belgium, France, and Germany; the lowest dissemination of HPWOs is observed in the Southern European countries of Greece, Portugal, Spain, and Italy. These rankings largely confirm those reported by the OECD (1999).

5 Estimation Results

Table 3 shows the results obtained from estimating different specifications of equation (3) for the pooled sample of all 15 European member countries using an ordered probit model. The specification in column (1) of Table 3 includes only the composite HPWO-scale described in the last section and 14 country dummies. Column (2) adds to this benchmark specification a series of variables describing the socioeconomic and occupational background of an individual, column (3) controls in addition for firm characteristics, and in column (4) income variables are added as additional controls.[13]

The HPWO-scale shows a highly significant positive effect on job satisfaction for all specifications shown in Table 3. Note further, that the sequential inclusion of additional controls does not affect the estimated coefficient on the HPWO-scale significantly. Overall, the other control variables are in line with previous studies on

[13]F-Tests indicate that the explanatory variables other than the composite HPWO-scale are jointly significant.

the determinants of job satisfaction. Age has an U-shaped effect on job satisfaction, and working more hours, working on Saturdays and/or Sundays, working in shifts and having a fixed-term contract have significant negative effects on job satisfaction. Being employed in small firms, as supervisor, manager, clerk, or service worker affects job satisfaction positively. The estimated coefficients on the income variables have the expected signs, but are not statistically significant at conventional levels.

Panel A of Table 4 reports the estimation results when estimating equation (3) separately for each country, using a specification that corresponds to the specification shown in column (3) of Table 3. For all countries the estimated coefficient on the HPWO-scale is positive, indicating that a higher involvement in HPWOs increases job satisfaction. For 10 out of the 15 countries the estimated coefficient is statistically significant at least at the 5%-level, and for Greece the coefficient is statistically significant at the 10%-level. For workers in Belgium, Ireland, Italy, and Portugal the HPWO-scale does not have a statistically significant effect on job satisfaction.

To investigate whether the increased job satisfaction obtained by being involved in HPWOs is due to the use of innovative work systems or due to supporting human resource practices in more detail, Panel B of Table 4 reports the results from estimating equation (3) using the Work System Index, the Skill Index, and the Incentive Index instead of the composite HPWO-scale. Note that the three indices enter the estimation equation jointly, i.e. each column reported in Panel B refers to a separate regression.[14]

The results in Panel B of Table 4 show that being involved in flexible workplace systems has positive effects on job satisfaction across all countries, and in the majority of cases the coefficients are statistically significant. Concerning the supporting human resource practices the results are less strong. With the exception of France, Greece, and Spain the point estimates of the effect of the skill index on job satisfaction are positive for all countries. In many cases, however, the coefficients are estimated very imprecisely, being statistically significant only for workers in Denmark, Germany, the Netherlands as well as for the pooled sample. For the incentive index the results are even weaker and more heterogeneous. Only for Portuguese workers the estimated coefficient is statistically significant negative at the 5%-level.

Panels B of Table 4 indicates that the positive effect of being involved in HPWOs

[14]I also estimated the same models with the three indices entering the estimation equation separately. The estimation results, which are available upon request, do not differ very much to those reported in Panel B of Table 4.

is mainly driven by flexible work systems rather than by an increased involvement in employer provided training in incentive schemes. It remains unclear, which components of flexible work systems are valued most by the workers. Panel C of Table 4 aims to investigate this question in more detail by showing the effects of the different components of the Work System Index on job satisfaction. The results depicted in Panel C are again obtained from a specification that corresponds to column (3) of Table 3 with the four components of the Work System Index, i.e. the Autonomy Index, the Communication Index, Team Work, and Job Rotation entering the equation jointly.

With the exception of workers in Greece, a higher level of vertical and horizontal communication increases the job satisfaction of workers significantly in all countries. A higher autonomy in the way a worker can perform his job also has a positive effect on job satisfaction in all countries, even though the coefficients are estimated less precisely than for the communication index, being statistically significant at least on a 5%-level for workers in Austria, Denmark, Finland, Greece, the Netherlands and Sweden, and at least on a 10%-level for workers in Italy, Spain, and the UK. Panel C of Table 4 further shows that being involved in team work or job rotation does not contribute significantly to the positive effect of innovative work systems on job satisfaction.

Overall, the estimation results confirm the notion that flexible work systems have a positive direct effect on the welfare of the workers involved in these systems. The workers value in particular more autonomy over how to perform their tasks, the opportunity to participate in decision-making, and increased communication with co-workers. The results further confirm the importance of procedural utility as defined by Frey, Benz, and Stutzer (2002).

6 Summary

In the last decade, an increasing number of firms changed their organization of work towards so-called High Performance Workplace Organizations (HPWO). These HPWOs are characterized by flat hierarchy structures, job rotation, self-responsible teams, multi-tasking, a greater involvement of lower-level employees in decision-making, the replacement of vertical by horizontal communication channels, and complementary human resource management practices that give employees the ap-

propriate incentives to participate in decision-making through the use of alternative payment schemes and increased employer provided training.

The main premise of HPWOs is that firms can achieve higher flexibility, higher product quality, and higher performance while remaining cost competitive by inducing workers to work harder and using the skills and information of their employees more effectively through moving decision authorities closer to those who have the relevant information. It has further been hypothesized that HPWOs are "win-win" systems that do not only benefit employers but also their employees through higher wages and increased job satisfaction. Theoretical and empirical studies in ergonomics, sociology, psychology and occupational medicine, however, suggest that several features of HPWOs may have detrimental effects on workers by increasing work-related health problems and the risk of occupational hazards.

