

## *WelfarEurope* Working Paper 2

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# Preference-respecting Multi-dimensional Well-being on the Job: Evidence from Recent Graduates

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September 2016

## Abstract

An important role of social and public policies is to encourage initiative of people to work and to provide employment for their citizens. Nevertheless, the role of these policies should not exclusively be concerned with the improvement in the quantity of jobs (i.e. ensuring the optimal employment rate) but likewise these policies should be designed to improve the well-being of workers by enhancing the quality of jobs for these workers. Although, it is difficult to spot the precise definition of job quality in the literature, one can reasonably argue that job quality is a multi-dimensional concept which includes the wage dimension but also non-wage (other) job dimensions such as job autonomy, job security, how interesting your job is, etc. Accepting the idea that a job quality is a multi-dimensional concept leads to the important question of aggregating these various job dimensions into an overall index of job quality which can be used as a measure of well-being on the job. Moreover, if we agree on the notion that the preferences of workers over job characteristics should be respected, then we have to find a proper way to weight these various job characteristics such that the construction of weights is consistent with the preference orderings over different jobs. A measure that satisfies the previous two requirements is known in the literature as the equivalent income (wage) measure. In this study we have applied the concept of equivalent wage to a specific sub-population of recent graduates (i.e. bachelor, master and doctoral students) who are presently participating at the labour market. In addition to the equivalent wage measure, we have used four other well-being measures which are wage, average preferences objective measure, equal weights objective measure and subjective job satisfaction measure. We have compared the following well-being measures on a large scale survey which consists of nineteen countries. Our results indicate that different measures of job quality will result in substantially different ranking of job quality across countries. In other words, this evidence points out that the choice of well-being measure for policy makers is utterly important for measuring job quality. We have also analysed the gender differential in job quality across countries by using wage and equivalent wage measure. These results are first illustrated at the mean and then we have provided a more detailed picture which has shown the wage and equivalent wage differentials across the distribution. The evidence we have found indicate that in majority of countries, the quality of jobs is higher for men. In addition, after we have computed the equivalent wage measure we have used this information in order to retrieve the willingness-to-pay for each non-wage job characteristic. We have compared the gender differences in the willingness-to-pay across and within countries. Lastly, we presented the decomposition the total willingness-to-pay on the contributions attributed to each non-wage job characteristic. We have found that across countries for both men and women, having a good career prospect is relatively the most important job characteristic while job security is relatively the least important job characteristic.

**Keywords:** job quality, job satisfaction, preferences, equivalent income, economics of gender

**JEL Classifications:** J16, J28, J80, I30

# 1 Introduction<sup>1</sup>

An important part of individual well-being comes from the well-being on the job. Given the fact that individuals spend much of their time at work, it is plausible to assume that the quality of job will be reflected in the evaluation of overall well-being of individuals. The evidence shows that individuals are not employed only to be paid but they have other reasons like realizing their own potentials and enriching their social life. Job quality is not only important for workers but for firms as well. According to the efficiency wage theory, the effort that a worker will exert is determined by the job quality which is defined as the amount of wage paid by the firm. Thus, higher job quality will induce workers to exert higher effort which will result in higher profits for firms. The policy makers are interested in the job quality as well. As a matter of fact, an important part of the economic literature is concerned with the implementation and evaluation of public and social policies. Since the job quality provides the information on how well people are doing on their jobs, this information would allow the policy makers to identify those workers in low quality jobs. Accordingly, the labour market policies can be designed in such a way to increase the well-being of those workers who are in low quality jobs. Thus, the aim of these policies is to enhance the decisions of economic agents since the actual behaviour of individuals may not bring them to achieve the best situation in life. Nevertheless, before we could assess the impact of a particular policy on the well-being of individuals, we would have to define the theoretical framework (concept) of well-being. For that matter, having a measure of well-being is quite useful. An approach that has been used extensively is to construct an objective well-being measure. However, a weakness of an objective well-being measure comes from the fact that such a measure will not care for the preferences of individuals but instead it would be paternalistic since the government (or someone else in charge) would decide what is the best for individuals. Certainly, this attempt would not be embraced by the economists who are stressing out the importance of individual preferences. The relative importance of various job aspects is not the same for all individuals. Some individuals prefer to work longer hours, some prefer higher paid jobs, some prefer higher security at the job, etc. Thus, the information on preferences of workers is highly relevant for creating a good social and public policies. In the literature we can basically find three approaches on how to obtain information on preferences (see [Decancq et al. \(2015\)](#)). The first approach is known as the *stated preference* approach where the individuals evaluate the importance between material (income) and non-material (non-income) dimensions. The disadvantage of the *stated preference* approach is that we either do not have the information about these evaluations or these evaluations are flawed due to cognitive difficulties individuals are exposed to by answering the questions in the contingent evaluation techniques. In the second approach, individuals declare their preferences through the behaviour we observe and through the choice they make. This is known as the *revealed preferences* approach (see [Bernheim and Rangel \(2009\)](#)). The *revealed preferences* approach has the disadvantage that the decisions which individuals make can contain errors and moreover we rarely observe choices over many dimensions. The third approach consists of using the *subjective satisfaction* scores of individuals which allow us to obtain the information on the weights between monetary (income) and non-monetary (non-income) dimensions (see [Schokkaert and Decancq \(2013\)](#)). The *subjective satisfaction* approach overcomes the disadvantages of these two approaches but it cannot be used directly for making interpersonal comparisons of well-being. However, the *subjective satisfaction* approach suffers from two problems which are suggested by [Sen \(1985\)](#). The first problem concerns the *physical condition neglect* which means that the *subjective satisfaction* may not need to take into account the physical characteristics of the individuals but only their mental states. The second problem concerns the *valuation neglect* since the *subjective satisfaction* cannot be used to value a reflective activities. These two problems restrain us to use the *subjective satisfaction* approach directly when we want to make interpersonal comparisons of well-being. In other words, the subjective responses to job satisfaction question may not contain independent variation to other variables of concern which we want to use to explain the individual behaviour. The responses to job satisfaction question reflect the objective situations in life of individuals but also on their psychological states such as aspirations, expectations and norms. Therefore, the analysis of job satisfaction requires more comprehensive approach and our attempt will be to show that we can use the subjective variable like job satisfaction in order to obtain useful information about the job quality of individuals.