Using individual data from the European Survey on Working Conditions (ESWC) covering all EU member states, this study aimed at contributing to our understanding of the effects of HPWOs on worker's overall utility from working by investigating the effects of being involved in innovative workplace systems on job satisfaction.

The estimation results unambiguously show that a higher involvement in HPWOs is associated with higher job satisfaction; hence, these organizational innovations increase employee's overall utility from working. The results further suggest that this positive effect is dominated by the involvement of workers in flexible work systems, indicating that workers particularly value the opportunities associated with these systems, such as increased autonomy over how to perform their tasks, the opportunity to participate in decision-making, and increased communication with co-workers. Compared to these components of flexible work systems, being involved in team work and job rotations as well as supporting human resource practices appears to contribute relatively little to the increased job satisfaction from being involved in HPWOs.

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Table 1: Job Satisfaction in the European Union

Country	*Not at all Satisfied*	*Not very Satisfied*	*Fairly Satisfied*	*Very Satisfied*	*Mean (S.D.)*	*Obs.*
Austria	0.010	0.106	0.499	0.385	2.258 (0.682)	763
Belgium	0.032	0.094	0.561	0.313	2.155 (0.716)	765
Denmark	0.011	0.039	0.412	0.538	2.475 (0.630)	881
Finland	0.013	0.057	0.651	0.279	2.195 (0.593)	607
France	0.048	0.175	0.602	0.175	1.904 (0.730)	846
Germany	0.020	0.128	0.602	0.250	2.082 (0.673)	891
Greece	0.051	0.261	0.548	0.140	1.777 (0.746)	376
Ireland	0.008	0.049	0.445	0.498	2.433 (0.626)	744
Italy	0.045	0.178	0.601	0.175	1.906 (0.726)	652
Luxembourg	0.015	0.105	0.616	0.264	2.128 (0.644)	286
Netherlands	0.021	0.096	0.403	0.480	2.341 (0.739)	915
Spain	0.042	0.192	0.621	0.144	1.869 (0.698)	762
Portugal	0.034	0.162	0.688	0.116	1.886 (0.634)	687
Sweden	0.051	0.103	0.565	0.280	2.074 (0.764)	719
UK	0.032	0.061	0.508	0.399	2.273 (0.717)	799
EU-15	0.033	0.130	0.568	0.269	2.074 (0.724)	10,693

Source: ESWC, 2000; own calculations.

Table 2: Indices of Involvement in HPWOs

Country	*Work System Index*	*Skill Index*	*Incentive Index*	*HPWO Scale*
Austria	0.602	0.012	0.028	0.214
Belgium	0.553	0.008	0.030	0.197
Denmark	0.617	0.016	0.018	0.217
Finland	0.570	0.010	0.066	0.215
France	0.548	0.008	0.060	0.205
Germany	0.522	0.008	0.032	0.187
Greece	0.477	0.006	0.019	0.167
Ireland	0.649	0.012	0.025	0.228
Italy	0.497	0.006	0.034	0.179
Luxembourg	0.596	0.013	0.040	0.216
Netherlands	0.660	0.013	0.041	0.238
Spain	0.488	0.016	0.022	0.176
Portugal	0.487	0.011	0.003	0.167
Sweden	0.570	0.010	0.062	0.214
UK	0.675	0.017	0.064	0.252
EU-15	0.562	0.011	0.042	0.205

Source: ESWC, 2000; own calculations.

Table 3: HPWO and Job Satisfaction: Results for the European Union

	(1)	(2)	(3)	(4)
HPWO Scale	1.154***	1.160***	1.235***	1.366***
	(0.177)	(0.196)	(0.199)	(0.224)
Age	-	-0.022*	-0.020	-0.029**
		(0.013)	(0.013)	(0.014)
Age^2/100	-	0.030*	0.027*	0.042**
		(0.016)	(0.016)	(0.018)
Job Tenure	-	-0.007	-0.005	-0.010
		(0.007)	(0.007)	(0.008)
Job Tenure^2/100	-	0.027	0.024	0.038
		(0.022)	(0.023)	(0.024)
Hours of Work	-	-0.007***	-0.007***	-0.005**
		(0.002)	(0.002)	(0.002)
Worked more than 10 hours	-	-0.004	-0.004	-0.004
		(0.004)	(0.004)	(0.004)
Worked Saturday and/or Sunday	-	-0.111***	-0.134***	-0.156***
		(0.039)	(0.040)	(0.044)
Shift Work	-	-0.203***	-0.160***	-0.200***
		(0.048)	(0.050)	(0.054)
Fixed-term Contract	-	-0.114*	-0.120**	-0.124*
		(0.060)	(0.060)	(0.066)
Supervisor	-	0.105**	0.114**	0.086
		(0.053)	(0.053)	(0.062)
Work with PC	-	-0.046	-0.022	0.012
		(0.046)	(0.047)	(0.054)
Married	-	0.056	0.051	-0.002
		(0.041)	(0.041)	(0.044)
Female	-	0.032	-0.002	0.034
		(0.041)	(0.043)	(0.049)
Children below Age 15	-	0.006	0.006	0.037
		(0.023)	(0.023)	(0.025)
Manager	-	0.418***	0.407***	0.346***
		(0.057)	(0.063)	(0.072)
Clerk	-	0.347***	0.337***	0.340***
		(0.066)	(0.070)	(0.078)
Service Worker	-	0.274***	0.217***	0.165**
		(0.060)	(0.065)	(0.072)
Elementary Worker	-	-0.006	0.018	-0.002
		(0.057)	(0.060)	(0.065)
Income: Low-Medium	-	-	-	-0.115*
				(0.062)
Income: Medium-High	-	-	-	0.011
				(0.068)
Income: Highest	-	-	-	0.097
				(0.081)
State-owned Firm	-	-	0.126*	0.120
			(0.065)	(0.076)
Firm Size: 1-9	-	-	0.231***	0.250***
			(0.061)	(0.067)
Firm Size: 10-49	-	-	0.071	0.099
			(0.058)	(0.063)
Firm Size: 50-99	-	-	-0.032	-0.049
			(0.067)	(0.074)
Firm Size: 100-249	-	-	-0.025	0.026
			(0.071)	(0.080)
5 Industry Dummies	No	No	Yes	Yes
14 Country Dummies	Yes	Yes	Yes	Yes
			(0.064)	(0.072)
Observations	10,693	10,693	10,693	8,774

Notes: Results from Ordered Probit Models. *: Significant at the 90% confidence level. **: Significant at the 95% confidence level. ***: Significant at the 99% confidence level. All regressions include 14 country dummies.

Table 4: Sensitivity Analysis

	EU-15	*Austria*	*Belgium*	*Denmark*	*Finland*	*France*	*Germany*	*Greece*
				Panel A: Composite HPWO-Index				
HPWO Scale	1.235***	1.427***	0.292	2.005***	1.290**	1.478***	1.490***	1.158*
	(0.199)	(0.492)	(0.480)	(0.524)	(0.548)	(0.436)	(0.554)	(0.668)
				Panel B: Effects of HPWO-Scale-components				
Work System Index	0.470***	0.477***	0.177	0.642***	0.812***	0.529***	0.472**	0.350
	(0.075)	(0.176)	(0.192)	(0.197)	(0.231)	(0.170)	(0.205)	(0.223)
Skill Index	1.435***	0.552	1.184	3.396**	1.622	-0.097	3.604**	-2.325
	(0.517)	(1.230)	(1.352)	(1.454)	(1.985)	(1.264)	(1.583)	(2.472)
Incentive Index	0.123	0.441	-0.259	0.166	-0.574*	0.436	0.377	1.172
	(0.147)	(0.699)	(0.377)	(0.484)	(0.346)	(0.274)	(0.425)	(0.850)
				Panel C: Effects of components of Work System Index				
Autonomy Index	0.287***	0.532***	0.107	0.762***	0.474**	0.206	0.259	0.544**
	(0.064)	(0.173)	(0.157)	(0.207)	(0.203)	(0.169)	(0.163)	(0.229)
Communication Index	0.624***	0.592***	0.594***	0.342**	1.015***	0.807***	0.552***	0.104
	(0.058)	(0.171)	(0.143)	(0.173)	(0.206)	(0.140)	(0.160)	(0.274)
Team Work	-0.027	-0.140	-0.271**	0.145	0.003	0.006	0.051	-0.075
	(0.040)	(0.117)	(0.108)	(0.108)	(0.118)	(0.097)	(0.097)	(0.150)
Job Rotation	-0.041	-0.028	0.056	0.024	-0.029	-0.068	-0.046	0.056
	(0.038)	(0.114)	(0.106)	(0.105)	(0.117)	(0.098)	(0.100)	(0.148)
Observations	10,693	763	765	881	607	846	891	376

Table 4 continued: Sensitivity Analysis

	Ireland	*Italy*	*Luxembourg*	*Netherlands*	*Spain*	*Portugal*	*Sweden*	*UK*
				Panel A: Composite HPWO-Index				
HPWO Scale	0.820	0.856	1.946**	1.635***	1.209**	-0.136	1.869***	1.648***
	(0.500)	(0.574)	(0.827)	(0.508)	(0.531)	(0.558)	(0.485)	(0.487)
				Panel B: Effects of HPWO-Scale-components				
Work System Index	0.250	0.457**	0.637**	0.683***	0.414**	0.040	0.719***	0.661***
	(0.190)	(0.213)	(0.310)	(0.197)	(0.187)	(0.196)	(0.212)	(0.196)
Skill Index	2.535	2.688	0.792	2.861**	-0.580	1.381*	1.075	1.460
	(2.095)	(2.056)	(2.055)	(1.305)	(0.882)	(0.723)	(0.888)	(1.131)
Incentive Index	0.074	-0.387	0.669	-0.142	1.221	-1.274***	0.353	0.207
	(0.472)	(0.406)	(0.729)	(0.349)	(1.381)	(0.477)	(0.268)	(0.314)
				Panel C: Effects of components of Work System Index				
Autonomy Index	0.044	0.345*	0.295	0.704***	0.289*	0.159	0.933***	0.326*
	(0.150)	(0.179)	(0.269)	(0.205)	(0.167)	(0.177)	(0.224)	(0.170)
Communication Index	0.500***	0.800***	0.861***	0.885***	0.564***	0.436**	0.950***	0.483***
	(0.156)	(0.158)	(0.272)	(0.157)	(0.154)	(0.196)	(0.164)	(0.136)
Team Work	-0.134	-0.091	-0.101	-0.051	-0.138	-0.073	0.100	0.058
	(0.125)	(0.107)	(0.201)	(0.107)	(0.124)	(0.136)	(0.111)	(0.134)
Job Rotation	0.024	-0.155	0.037	-0.020	-0.037	-0.162	-0.171	0.025
	(0.110)	(0.101)	(0.193)	(0.099)	(0.126)	(0.136)	(0.113)	(0.107)
Observations	744	652	286	915	687	762	719	799

Notes: Regressions further include all variables shown in Table 3. Estimations for EU-15 includes in addition 14 country dummies. See also notes to Table 3.