Although, the well-being on the job is an important part of the overall well-being for many individuals, nevertheless, it is amazing that in contemporary economic literature, the topic of job quality is quite under researched. Yet, it is evident that the policy makers and governments are mainly concentrated on how many jobs there are in the economy and in the literature much attention has been given to studies that deal with the topic of job quantity (i.e. job creation, job stability and labour market participation). This shows a limited viewpoint of

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<sup>1</sup>We acknowledge the support from the European Social Fund, which financed the project *WelfarEurope - Measuring Quality of Life and Work in Europe*. The paper was mainly written during our visit to the Centre for Economic Studies (CES) at Katholieke Universiteit Leuven and Marko Ledić's visit to the Institute of Economics, Zagreb. We thank Erik Schokkaert for hospitality at CES and for fruitful discussions. The responsibility for all errors and omissions remain with the authors.

researchers and policy makers since the well-being of individuals is substantially determined by the quality of their jobs. Nevertheless, we can notice that recently, the topic of job quality is becoming increasingly important for the policy makers, governments and international organizations. The European Union has shown a significant effort to incorporate the job quality in their agenda on the *European Employment Strategies*. In Leaken 2001, it was the first time that the job quality indicators have been considered as a part of employment and social policies. Within this initiative, the quality of employment was selected as an aspect that will define the quality of job (see [European Commission \(2001\)](#)). The important incentive for measuring and evaluating multi-dimensional well-being of the current and future generations has been developed by the Stiglitz, Sen and Fitoussi Commission (see [Stiglitz et al. \(2009\)](#)). The OECD has included the topic of job quality in their analysis of overall well-being *Better Life Initiative* but also to the analysis of *Inclusive Growth* (see [OECD \(2015a,b\)](#)), ILO constructed the “Manual on Concepts and Definitions of Decent Work Indicators” ([ILO \(2012\)](#)), the UNECE constructed the “Framework for Measuring Quality of Employment” ([UNECE \(2015\)](#)) and the Eurofond constructed the “Job Quality Framework” ([Eurofound \(2012\)](#)).

Although a substantial effort has been exerted by international organisations to improve the measurement of job quality and to develop its conceptual framework, it is evident that further effort is needed for constructing the operational framework for measuring job quality which can be then easily applied in different settings while respecting the fundamental principles (assumptions) that a reasonable job quality measure should incorporate (see [Muñoz de Bustillo et al. \(2011b\)](#)). Unfortunately, until today there is still no agreement on the definition of job quality and what will be the proper way to measure it. The researchers and policy makers are confronted with two main impediments when they are analysing the job quality. The first difficulty bears upon finding a proper definition and how to find a measure of job quality which will be consistent with comparisons over countries, time and groups<sup>2</sup>. The second difficulty concerns the multi-dimensional concept of job quality which resulted in finding no agreement on the question about which dimensions we should include in a measure of job quality but also there is no agreement on how to measure these dimensions. Researches who have tackled the topic of job quality, were predominantly interested in the job quality from a one-dimensional prospect of wage (see [Lucifora et al. \(2005\)](#) and [Grimshaw \(2011\)](#)). This is obviously not a very realistic point of view since the job quality is not only determined with the material dimension (see [Clark \(2005\)](#)) but it is also determined by other dimensions which are not expressed in material terms. Thus, a stepping-stone for measuring job quality comes from the fact that job quality is a multi-dimensional concept and trying to construct a measure of well-being which will aggregate various job dimensions in a single measure is not a trivial task. If one wants to tackle this issue then the first step is to create the weights ascribed to each dimension which have normative justification. In the literature there are two main approaches for creating an index of well-being on the job. The first approach is to compute the objective measure of well-being on the job which ascribes equal weights to all job dimensions. The objective well-being measure is computed either by using a factor analysis, regression analysis (see [Jencks et al. \(1988\)](#), [Kalleberg and Vaisey \(2005\)](#)) or the researcher presupposes some arbitrary weights which are then ascribed to all job dimensions. Although, this approach is quite simple to implement, nevertheless it suffers from a serious weakness which is that the chosen weights do not reflect the fact that individuals have different preferences over various job attributes. As we have argued, different individuals may have different preferences over job dimensions. The second approach is to measure job quality with the subjective job satisfaction revealed by individuals (see [Freeman \(1978\)](#); [Clark and Oswald \(1996\)](#), [Hamermesh \(1977, 2001\)](#), [Blanchflower and Oswald \(2004\)](#), [Ritter and Anker \(2002\)](#), [Levy-Garboua and Montmarquette \(2004\)](#) and [D’Addio et al. \(2007\)](#)). The concept of job satisfaction originates from the literature in sociology, industrial psychology and organizational behaviour (see [Herzberg et al. \(2011\)](#) and [Spector \(1997\)](#)). The subjective job satisfaction reflects the workers attitude for a various collection of job characteristics at their job. The proponents of this approach presuppose that the job satisfaction score reflects the well-being on the job or in other words it reflects the true valuation of the job quality for individuals (see [Clark \(1997, 2001\)](#), [Frey and Stutzer \(2002a,b\)](#)). One of the founders of the concept of job satisfaction, [Locke \(1976\)](#) suggested that the job satisfaction in general, can be defined as the summation of job outcomes such that each job outcome is weighted by its importance to the worker. Nevertheless, as it has been argued in the literature, the subjective job satisfaction is affected by the adaptation and expectations (i.e. scaling factors) which means that one has to be careful with the direct interpretation of the job satisfaction measure since

<sup>2</sup>Nevertheless, there are several approaches that researches have undertaken to analyse the differences and trends in job quality across countries. The most elementary approach for analysing job quality is based on the analysis of job dimensions (see [Olsen et al. \(2010\)](#); [Clark \(2005\)](#)). Although, this approach is simple to apply, nevertheless a serious weakness of this approach is that it does not take into account the correlations between different job dimensions (i.e. low job security and high job autonomy) and also this approach is difficult to apply if we consider a large number of job dimensions. Second approach is to analyse the job quality on the basis of taxonomy of job types (see [Holman \(2013\)](#)). Third approach is to analyse the job quality from the macroeconomic perspective which is based on building a model of job quality at the national level (see [Davoine et al. \(2008\)](#)). The forth approach is to analyse the job quality by constructing an index of job quality which weights different job dimensions (see [Ritter and Anker \(2002\)](#); [Leschke et al. \(2008\)](#); [Muñoz de Bustillo et al. \(2011a\)](#) and [Schokkaert et al. \(2011\)](#)).

the job satisfaction is not a proxy for utility or well-being at work<sup>3</sup> (see Hamermesh (2001), Levy-Garboua and Montmarquette (2004), Muñoz de Bustillo et al. (2011b) and Sousa-Poza and Sousa-Poza (2000)). To illustrate this point, one can simply imagine a worker who objectively holds a job of low quality but her subjective job satisfaction is high due to her low reference level of adaptations and expectations. In other words, the well-being on the job is considered to be a more comprehensive concept than the concept of job satisfaction (see Danna and Griffin (1999)). It is obvious that these two approaches for measuring job quality are opposing each other. The objective measures of well-being do not take into account the importance of individual preferences but instead the relative importance of each dimension is imposed in a paternalistic way. The subjective job satisfaction measure is sensitive to individual preferences but these preferences are as well under the influence of scaling factors which can violate the assumption of genuine preferences (i.e. violation of the consistency assumption).

In this empirical study we aim our attention at measuring job quality using a large sample of countries. We restrict our analysis to a specific sub-population of recent graduates who have just entered the labour market. Since the literature on job quality for young and educated workers is quite scarce and moreover given the importance this sub-population have in the society, we have decided to take this approach and measure job quality among recent graduates. The main reason why younger highly educated workers have been left out from the job quality analysis is based on opinion that this group of people have higher opportunities on the labour market than the others (see Kalleberg and Vaisey (2005)). However, these young and educated workers have job characteristics and job values that differ from the job characteristics and job values of previous generations of workers (see Ng et al. (2010)). Thus, what a former group of workers think of a good job may be quite different from the opinion of the later group of workers. As a measure of job quality is of the utmost importance for constructing valuable labour market policies we have decided to compute and compare five different measures of well-being on the job. The job quality measures we have used to evaluate the job quality across countries, include the objective measure of equal weights, objective measure of average preferences, subjective measure of job satisfaction, wage and equivalent wage. In the upcoming sections we will explain in detail the implementation and informational requirement for each of these measures.

We also analyse the determinants of job satisfaction among the recent graduates. From the perspective of policy makers and governments it is important to know the effects of various job characteristics on job satisfaction, since the policy makers can influence on the former variables. The literature on job satisfaction suggests that there are various determinants that have an effect on job satisfaction. The first set of determinants refers to monetary and non-monetary job characteristics. The effect of wage on job satisfaction is found to be positive although some researches claim that the relationship between the absolute wage level and job satisfaction is not substantial (see Levy-Garboua and Montmarquette (2004)). It has been found that the effect of wage on job satisfaction is reducible since workers can adapt to higher wages (see Groot and Maassen van den Brink (1999)), that job satisfaction can be influenced by wage inequality (see Hamermesh (2001)) or it is the wage of some reference group which matters (see Clark and Oswald (1996)). On the other hand, the important list of non-monetary job characteristics includes recognition, achievement, responsibility, variety, task identity, autonomy, skill utilization and security (see Herzberg et al. (2011); Muñoz de Bustillo et al. (2011b)). The relationship between the temporary work and part-time work and job satisfaction has been studied as well (see De Witte and Näswall (2003); Booth and Van Ours (2008)). The effect of education on job satisfaction has been found to be diverse, some researches found a positive correlation (see Clark and Oswald (1996); Grund and Sliwka (2005)) while other researches found a correlation effect (see Hall and Buttram (1994)).

In addition, our work connects the measurement of job quality with the literature on gender economic inequality<sup>4</sup>. We do so by analysing the gender differences in job quality within and across countries. Although the economic position of men and women has become more equal from the 1950s until today, we still observe that women are on average less paid and that they work on the jobs of lower quality (see Ponthieux and Meurns (2015) for an overview). The evidence that shows persisting gender wage gaps across countries is indeed puzzling since women have gained comparable level of education relative to men, women have prolonged their decision about maternity and the family structures have changed such that marriages are not stable as before and women showed increased economic independence by discarding their male spouse as a breadwinner. Nevertheless, women are still treated unequal to men on the labour market. The importance of this evidence has greatly reflected in recent work of policy makers who have designed policies in order to equate the conditions which led to gender wage inequality (see OECD (2012)). The approach we have taken to analyse the gender differences in job quality consists of comparing the wage and equivalent wage measure. In addition, after comparing the gaps in the job quality at the mean, we have proceed further into the distributional analysis of the gender gaps in job quality. We have

<sup>3</sup>Economists have been traditionally reluctant to use the subjective variables like job satisfaction, although other social scientists have paid much attention to it.

<sup>4</sup>Although the following term is a quite broad we would concentrate on the issue of the gender wage gap and gender equivalent wage gap.



also compared the gender differences in the willingness-to-pay for reaching the reference values for non-wage job characteristics. Finally, we have illustrated the Shapley value decomposition of the total willingness-to-pay on the contributions attributed to each non-wage job characteristic. The later results are computed separately for men and women and we also compare these results across gender. Our results indicate that it is quite important which measure of well-being on the job we chose since different measures will result in different ranking of countries. We have found that in most of the countries, men have higher well-being on the job than women. Besides wage, young graduates care much about other non-wage job characteristics. Our results show that for both men and women, having a good career prospect is relatively the most important non-wage job characteristic while job security is relatively the least important non-wage job characteristic.

The paper is structured as follows. In section 2 we describe the conceptual framework for each measure of job quality. In section 3 we present a set of measures of job quality that we will use. Section 4 illustrates the empirical strategy for estimating job satisfaction model. In the same section we illustrate the methodology for estimating the equivalent wage from the job satisfaction data. Section 5 describes the data and it shows the distribution of job quality across countries. Section 6 presents the results. Section 7 concludes.

## 2 Satisfaction, Individual Preferences and Job Characteristics

In this section we illustrate the theoretical framework for measuring job quality that will be used in our empirical analysis. The purpose of constructing a measure of job quality is to provide an information on the well-being of individuals at their jobs. It is important to note that before constructing a measure of job quality one should justify the foundations on which the following measure is based on. We present a set of propositions which serve as a normative underpinnings for these measures. Each proposition would have a different implication on what these measures would entail. For the presentation of these propositions we follow [Fleurbaey et al. \(2009\)](#), [Schokkaert et al. \(2011\)](#).

### 2.1 The Framework

Let us assume that a job of each individual  $i$  (where  $i \in 1, 2, \dots, N$ ) is defined by a vector of job characteristics or aspects that we denote with  $\theta_i$ . The vector of job characteristics represents the jobs of individuals in all respects by including the outcomes and achievements at their jobs. We assume that the vector of job characteristics consists of a material job characteristic which is captured by wage of the individual  $w_i$  and other (non-wage) job characteristics (i.e. security, autonomy, etc.) which are represented with a vector  $x_i$  that contains  $m$  other job characteristics  $x_i = (x_i^1, x_i^2, \dots, x_i^m)$ , where  $m \in (1, 2, \dots, M)$ . Thus, the vector of job characteristics can be written as  $\theta_i = (w_i, x_i)$ , where  $\theta_i \in \mathbb{R}_+^m$ . We assume that individuals are well-informed about what represents a good job. In other words, each individual  $i$  has an ordinal preference ordering over the vectors of job characteristics which are denoted with  $\mathcal{R}_i$  for a weak preference ordering,  $\mathcal{P}_i$  for a strict preference ordering and  $\mathcal{I}_i$  for an indifferent preference ordering. In addition, we assume that individual preferences are complete, continuous, transitive and weakly monotonic. We can represent any preference ordering  $\mathcal{R}_i$  that satisfy these requirements by a utility function which we denote with  $U_i$ . Formally this relation can be written as

$$\forall \theta_i, \theta'_i \in \mathbb{R}_+^m, \theta_i \succeq \theta'_i \iff U_i(\theta_i) \geq U_i(\theta'_i) \quad (1)$$

where  $U_i : \mathbb{R}_+^m \rightarrow \mathbb{R}$ . Since we will be interested in ordinal ranking of bundles of job characteristics, we can use the indifference curves obtained from the utility function as a description of preference rankings for these bundles. Nevertheless, in order to be able to make the interpersonal comparison of utilities we must have individuals with exactly the same preferences which does not seem as a plausible assumption since different individuals may have different preferences. Once we introduce the heterogeneity of preferences we may not longer use the indifference curves as a tool to compare bundles of goods between individuals. A situation where the heterogeneity of preferences does not allow us to use the indifference curves for utility comparison is depicted in [Figure 1](#). Suppose there are two individuals  $i$  and  $j$  and both of them have two job characteristics  $\theta^1$  and  $\theta^2$ . The slope of indifference curves reveal that an individual  $i$  relatively prefers  $\theta^2$  while on the opposite an individual  $j$  relatively prefers  $\theta^1$ . Since their indifference curves cross we are not able to tell whether individual  $i$  in point  $\theta_i$  is better or worse off than individual  $j$  in point  $\theta_j$ . A solution to this problem is found by cardinalizing the utility function such that to each indifference curve we ascribe a number according to which we can precisely rank the well being of individuals by looking at their indifference curves. An approach that we will follow in order to achieve the cardinalization of utility function is to use the information on the subjective satisfaction of individuals  $S_i$  as a way of assigning a number to indifference curves of individuals. As long as the satisfaction function of individuals  $S_i$  complies with individual preferences  $\mathcal{R}_i$  one can achieve a cardinalization of utility function. The following requirement can be