7 Appendix: Variable Definition and Descriptive Statistics

Appendix Table 1 Variable Definition

Variable	*Definition*
Job Satisfaction	Ordinal variable that equals 0 if respondent is not at all satisfied, 1 if he is not very satisfied, 2 if he is fairly satisfied, and 3 if he is very satisfied with the working conditions in the main job.
Work System Index	Index variable describing the extent to which the respondent has autonomy in decision-making, the degree of vertical and horizontal communication, and the design of the workplace.
Skill Index	Index variable describing the extent to which the respondent participated in employer provided training (see chapter 2).
Incentive Index	Index variable describing the extent to which the respondent participates in performance-related payment schedules.
HPWO Scale	Index variable using the Work System Index, the Skill Index and the Incentive Index.
Age	Age of respondent measured in years.
Job Tenure	Number of years a respondent has been employed in his/her present main job.
Usual Hours of Work	Number of hours a respondent usually works per week.
Days Worked more than 10 Hours	Number of days a respondent works more than 10 hours a day.
Work Saturday or Sunday	Dummy variable that equals 1 if the respondent usually works at least one day per month on Saturdays or Sundays, 0 otherwise.
Shift Work	Dummy variable that equals 1 if the respondent works in shifts, 0 otherwise.
Fixed-term Contract	Dummy variable that equals 1 if the respondent is employed on a fixed-term contract, 0 otherwise.
Supervisor	Dummy variable that equals 1 if the respondent supervises other workers, 0 otherwise.
Work with PC	Dummy variable that equals 1 if the respondent works at least 1/4 of his working time with personal computers, 0 otherwise.
Married	Dummy variable that equals 1 if the respondent is married or cohabitating, 0 otherwise.
Female	Dummy variable that equals 1 if the respondent is female, 0 otherwise.
Number of Children below Age 15	Number of children below age 15 living in the household ofthe respondent.

Appendix Table 1 continued: Variable Definition

Variable	*Definition*
Manager/Professional/Technician	Dummy variable that equals 1 if the respondent is employed as manager, legislator, senior official, professional, technician or associate professional, 0 otherwise.
Clerk	Dummy variable that equals 1 if the respondent is employed as clerk, 0 otherwise.
Service-Worker	Dummy variable that equals 1 if the respondent is employed as service worker or shop and market sales worker, 0 otherwise.
Craft	Dummy variable that equals 1 if the respondent is employed as craft or related trade worker, 0 otherwise.
Elementary Worker	Dummy variable that equals 1 if the respondent is employed in an elementary occupation, 0 otherwise.
Income: Low-Medium	Income of the respondent is in the low-medium bracket of a 4 scale harmonized income scale ranging from lowest to highest.
Income: Medium-High	Income of the respondent is in the medium-high bracket of a 4 scale harmonized income scale ranging from lowest to highest.
Income: Highest	Income of the respondent is in the highest bracket of a 4 scale harmonized income scale ranging from lowest to highest.
State-owned Firm	Dummy variable that equals 1 if the respondent is employed in a state-owned company, 0 otherwise.
Firm Size: 2-9	Dummy variable that equals 1 if the respondent is employed in an establishment with 2 to 9 workers, 0 otherwise.
Firm Size: 10-49	Dummy variable that equals 1 if the respondent is employed in an establishment with 10 to 49 workers, 0 otherwise.
Firm Size: 50-99	Dummy variable that equals 1 if the respondent is employed in an establishment with 50 to 99 workers, 0 otherwise.
Firm Size: 100-249	Dummy variable that equals 1 if the respondent is employed in an establishment with 100 to 249 workers, 0 otherwise.
Firm Size: more than 249	Dummy variable that equals 1 if the respondent is employed in an establishment with more than 249, 0 otherwise.
Manufacturing	Dummy variable that equals 1 if the firm is in the manufacturing sector, 0 otherwise.
Construction	Dummy variable that equals 1 if the firm is in the construction sector, 0 otherwise.
Retail Trade	Dummy variable that equals 1 if the firm is in the wholesale and retail trade, repair of motorvehicels, and personal and household goods, 0 otherwise.
Transport/Communication	Dummy variable that equals 1 if the firm is in the transport, storage, or communication sector, 0 otherwise.
Financial Services	Dummy variable that equals 1 if the firm is in the financial service sector, real estate. or renting and business activities, 0 otherwise.
Other Services	Dummy variable that equals 1 if the firm is in the hotels and restaurants sector, education, health and social work, or other personal services, 0 otherwise.

Appendix Table 2 Descriptive Statistics

	Austria		*Belgium*		*Denmark*		*Finland*		*France*		*Germany*	
	Mean	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*
Job Satisfaction	2.286	0.676	2.140	0.731	2.489	0.616	2.178	0.598	1.916	0.747	2.074	0.675
Work System Index	0.598	0.247	0.590	0.208	0.702	0.192	0.653	0.200	0.577	0.222	0.549	0.217
Skill Index	0.010	0.036	0.008	0.033	0.018	0.046	0.009	0.026	0.007	0.033	0.007	0.026
Incentive Index	0.021	0.077	0.026	0.114	0.018	0.083	0.050	0.133	0.049	0.149	0.024	0.098
HPWO Scale	0.126	0.065	0.125	0.065	0.150	0.062	0.145	0.068	0.129	0.076	0.115	0.061
Age	36.533	10.218	37.022	10.164	39.109	11.280	37.969	10.960	37.102	9.799	39.329	10.747
Job Tenure	11.696	9.086	9.936	9.343	11.189	10.090	8.095	8.774	9.416	8.837	7.783	7.505
Usual Hours of Work	37.046	10.569	35.723	10.287	36.247	9.096	39.409	12.201	36.903	9.002	36.163	10.563
Days Worked more than 10 Hours	2.176	4.868	1.644	4.331	1.864	4.099	2.321	4.014	2.358	5.495	1.887	4.556
Work Saturday or Sunday	0.509	0.500	0.448	0.498	0.434	0.496	0.476	0.500	0.512	0.500	0.477	0.500
Fixed-term Contract	0.058	0.233	0.059	0.235	0.060	0.238	0.117	0.322	0.092	0.289	0.085	0.279
Shift Work	0.128	0.335	0.231	0.422	0.084	0.278	0.250	0.434	0.197	0.398	0.193	0.395
Supervisor	0.206	0.405	0.165	0.371	0.203	0.403	0.114	0.318	0.142	0.349	0.167	0.373
Work with PC	0.398	0.490	0.481	0.500	0.530	0.499	0.493	0.500	0.429	0.495	0.373	0.484
Married	0.644	0.479	0.694	0.461	0.732	0.443	0.647	0.478	0.693	0.462	0.669	0.471
Female	0.535	0.499	0.392	0.489	0.463	0.499	0.437	0.496	0.433	0.496	0.430	0.495
Number of Children below Age 15	1.662	0.895	1.826	1.033	1.831	0.945	1.839	0.980	1.793	0.973	1.488	0.766
Manager/Professional/Technician	0.163	0.369	0.276	0.447	0.443	0.497	0.259	0.438	0.301	0.459	0.246	0.431
Clerk	0.197	0.398	0.226	0.419	0.151	0.358	0.109	0.312	0.160	0.366	0.157	0.364
Service-Worker	0.283	0.451	0.127	0.333	0.112	0.316	0.163	0.370	0.176	0.381	0.163	0.369
Craft	0.194	0.396	0.128	0.334	0.140	0.347	0.231	0.422	0.175	0.380	0.281	0.450
Elementary Worker	0.164	0.370	0.243	0.429	0.154	0.362	0.239	0.427	0.188	0.391	0.154	0.361
State-owned Firm	0.038	0.191	0.105	0.306	0.262	0.440	0.076	0.265	0.116	0.320	0.076	0.266
Firm Size: 1-9	0.430	0.495	0.251	0.434	0.170	0.376	0.323	0.468	0.356	0.479	0.301	0.459
Firm Size: 10-49	0.280	0.450	0.298	0.458	0.319	0.466	0.321	0.467	0.301	0.459	0.329	0.470
Firm Size: 50-99	0.084	0.277	0.116	0.321	0.152	0.359	0.105	0.307	0.090	0.286	0.104	0.306
Firm Size: 100-249	0.090	0.287	0.105	0.306	0.128	0.335	0.122	0.327	0.105	0.307	0.101	0.302
Firm Size: more than 249	0.115	0.320	0.230	0.421	0.230	0.421	0.129	0.335	0.148	0.355	0.165	0.371
Manufacturing	0.249	0.433	0.204	0.403	0.236	0.425	0.353	0.478	0.236	0.425	0.235	0.424
Construction	0.105	0.307	0.058	0.233	0.051	0.220	0.081	0.273	0.069	0.253	0.150	0.358
Retail Trade	0.261	0.439	0.207	0.405	0.158	0.365	0.127	0.333	0.229	0.421	0.231	0.422
Transport/Communication	0.055	0.228	0.131	0.337	0.085	0.279	0.129	0.335	0.072	0.259	0.070	0.255
Financial Services	0.111	0.315	0.133	0.340	0.136	0.343	0.153	0.360	0.122	0.327	0.068	0.253
Other Services	0.219	0.414	0.268	0.443	0.334	0.472	0.155	0.362	0.272	0.445	0.246	0.431
Observations	763		765		881		607		846		891	