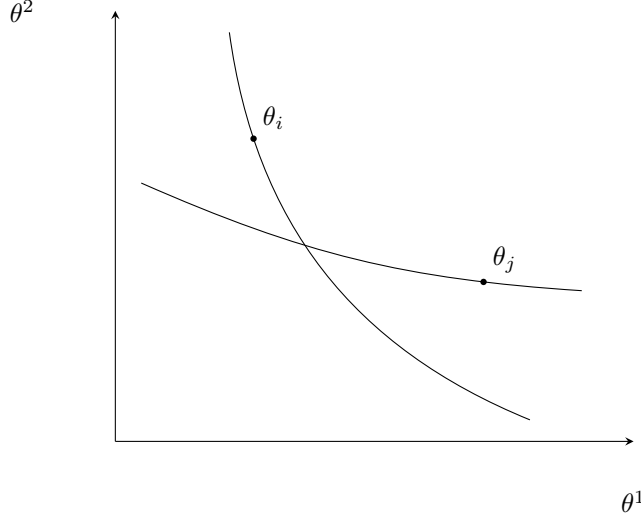


Figure 1: Preferences

written as

$$\forall \theta_i, \theta'_i \in \mathbb{R}_+^m, \theta_i \mathcal{R}_i \theta'_i \iff S_i(\theta_i) \geq S_i(\theta'_i) \quad (2)$$

Nevertheless, this requirement that tells us that a cardinal representation of  $S_i$  could be achieved from the preference ranking  $\mathcal{R}_i$  is not entirely consistent neither with the theory nor with the empirical findings. For instance, individuals may report the level of subjective satisfaction which is affected with their mental states or feelings that they are endure and therefore their level of satisfaction will not be consistent with the preference ordering (see [Adler \(2013\)](#)). Another reasons why the consistency between the subjective satisfaction and preference ordering may fail concerns the evidence that individuals change their aspirations and expectations in life such that they compare their life situations with a particular reference group or they compare their life situations at different points in their life span (see [Loewenstein and Ubel \(2008\)](#)). In other words, if we want to have a proper cardinal representation of  $S_i$  which is consistent with the representation of preference ranking  $\mathcal{R}_i$ , we have to take into account the influence of aspirations, expectations and other scaling factors. It is important to note that these scaling factors affect the labels (position) of indifference curves but they do not have an effect on the slope of indifference curves. Finally, we arrive at the condition that guarantees that the cardinal representation of the satisfaction function  $S_i$  is consistent with the representation of the preference ordering  $\mathcal{R}_i$ . The following condition can be written as

$$\theta_i \mathcal{R}_i \theta'_i \iff S_i(\theta_i, \mathcal{R}_i, \Sigma_i) \geq S_i(\theta'_i, \mathcal{R}_i, \Sigma_i) \quad (3)$$

where  $\Sigma_i$  represents the scaling factors such as aspiration and expectation of individuals. We can see that immediately after we control for the level of aspiration and expectation, the preference orderings of bundles is logically equivalent (equal by definition) to a situation where we compare the subjective satisfaction of individuals holding these bundles and given their preferences.

## 2.2 Propositions for a measure of job quality

We now turn to present a set of propositions which a sound measure of job quality should satisfy. In the following setting a measure of job quality designates the well-being of individuals at the jobs they hold. The job situation of the individual  $i$  is completely characterized by a triplet  $(\theta_i, \mathcal{R}_i, \Sigma_i)$ . The well-being of individual  $i$  is denoted with  $\Omega_i$ . Putting this notation into use we can compare the well-being of individual  $i$  in different job situations. Let us suppose that we have to evaluate the well-being of individual  $i$  at two job situations which are  $(\theta_i, \mathcal{R}_i, \Sigma_i)$  and  $(\theta'_i, \mathcal{R}'_i, \Sigma'_i)$ . If we encounter that  $(\theta_i, \mathcal{R}_i, \Sigma_i) \succeq (\theta'_i, \mathcal{R}'_i, \Sigma'_i)$  (or equivalently  $(\theta_i, \mathcal{R}_i, \Sigma_i) \mathcal{R}_i (\theta'_i, \mathcal{R}'_i, \Sigma'_i)$ ) then we can conclude that  $\Omega(\theta_i, \mathcal{R}_i, \Sigma_i) \geq \Omega(\theta'_i, \mathcal{R}'_i, \Sigma'_i)$ . As we are predominantly interested in comparing well-being between individuals we have to come up with a valid and acceptable properties on which our measure of well-being will be based on. In this regard, showing respect for individual preferences play a decisive role. If we assume that individuals have identical preferences then we do not have to worry that the principle of sovereignty of individual preferences would be violated in the process of well-being comparison. Nevertheless, we confront a non-trivial

question how to compare the well-being between individuals when we assume that individuals do not have the identical preferences. On the way to find a solution to the following dilemma we could start with the so-called *Dominance Principle*.

**Principle 1** (*Dominance Principle*). *Let us assume that there are two individuals  $i$  and  $j$  which differ in their preference rankings such that  $\mathcal{R}_i \neq \mathcal{R}_j$ . Then this principle imply that  $\Omega(\theta_i, \mathcal{R}_i, \Sigma_i) \geq \Omega(\theta_j, \mathcal{R}_j, \Sigma_j)$  if  $\theta_i \geq \theta_j$  and similarly for the strict preference relations ( $\mathcal{P}$ ) and indifference preference relations ( $\mathcal{I}$ ).*

In line with this principle we can say that if the bundle of job characteristics of the individual  $i$  is not smaller than the bundle of job characteristics of the individual  $j$  then the well-being at job of individual  $i$  is at least as good as the well-being at job of individual  $j$ . It is obvious that a weakness of this principle is that it does not imply a complete preference ordering but only partial preference ordering. The *Dominance Principle* completely disregards individual preferences (and scaling factors) when it compares the job quality of individuals. Nevertheless, the preferences of individuals can be quite distinctive and since we believe that the idea of respecting individual preferences is important, we would look for a principle which would require that a measure of well-being at the job takes into account the preferences of individuals over a vector of job characteristics. In order to do this we introduce the *Same Preference Principle*.

**Principle 2** (*Same Preference Principle*).

*Let us assume that there are two individuals  $i$  and  $j$  which have identical preference rankings,  $\mathcal{R}_i = \mathcal{R}_j = \mathcal{R}$  and they have identical scaling factors,  $\Sigma_i = \Sigma_j = \Sigma$ . Then the following principle imply that (i)  $\Omega(\theta_i, \mathcal{R}_i, \Sigma_i) \geq \Omega(\theta'_i, \mathcal{R}_i, \Sigma_i) \iff \theta_i \mathcal{R} \theta'_i$ , (ii)  $\Omega(\theta_i, \mathcal{R}, \Sigma) \geq \Omega(\theta_j, \mathcal{R}, \Sigma) \iff \theta_i \mathcal{R} \theta_j$ , and similarly for the strict preference relations ( $\mathcal{P}$ ) and indifference preference relations ( $\mathcal{I}$ ).*

The following principle states that the choice between the two different bundles of job characteristics within the same individual will help us to compare the well-being at the job that includes these bundles. In addition, this principle assert that for two individuals with the same preference ordering and same level of scaling factors, we can compare the well-being between these two individuals which will be equivalent to the preference orderings between the bundles of job characteristics own by each individual. Nevertheless, it is important to stress out that we cannot find a measure of job quality which will satisfy at the same time the *Dominance Principle* and *Same Preference Principle* because these two principles are mutually not consistent. [Fleurbaey \(2007\)](#) and [Decancq et al. \(2015\)](#) show that if we consider both of these principles then the axiom of transitivity will be violated. This can be easily shown in [Figure 2](#). Suppose there are four jobs available which we denote with  $a$ ,  $b$ ,  $c$  and  $d$ . Each of these jobs is characterized with the different vector of job characteristics  $\theta$ . If we apply the *Dominance Principle* we would obtain  $\Omega^b(\theta_i^b, \mathcal{R}_i, \Sigma_i) \geq \Omega^c(\theta_j^c, \mathcal{R}_j, \Sigma_j)$  and  $\Omega^d(\theta_j^d, \mathcal{R}_j, \Sigma_j) \geq \Omega^a(\theta_i^a, \mathcal{R}_i, \Sigma_i)$  while if apply the *Same Preference Principle* we would obtain  $\Omega^c(\theta_j^c, \mathcal{R}_j, \Sigma_j) \geq \Omega^d(\theta_j^d, \mathcal{R}_j, \Sigma_j)$  and  $\Omega^a(\theta_i^a, \mathcal{R}_i, \Sigma_i) \geq \Omega^b(\theta_i^b, \mathcal{R}_i, \Sigma_i)$ . Obviously, it is not possible to satisfy these results.

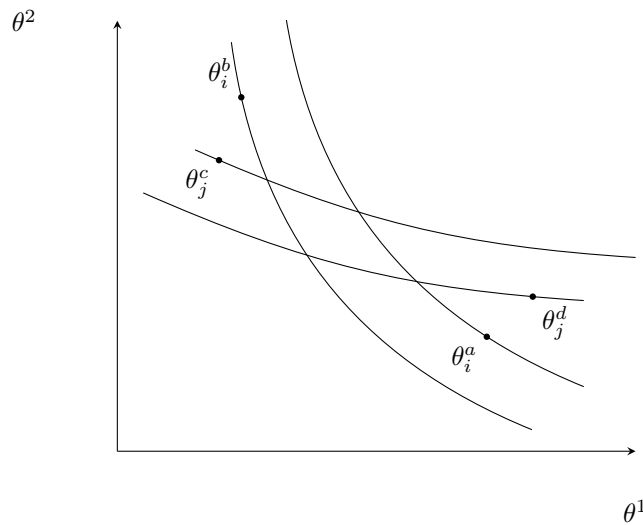


Figure 2: Preferences (violation of transitivity)

Although the previous principle gave rise to the important notion of individual preferences that should be respected, yet the underlining assumption was that the scaling factors are assumed to be constant across individuals.



Nevertheless, as we have argued the scaling factors such as the level of aspirations and expectations can vary across individuals or they can vary across time for a given individual. Therefore, we have to consider the principle which takes into account individual preferences in the setting where the scaling factors might not be constant. This principle can be formally stated as

**Principle 3** (*Personal Preference Principle*). *Let us assume that there are two individuals  $i$  and  $j$  which have identical preference rankings,  $\mathcal{R}_i = \mathcal{R}_j = \mathcal{R}$  but their scaling factors differ,  $\Sigma_i \neq \Sigma_j$ . Then the following principle imply that (i)  $\Omega(\theta_i, \mathcal{R}_i, \Sigma_i) \geq \Omega(\theta'_i, \mathcal{R}_i, \Sigma'_i) \iff \theta_i \mathcal{R}_i \theta'_i$ , (ii)  $\Omega(\theta_i, \mathcal{R}, \Sigma_i) \geq \Omega(\theta_j, \mathcal{R}, \Sigma_j) \iff \theta_i \mathcal{R} \theta_j$ , and similarly for the strict preference relations ( $\mathcal{P}$ ) and indifference preference relations ( $\mathcal{I}$ ).*

Nevertheless, since the *Personal Preference Principle* is not consistent with the *Dominance Principle* and since the *Personal Preference Principle* implies the *Same Preference Principle*, this means that the *Personal Preference Principle* will not be consistent with the *Dominance Principle* as well. In order to solve this problem one can either weaken the *Same Preference Principle* or one can weaken the *Dominance Principle*. Fleurbaey (2007) and Decancq et al. (2015) argue that we should weaken the *Dominance Principle* since it is crucial that the creators of public and social policies respect individual preferences over important dimensions in life. A weaker form of the *Dominance Principle* is given in the following principle.

**Principle 4** (*Subset Dominance (Weak Dominance) Principle*). *Let us assume that there are two individuals  $i$  and  $j$  which might have different preference rankings,  $\mathcal{R}_i \neq \mathcal{R}_j$  and they might have different scaling factors,  $\Sigma_i \neq \Sigma_j$ . In addition, let us assume that there exists a subset  $\Gamma \in \mathbb{R}_+^m$ , such that  $\theta_i, \theta_j \in \Gamma$ . Then we have  $\Omega(\theta_i, \mathcal{R}_i, \Sigma_i) \geq \Omega(\theta_j, \mathcal{R}_j, \Sigma_j)$  if  $\theta_i \geq \theta_j$ .*

It is important to note that the *Subset (Weak) Dominance Principle* still applies the same rationale as the *Dominance Principle* but it is constrained at the specific subset of the space of job characteristics which we denote with  $\Gamma$ . Fleurbaey (2009) has shown that the *Same Preference Principle* and *Personal Preference Principle* are both satisfying the *Subset Dominance (Weak Dominance) Principle* and this proves the existence of a well-being measure which respect individual preferences. This measure is known as the *Equivalent income* (see Fleurbaey (2009) and Decancq et al. (2015)) and it will be discussed more in detail in the next section.

### 3 Measures of Job Quality

We present five measures of well-being on the job where each of these measures are conceptually different so that they use different part of information to evaluate job quality. We will differentiate between the well-being measures according to the arguments present in each of these measures which are a vector of job characteristics  $\theta_i$ , preference orderings  $\mathcal{R}_i$  and the scaling factors (i.e. aspiration and expectations)  $\Sigma_i$ . In other words, a measure of well-being on the job uses the information which is included in a triple  $(\theta_i, \mathcal{R}_i, \Sigma_i)$ . However, it is not necessary that all measures of well-being on the job use the entire information included in a triple but rather they may use only some part of it. Since our aim is to evaluate the job quality across individuals, we can compare the numbers obtained with each measure of well-being on the job. Having a number attached to a measure of well-being on the job for each individual  $i$ , we can simply look at the distribution of the measure in order to single out the worst off or the best off individuals.