Appendix Table 2 continued: Descriptive Statistics

	Greece		*Ireland*		*Italy*		*Luxembourg*		*The Netherlands*	
	Mean	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*
Job Satisfaction	1.779	0.739	2.409	0.646	1.948	0.727	2.108	0.648	2.343	0.759
Work System Index	0.450	0.241	0.611	0.244	0.553	0.215	0.595	0.231	0.704	0.188
Skill Index	0.007	0.030	0.011	0.045	0.007	0.023	0.014	0.052	0.014	0.056
Incentive Index	0.016	0.076	0.023	0.102	0.033	0.120	0.022	0.093	0.035	0.110
HPWO Scale	0.094	0.064	0.130	0.072	0.119	0.065	0.129	0.071	0.153	0.074
Age	33.598	9.662	35.226	11.175	37.126	10.328	36.654	9.002	37.580	10.303
Job Tenure	7.194	7.589	6.843	7.751	11.060	9.140	11.678	8.886	6.282	7.052
Usual Hours of Work	38.923	11.473	38.152	11.986	39.408	9.223	37.811	9.513	32.543	11.986
Days Worked more than 10 Hours	2.747	6.429	2.438	5.030	1.870	4.347	1.395	3.831	1.727	4.059
Work Saturday or Sunday	0.585	0.493	0.526	0.500	0.546	0.498	0.503	0.501	0.421	0.494
Fixed-term Contract	0.090	0.287	0.074	0.262	0.049	0.216	0.052	0.223	0.114	0.318
Shift Work	0.199	0.400	0.215	0.411	0.238	0.426	0.175	0.380	0.142	0.349
Supervisor	0.122	0.328	0.227	0.419	0.169	0.375	0.189	0.392	0.180	0.385
Work with PC	0.295	0.457	0.446	0.497	0.500	0.500	0.427	0.495	0.634	0.482
Married	0.604	0.490	0.578	0.494	0.589	0.492	0.773	0.420	0.672	0.470
Female	0.431	0.496	0.501	0.500	0.371	0.483	0.392	0.489	0.473	0.500
Number of Children below Age 15	1.630	0.885	1.944	1.185	1.469	0.774	1.916	0.962	1.628	0.956
Manager/Professional/Technician	0.178	0.383	0.281	0.450	0.241	0.428	0.290	0.455	0.402	0.491
Clerk	0.213	0.410	0.142	0.350	0.273	0.446	0.213	0.410	0.173	0.378
Service-Worker	0.197	0.398	0.230	0.421	0.149	0.356	0.091	0.288	0.129	0.335
Craft	0.226	0.419	0.106	0.308	0.209	0.407	0.224	0.418	0.111	0.315
Elementary Worker	0.186	0.390	0.241	0.428	0.129	0.335	0.182	0.386	0.185	0.388
State-owned Firm	0.096	0.295	0.093	0.290	0.104	0.306	0.203	0.403	0.017	0.131
Firm Size: 1-9	0.447	0.498	0.292	0.455	0.371	0.483	0.227	0.420	0.126	0.332
Firm Size: 10-49	0.306	0.461	0.358	0.480	0.284	0.451	0.255	0.437	0.257	0.437
Firm Size: 50-99	0.080	0.271	0.098	0.298	0.098	0.298	0.073	0.261	0.144	0.352
Firm Size: 100-249	0.104	0.305	0.114	0.318	0.097	0.296	0.105	0.307	0.191	0.394
Firm Size: more than 249	0.064	0.245	0.138	0.346	0.150	0.358	0.339	0.474	0.282	0.450
Manufacturing	0.277	0.448	0.253	0.435	0.291	0.455	0.150	0.358	0.189	0.392
Construction	0.035	0.183	0.074	0.262	0.037	0.188	0.122	0.328	0.060	0.238
Retail Trade	0.247	0.432	0.190	0.392	0.190	0.393	0.227	0.420	0.183	0.386
Transport/Communication	0.120	0.325	0.099	0.299	0.107	0.310	0.112	0.316	0.095	0.293
Financial Services	0.098	0.298	0.136	0.343	0.140	0.347	0.133	0.340	0.210	0.407
Other Services	0.223	0.417	0.249	0.433	0.235	0.424	0.255	0.437	0.263	0.441
Observations	376		744		652		286		915	