#### 3.1 Subjective Measure of Well-being on the Job

The subjective measure of well-being on the job is based on the job satisfaction question where individuals self report their level of satisfaction on the job. The convenience of this approach is that we can use the answers on the job satisfaction question as a measure of job quality. We can define the subjective measure of well-being on the job of individual  $i$  which is represented with the job satisfaction function as follows

$$WB^s(\theta_i, \mathcal{R}_i, \Sigma_i) = S(\theta_i, \mathcal{R}_i, \Sigma_i) \quad (4)$$

Nevertheless, one has to be very cautious when using the subjective job satisfaction as an instrument to compare job quality. As we have already mentioned in the previous section, the number assigned to the subjective job satisfaction (i.e. calibration of the job satisfaction function) of individuals will be under the influence of the scaling factors like the aspirations, adaptation, expectations and personal characteristics of individuals. One can reasonably be sceptical about whether the subjective measure of well-being on the job appreciate the preferences of individuals. As long as the consistency assumption is satisfied, this measure will comply with the ordinal preference rankings of individuals  $\mathcal{R}_i$  such that we could legitimately be involved in making *intra-personal* comparisons of well-being on the job. In other words, if the consistency assumption holds, we can argue that this measure satisfies

the *Same Preference Principle*. Of course, one can easily imagine the situation where the individual  $i$  prefers  $\theta_i$  over  $\theta'_i$ ,  $\theta_i \mathcal{R}_i \theta'_i$ , but due to altering scaling factors, the individual  $i$  would still be more satisfied in a situation where she possesses  $\theta'_i$  than in a situation where she possesses  $\theta_i$ ,  $S(\theta_i, \mathcal{R}_i, \Sigma_i) < S(\theta'_i, \mathcal{R}_i, \Sigma'_i)$ . Nevertheless, even if the *Same Preference Principle* is satisfied still this does not allow us to make the *inter-personal* comparisons of well-being on the job. For instance, it is easy to imagine the situation where two individuals  $i$  and  $j$ , both have the same preferences,  $\mathcal{R}_i = \mathcal{R}_j = \mathcal{R}$ , where they both prefer job  $b$  over job  $a$  but nevertheless the satisfaction of individual  $i$  that holds job  $b$  may be lower than the satisfaction of individual  $j$  that holds job  $a$ . Since these two individuals assign a different number to their satisfaction functions and since the later depend on the scaling factors (i.e. adaptations, norms and expectations) which may be different for different individuals, it is indeed plausible this situation to occur. Thus, since the scaling factors play a role, the subjective job satisfaction will not satisfy the *Personal Preference Principle*. In the work by Sen (1985) the influence of aspiration and adaptations on the subjective satisfaction is well described in his notion of *physical condition neglect* according to which a person  $i$  can adapt to her poor situation such that she is more satisfied than the other person  $j$  who might be in the better situation but due to a higher expectations of person  $j$ , still person  $i$  will be more satisfied than person  $j$ . Thus, it is reasonable to argue that if consider the subjective job satisfaction as a measure of job quality then the comparisons of well-being on the job across individuals would be flawed.

### 3.2 Wage

In the previous section we have assumed that one dimension of the vector of job characteristics  $\theta$  grasps the possession of monetary assets of the individual. This material dimension of  $\theta$  was represented with wage. Using wage as a measure of well-being on the job of individual  $i$  we arrive at the following expression

$$\text{WB}^w(\theta_i, \mathcal{R}_i, \Sigma_i) = w_i \quad (5)$$

One can immediately notice that the multi-dimensionality of the job quality measure falls apart with the wage measure. The obvious weakness of the this approach is that the *inter-personal* comparisons of well-being on the job between two individuals would be identical if these two individuals have the same wage, although these two individuals may be quite different with respect to other (non-wage) job characteristics which they find important on their jobs. Reducing the well-being on the job on a single measure that only takes into account material assets is deeply unsatisfactory according to our view.

### 3.3 Objective Measure of Well-being on the Job

Those who are interested in the multi-dimensional concept of well-being would not find the previous measure of well-being useful since it only take into consideration one aspect of the job of individuals (i.e. wage). The weakness of a one-dimensional measure can be solved by including additional aspects of the job which workers consider important. Unfortunately, even when these additional aspects of the job are included in a measure of well-being, still the remaining challenge is how to make the *inter-personal* comparisons of well-being based on a vector of job characteristics. Using the *Vector Dominance Principle* we would require that all elements of the vector of job characteristics are larger for some individual (i.e.  $\theta_i \gg \theta_j$ ) so that we could make the well-being comparison. It seems that the later requirement would be rather difficult to satisfy. A logical solution to this problem consists of finding the importance weights for each aspect of the job and then using these weights we aggregate all aspects of the job in one score which can be used for making *inter-personal* comparisons of well-being. The weight ascribed to each aspect of the job would reflect the importance of that aspect of the job relative to some other aspect of the job that is chosen in the measure of job quality. The selection of weights for the objective well-being measures on the job is based either on the statistical-data driven procedure (i.e. factor or principal component analysis) or on the normative (i.e. a priori) opinion and neither of these two approaches allow that the constructed weights use the information on individual preferences and in that way consider the individual opinion on the aspects of the job which they find important. Particularly, the weights for the objective measure of well-being would be grounded on the notion that the comparison of well-being should be based on some reference individual whose preferences and scaling factors we take for granted. We will denote the reference value for preferences by  $\tilde{\mathcal{R}}$  while the reference value for a vector of scaling factors is denoted by  $\tilde{\Sigma}$ . The objective measure of well-being on the job for individual  $i$  can be defined as follows

$$\text{WB}^o(\theta_i, \mathcal{R}_i, \Sigma_i) = S(\theta_i, \tilde{\mathcal{R}}, \tilde{\Sigma}) \quad (6)$$

Notice that the objective well-being measure uses the subjective job satisfaction score of some reference individual (i.e.  $\tilde{\mathcal{R}}$  and  $\tilde{\Sigma}$ ) which will then be used to compare the well-being of various jobs. Thus, the weights ascribed

to the attributes of the job will be the same across individuals. Nevertheless, since the preferences and scaling factors differ across individuals, the objective measures of well-being do not satisfy the *Same Preference Principle* and thus they do not satisfy the *Personal Preference Principle*. Yet, the objective well-being measures would satisfy the *Dominance Principle* if we select positive weights to each aspect of the job.