Appendix Table 2 continued: Descriptive Statistics

	Portugal		*Spain*		*Sweden*		*UK*		*EU-15*	
	Mean	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*	*Mean*	*S.D.*
Job Satisfaction	1.885	0.620	1.877	0.692	2.110	0.750	2.233	0.765	2.139	0.725
Work System Index	0.443	0.267	0.499	0.218	0.625	0.190	0.643	0.234	0.594	0.232
Skill Index	0.007	0.043	0.016	0.071	0.011	0.043	0.014	0.042	0.011	0.043
Incentive Index	0.003	0.029	0.017	0.078	0.053	0.133	0.046	0.149	0.030	0.110
HPWO Scale	0.089	0.064	0.110	0.077	0.142	0.070	0.145	0.082	0.128	0.072
Age	35.614	11.169	37.248	11.358	38.719	11.957	37.314	11.656	37.272	10.850
Job Tenure	8.957	8.464	7.740	8.494	8.618	9.447	5.737	6.717	8.709	8.716
Usual Hours of Work	40.739	8.222	39.033	10.377	37.924	8.954	36.504	13.160	37.254	10.738
Days Worked more than 10 Hours	1.651	4.914	1.753	4.957	2.374	4.190	3.448	6.861	2.116	4.882
Work Saturday or Sunday	0.443	0.497	0.508	0.500	0.469	0.499	0.616	0.487	0.493	0.500
Fixed-term Contract	0.166	0.372	0.302	0.459	0.079	0.270	0.091	0.288	0.101	0.301
Shift Work	0.108	0.310	0.244	0.430	0.192	0.394	0.269	0.444	0.189	0.392
Supervisor	0.098	0.297	0.146	0.353	0.170	0.376	0.243	0.429	0.172	0.377
Work with PC	0.224	0.417	0.301	0.459	0.519	0.500	0.506	0.500	0.446	0.497
Married	0.665	0.472	0.615	0.487	0.602	0.490	0.703	0.457	0.658	0.474
Female	0.520	0.500	0.346	0.476	0.373	0.484	0.448	0.498	0.439	0.496
Number of Children below Age 15	1.681	0.850	1.530	0.792	1.656	0.949	1.740	1.010	1.701	0.947
Manager/Professional/Technician	0.095	0.293	0.127	0.334	0.345	0.476	0.243	0.429	0.266	0.442
Clerk	0.108	0.310	0.244	0.430	0.120	0.325	0.174	0.379	0.174	0.379
Service-Worker	0.234	0.424	0.206	0.405	0.168	0.374	0.210	0.408	0.177	0.382
Craft	0.192	0.394	0.231	0.422	0.156	0.363	0.176	0.381	0.181	0.385
Elementary Worker	0.371	0.483	0.192	0.394	0.211	0.409	0.196	0.398	0.201	0.401
State-owned Firm	0.083	0.276	0.088	0.283	0.095	0.293	0.049	0.216	0.096	0.295
Firm Size: 1-9	0.415	0.493	0.450	0.498	0.250	0.434	0.253	0.435	0.304	0.460
Firm Size: 10-49	0.277	0.448	0.277	0.448	0.342	0.475	0.297	0.457	0.302	0.459
Firm Size: 50-99	0.115	0.319	0.076	0.265	0.143	0.351	0.114	0.318	0.110	0.312
Firm Size: 100-249	0.071	0.258	0.073	0.261	0.104	0.306	0.119	0.324	0.111	0.314
Firm Size: more than 249	0.122	0.328	0.123	0.329	0.160	0.367	0.218	0.413	0.174	0.379
Manufacturing	0.319	0.466	0.205	0.404	0.302	0.459	0.199	0.399	0.246	0.430
Construction	0.121	0.326	0.121	0.326	0.068	0.252	0.074	0.262	0.082	0.274
Retail Trade	0.211	0.408	0.169	0.375	0.150	0.358	0.255	0.436	0.201	0.401
Transport/Communication	0.071	0.258	0.068	0.252	0.140	0.348	0.096	0.295	0.094	0.292
Financial Services	0.060	0.237	0.088	0.283	0.149	0.356	0.151	0.359	0.127	0.333
Other Services	0.218	0.413	0.349	0.477	0.191	0.393	0.224	0.417	0.250	0.433
Observations	687		762		719		799		10,693	

Construction of HPWO-Indices

a) Work-System Index
The *Work System-Index* is based on four main components: (1) the autonomy of an individual in decision-making, (2) the degree of horizontal and vertical communication, (3) team-work, and (4) a job design that involves job rotation.

The index for the autonomy of an individual in decision-making is based on the responses of a worker to the following five questions:

- *Are you able, or not, to choose or change your order of tasks?*
- *Are you able, or not, to choose or change your methods of work?*
- *Are you able, or not, to choose or change your speed or rate of work?*
- *Generally, does your main paid job involve, or not, assessing yourself the quality of your own work?*
- *Generally, does your main paid job involve, or not, solving unforeseen problems on your own?*

The answers to these questions were coded 1 if the individuals answered yes, and 0 otherwise. An autonomy index is calculated as the sum of the five questions divided by five.

Conditional on being able to discuss working conditions within the workplace of an individual in general, the second component of the *Work System-Index*, the index for the degree of horizontal and vertical communication, is based on the responses to the following five questions:

- *Do these exchanges of views (on working conditions) take place with your colleagues?*
- *Do these exchanges of views (on working conditions) take place with your superiors?*
- *Do these exchanges of views (on working conditions) take place with your staff representatives?*
- *Do these exchanges of views (on working conditions) take place on a regular basis?*
- *Do these exchanges of views (on working conditions) take place on a formal basis?*

The answers to these questions were coded 1 if the individuals answered yes and 0 otherwise. Similar to the autonomy index, a communication-index is derived as the sum of the five variables divided by five.

The last two components of the *Work System-Index* describe whether the job of an individual involves team-work and job rotation and are based on the following questions:

- *Does your job involve, or not, doing all or part of your work in a team?*
- *Does your job involve, or not, rotating tasks between yourself and colleagues?*

Again, the answers to these questions were coded 1 if the individuals answered yes and 0 otherwise. Based on the indices for the autonomy of an individual in decision-making, the extent of vertical and horizontal communication, team work and job rotation, a composite index describing the involvement of an individual in a flexible work system is derived as the sum of these four components divided by 4. This final *Work System-Index* ranges between 0 and 1.

b) Skill Index
The skill-index is based on the responses to the following questions:

- *Over the past 12 months, have you undergone training paid for or provided by your employer or by yourself if you are self-employed, to improve your skills or not?*
- *If yes, how many days over the past 12 months did you participate in training?*

Based on this information, I calculated the days of training that an individual participated in employer-provided training, setting the days of training to zero for those reported that they have not undergone employer provided training. I computed the standardized score (z-score) for these variable and linearly transformed this score to a skill index that ranges between zero and 1.

c) Incentive Index

The incentive index is constructed using the responses to the following questions:

- *Does your remuneration include payments based on the overall performance of the company (profit-sharing scheme) where you work?*
- *Does your remuneration include payments based on the overall performance of a group?*
- *Does your remuneration include income from shares in the company you work for?*

The answers to these questions were coded 1 if the individuals answered yes and 0 otherwise. The incentive index is defined as the sum of the three variables divided by three.

c) HPWO Scale

The HPWO Scale is defined as the sum of the *Work System-Index*, the *Skill Index*, and the *Incentive Index* divided by three.

Appendix Table 3: HPWO components

	EU-15	Austria	Belgium	Denmark	Finland	France	Germany	Greece
Able to choose order of tasks	0.602	0.585	0.638	0.790	0.751	0.662	0.524	0.379
Able to choose methods of work	0.660	0.606	0.619	0.756	0.658	0.623	0.699	0.422
Able to choose speed or rate of work	0.664	0.687	0.614	0.792	0.658	0.652	0.623	0.578
Assessing quality of own work	0.740	0.729	0.713	0.870	0.796	0.808	0.686	0.503
Solving unforeseen problems	0.811	0.784	0.868	0.916	0.752	0.874	0.777	0.656
Autonomy Index	0.696	0.678	0.691	0.825	0.723	0.724	0.662	0.508
Communication with colleagues	0.669	0.624	0.729	0.763	0.848	0.618	0.651	0.582
Communication with superiors	0.664	0.671	0.705	0.817	0.852	0.663	0.626	0.535
Communication with staff representatives	0.310	0.225	0.355	0.463	0.449	0.284	0.286	0.203
Communication on a regular basis	0.366	0.343	0.437	0.435	0.419	0.353	0.224	0.194
Communication on a formal basis	0.324	0.367	0.395	0.358	0.326	0.359	0.239	0.153
Communication Index	0.467	0.446	0.524	0.567	0.579	0.455	0.405	0.333
Job involves team work	0.606	0.671	0.578	0.631	0.626	0.574	0.573	0.555
Job involves job rotation	0.479	0.610	0.420	0.444	0.352	0.438	0.449	0.511
Work System Index	0.562	0.602	0.553	0.617	0.570	0.548	0.522	0.477
Share of workers receiving training	0.319	0.321	0.305	0.480	0.520	0.235	0.283	0.120
Days of training	3.847	4.218	2.940	5.743	3.660	2.808	2.769	2.192
Skill Index	0.011	0.012	0.008	0.016	0.010	0.008	0.008	0.006
Payments on overall performance of company	0.072	0.060	0.044	0.030	0.113	0.114	0.055	0.035
Payments based on overall group performance	0.033	0.018	0.029	0.011	0.070	0.035	0.023	0.017
Income from shares in the company	0.022	0.007	0.017	0.013	0.014	0.032	0.018	0.004
Incentive Index	0.042	0.028	0.030	0.018	0.066	0.060	0.032	0.019
HPWO Scale	0.205	0.214	0.197	0.217	0.215	0.205	0.187	0.167
Observations	10693	763	765	881	607	846	891	376

Appendix Table 3 continued: HPWO components

	Ireland	Italy	Luxembourg	Netherlands	Spain	Portugal	Sweden	UK
Able to choose order of tasks	0.544	0.496	0.573	0.791	0.516	0.451	0.771	0.696
Able to choose methods of work	0.554	0.663	0.671	0.830	0.540	0.505	0.833	0.667
Able to choose speed or rate of work	0.621	0.709	0.651	0.795	0.604	0.527	0.638	0.711
Assessing quality of own work	0.733	0.697	0.653	0.834	0.747	0.694	0.749	0.761
Solving unforeseen problems	0.726	0.757	0.742	0.940	0.822	0.677	0.919	0.808
Autonomy Index	0.636	0.664	0.658	0.838	0.646	0.571	0.782	0.729
Communication with colleagues	0.751	0.647	0.735	0.826	0.611	0.449	0.692	0.738
Communication with superiors	0.746	0.626	0.683	0.829	0.527	0.488	0.748	0.739
Communication with staff representatives	0.486	0.284	0.390	0.384	0.239	0.291	0.305	0.371
Communication on a regular basis	0.498	0.414	0.358	0.504	0.317	0.341	0.231	0.529
Communication on a formal basis	0.419	0.353	0.459	0.425	0.111	0.363	0.250	0.454
Communication Index	0.580	0.465	0.525	0.593	0.361	0.386	0.445	0.566
Job involves team work	0.755	0.406	0.698	0.691	0.566	0.582	0.574	0.796
Job involves job rotation	0.625	0.452	0.505	0.517	0.379	0.411	0.480	0.608
Work System Index	0.649	0.497	0.596	0.660	0.488	0.487	0.570	0.675
Share of workers receiving training	0.361	0.210	0.316	0.464	0.202	0.138	0.406	0.515
Days of training	4.269	2.010	4.813	4.620	6.005	3.877	3.620	6.095
Skill Index	0.012	0.006	0.013	0.013	0.016	0.011	0.010	0.017
Payments on overall performance of company	0.030	0.059	0.070	0.093	0.043	0.006	0.132	0.086
Payments based on overall group performance	0.020	0.035	0.046	0.018	0.017	0.003	0.039	0.060
Income from shares in the company	0.025	0.006	0.003	0.012	0.006	0.000	0.015	0.048
Incentive Index	0.025	0.034	0.040	0.041	0.022	0.003	0.062	0.064
HPWO Scale	0.228	0.179	0.216	0.238	0.176	0.167	0.214	0.252
Observations	744	652	286	915	687	762	719	799