### 3.4 Equivalent Wage

The measures we have yet presented seem to suffer from some serious weaknesses. Although the subjective measure of well-being may respect individual preferences in the *inter-personal* well-being comparisons (i.e. the *Same Preference Principle* is satisfied) if the *consistency assumption* holds, still the following measure cannot be used in the *intra-personal* well-being comparisons (i.e. the *Unconditional respect for preferences* is violated) due to the presence of scaling factors. On the other hand, the objective well-being measures are patronizing in ascribing the weights to job dimensions and thus these measures do not show respect for individual preferences over job dimensions that individuals may care about. Nevertheless, there exists an approach which appreciates individual preferences and which can be used in *inter-personal* comparisons of well-being. It is called the *equivalent income (wage)* approach (see [Fleurbaey et al. \(2009\)](#) and [Decancq et al. \(2015\)](#)). We can describe the well-being on the job of individual  $i$  using the equivalent wage measure as

$$WB^{w*}(\theta_i, \mathcal{R}_i, \Sigma_i) = w_i^* \text{ such that } (w_i, x_i) \mathcal{I}_i (w_i^*, \tilde{x}_i) \quad (7)$$

This measure represents the hypothetical level of wage  $w_i^*$  of an individual  $i$  when all of her non-wage dimensions  $x_i$  are set on the reference value  $\tilde{x}$  such that she is indifferent between this position and her original position. The equivalent wage is represented in [Figure 3](#). For simplicity of presentation, we assume that there are two individuals  $i$  and  $j$  and there are only two job characteristics which are wage  $w$  and job security  $s$ . The vectors of job characteristics are represented by  $\theta_i$  and  $\theta_j$  for individual  $i$  and  $j$ , respectively. The solid horizontal line represents the reference value for job security which we denote with  $\tilde{s}$ . One can notice that individual  $i$  has a lower wage than individual  $j$  though individual  $j$  is more secure than individual  $j$ . In addition, we can see that these two individuals have different (ideas, judgements) believes on what makes a valuable (great) job. For instance, individual  $j$  has a steeper indifference curve which tells us that she prefer less job security. On the other hand, the indifference curve of individual  $i$  is sloped less which means that he attaches a higher weight on job security. The intersection point between the reference value for security  $\tilde{s}$  and indifference curve represents the equivalent wage. These two points are denoted with  $\theta'_i$  and  $\theta'_j$ . Notice that in order to reach the equivalent wage we are moving along the indifference curves of individuals  $i$  and  $j$  so that these two individuals are equally well-off in their initial positions  $(\theta_i, \theta_j)$  and when they reach the reference value for job security  $(\theta'_i, \theta'_j)$ .

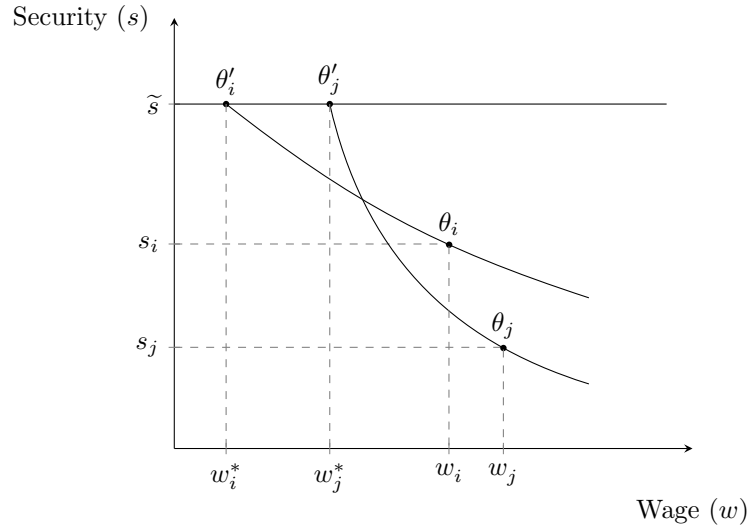


Figure 3: Equivalent wage

It is obvious that the equivalent wage is equal to wage when all non-wage job characteristics of individuals are taking the reference values. In addition, we can see that the equivalent wage of individuals does not reckon on their preferences over job attributes. Even though the individual  $i$  has a higher job security, yet the equivalent income of individual  $i$  is lower than the equivalent wage of individual  $j$  because individual  $j$  has a higher wage and

he cares less for job security. Nevertheless, even if we had the situation where  $w_i > w_j$  and  $s_i > s_j$  still we could have  $w'_i > w'_j$ . In other words, the equivalent wage measure would not satisfy the *Dominance Principle* but the equivalent wage measure would satisfy the preferences of individuals (*Same Preference Principle* and *Personal Preference Principle*) and the *Subset (Weak) Dominance Principle*. Once we have obtained the equivalent wage we can easily retrieve the individual willingness-to-pay (WTP) for having the non-wage job characteristics at the reference values. Taking the difference between the equivalent wage and wage of the individual  $i$  we arrive at

$$\text{WTP}_i(x_i \rightarrow \tilde{x}; \theta_i) = w_i - w_i^* \quad (8)$$

where  $\text{WTP}_i(x_i \rightarrow \tilde{x}; \theta_i)$  represents the of willingness to pay of individual  $i$  for a change from  $x_i$  to  $\tilde{x}$ . We can see in our example that although the individual  $i$  has higher job security than individual  $j$  ( $s_i > s_j$ ) yet, individual  $i$  has a higher WTP than individual  $j$ . The reason for this lies in the fact that individual  $i$  cares more about job security than individual  $j$  does.

## 4 Methodology

### 4.1 Estimating Equivalent Wage

In this section we present the methodological framework for estimating the equivalent wage from the individual data on job satisfaction. The procedure for estimating equivalent wage (income) that we follow in our work can be found in [Fleurbaey et al. \(2009\)](#), [Schokkaert et al. \(2011\)](#) and [Decancq et al. \(2015\)](#). The estimation of the equivalent wage requires that we have available information on subjective job satisfaction  $S_i$ , information about job characteristics  $\Sigma_i$  and information on preferences of individuals  $\mathcal{R}_i$ . Normally, one can find the information on  $S_i$  and  $\Sigma_i$  in surveys which are immediately ready to use in the estimation of the equivalent wage. However, the information on  $\mathcal{R}_i$  is usually not directly accessible from the data so we will follow the procedure which infer information on individual preferences from the data on job satisfaction. Typically, one can find in the questionnaires the following job satisfaction question *What is your overall satisfaction with job?* The interviewees are normally offered a categorical or discrete (or combination of both) scale on which they can choose their answer where the scale of answers ranges from the lowest level of job satisfaction (“very dissatisfied”) to the highest level of job satisfaction (“very satisfied”). The relationship between the job satisfaction as the dependent variable and the right hand side variables can be presented with the following equation

$$S_i = \alpha + (\beta + \Omega Z_i) \ln w_i + (\gamma + \Lambda Z_i)' X_i + Z_i \sigma + \epsilon_i \quad (9)$$

where  $\ln w_i$  is the logarithm of wage,  $X_i$  is a vector of other (non-wage) job characteristics,  $Z_i$  is a vector of personal characteristics,  $\epsilon_i$  is the error term while  $\alpha, \beta, \gamma, \Omega, \Lambda$  and  $\sigma$  are parameters to be estimated. The logarithmic transformation of wage is applied in order to capture the non-linear effect of wage on job satisfaction. That is to say, we are assuming that the effect of wage on job satisfaction is marginally decreasing. The important point that has to be emphasized from the outset concerns the impact of personal characteristics on job satisfaction. We distinguish two different effects that  $Z_i$  has on  $S_i$ . The direct effect that personal characteristics have on the subjective job satisfaction, represented with  $\sigma$ , is capturing the effect of aspirations, adaptations and norms which may be different across individuals. This effect scales the indifference curves of individuals but does not change the slope of indifference curves. Nevertheless, the personal characteristics  $Z_i$  have the indirect effect on the subjective job satisfaction through the interaction terms. In other words, a vector of coefficients  $\Omega$  and  $\Lambda$  change the slope of indifference curves of individuals since they affect the marginal rate of substitution between wage and other (non-wage) job characteristics. Thus, the interaction terms between job characteristics and personal characteristics are of great importance for us in obtaining the information on individual preferences. The heterogeneity of individual preferences is certainly an important issue and we take the view that individual preferences over job characteristics should definitely be respected. In that respect, we model the heterogeneity of individual preferences by assuming that workers with different socio-demographic and other work related characteristics have a distinctive view on the importance over job characteristics. We can represent the marginal rate of substitution between wage and other (non-wage) job characteristic  $k$  as follows

$$MRS_i^{w, X_{ik}} \equiv \frac{\partial S_i / \partial X_{ik}}{\partial S_i / \partial w_i} = \frac{(\gamma + \Lambda Z_i)' w_i}{\beta + \Omega Z_i} \quad (10)$$

where  $MRS_i^{w, X_{ik}}$  denotes the marginal rate of substitution for an individual  $i$ . One should note that we are not precisely able to obtain the information on individual preferences but rather we can estimate the group preferences where the particular group is defined for those individual with the same values for personal characteristics  $Z$ . Thus,

we assume that individuals with the same values for  $Z$  have the same preferences. In addition, we will assume that the marginal rate of substitution between wage and other (non-wage) job characteristics is constant, although we are certainly aware this may be an oversimplification. After we have specified the job satisfaction regression we can proceed further with the estimation of equivalent wage. In the next step we define the reference values for all other (non-wage) job characteristics which we denote with  $\bar{X}_i$ . Plugging these reference values and the level of wage  $w_i^*$  into the job satisfaction regression we obtain the following expression

$$S_i = \alpha + (\beta + \Omega Z_i) \ln w_i^* + (\gamma + \Lambda Z_i)' \bar{X}_i + Z_i \sigma + \epsilon_i \quad (11)$$

where  $\bar{X}_i = (\bar{X}_{1i}, \dots, \bar{X}_{ki})$ . We calculate the equivalent wage  $w_i^*$  such that a worker  $i$  is indifferent between the hypothetical job situation  $(w_i^*, \bar{X}_i)$  and her actual job situation  $(w_i, X_i)$ . In order to do the following we equate the equations (1) and (3)

$$\alpha + (\beta + \Omega Z_i) \ln w_i + (\gamma + \Lambda Z_i)' X_i + Z_i \sigma + \epsilon_i = \alpha + (\beta + \Omega Z_i) \ln w_i^* + (\gamma + \Lambda Z_i)' \bar{X}_i + Z_i \sigma + \epsilon_i \quad (12)$$

The following expression can be simplified further to

$$(\beta + \Omega Z_i) \ln w_i + (\gamma + \Lambda Z_i)' X_i = (\beta + \Omega Z_i) \ln w_i^* + (\gamma + \Lambda Z_i)' \bar{X}_i \quad (13)$$

Solving this equation for  $w_i^*$  we obtain the equivalent wage equation

$$w_i^* = w_i \exp \left[ \left( \frac{\gamma + \Lambda Z_i}{\beta + \Omega Z_i} \right)' (X_i - \bar{X}_i) \right] \quad (14)$$

We can notice that a vector  $\sigma$  has vanished from the equivalent wage equation since the coefficients capturing aspirations, adaptations and norms do not play a role any more. The error term  $\epsilon_i$  has been dropped since any stochastic dissimilarities over workers are not important for computing the equivalent wage. Nevertheless, the interaction terms between personal characteristics and job characteristics are included in the equation since the equivalent wage measure respect preferences over job characteristics. The term in the second (round) bracket shows by how much a worker is deprived in each of his non-wage job dimension from the reference value of that non-wage job dimension. This immediately implies that if a worker suffers no deprivation in non-wage job characteristics then her equivalent wage equates to her wage.

## 4.2 Estimating Job Satisfaction Equation

This section illustrates our empirical strategy that we have used for estimating the job satisfaction regression. We have worked with several different specifications for the job satisfaction regression. We start with the simplest specification for the job satisfaction regression while in each consecutive model specification we enrich our specification by adding up additional control variables. The dependent variable which we denote with  $S_i$  represents the job satisfaction acknowledged by each individual  $i$ . Obviously one important job characteristic concerns the monetary remuneration of workers for the effort they have exerted. In our work, this characteristic is represented with wage<sup>5</sup> which we denote with  $(w_i)$ . The remaining job characteristics which we have used relate to a set of non-wage job characteristics which we denote with a vector  $(X_i)$ . The respondents were asked to assess eight job characteristics using the following question: *Please indicate to what extent the following job characteristics actually apply to your current work situation?* The list of job characteristics included work autonomy (*Autonomy*), job security (*Security*), opportunity to learn new things (*Learn*), new challenges (*Challenges*), good career prospects (*Career*), social status (*Social Status*), chance of doing something useful for society (*Valuable*) and good chance to combine work with family task (*Family Work*). The responders were offered a discrete-categorical scale where the possible answers from which they could choose ranged from 1 (“not at all”) to 5 (“to a very high extent”). We denote a vector of job characteristics (wage and other (non-wage) characteristics) with  $\theta(w_i, X_i)$ . It is important to note that this set of job characteristics we have chosen, is not to be considered as the exhaustive set of job characteristics that workers find important at their jobs. Yet, our choice of job characteristics matches the choice of job characteristics we have found in other studies. We have included a vector of personal characteristics ( $Z_i$ )

<sup>5</sup>We have used the gross monthly wage of the individuals in their full-time working equivalent. A full-time working equivalent is calculated on the basis of the average working hours in the country where the individual works. The gross monthly wage includes the gross monthly earnings in the main employment per contractual hours and overtime hours. Wages for all countries are measured in euros and they have been corrected for the purchasing power parity (PPP) between countries. In addition, we have used a Consumer Price Index (CPI) in order to have a comparable measures of inflation since the data is collected in 1999/2000 for one group of countries while for other set of countries the data is collected in 2002/2003. We have applied a CPI for all countries in the later group. The reference period for a CPI is 2005.



which consists of a set of socio-demographic variables such as age, gender, dummy variable if an individual has at least one child, dummy variable if an individual is living with partner, dummy variable if an individual is living with parents, relatives, friends or other, level of education measured as the number of years of education currently attained (i.e. the number of years which is required to earn the highest degree which individual has attained at present) then it consists of a dummy variable if an individual works in the medium company (50-249 employees), dummy variable if an individual works in a large company (250 employees and more), dummy variable if an individual followed any work related course or training in the past 12 months, dummy variable if an individual work in public sector, dummy variable if an individual works part time (i.e. less than 30 hours per week) and a five points scale (from 1 to 5) variable for work risk which measures the degree of damage that could happen if a worker made major mistakes or omissions in the performance of his work. The richness of the data allowed us to include a self-assessment of the workers on a set of 14 competencies required at their job which we then include in a vector  $F_i$ . The respondents were asked to provide the information on their own level of competence by answering at the following question *How do you rate your own level of competence?*. This list of competencies includes the mastery of their own field or discipline (*Masterfield*), knowledge of other field or discipline (*Knowfield*), analytical thinking (*Think*), ability to perform well under pressure (*Pressure*), alertness to new opportunities (*Alert*), ability to use time efficiently (*Use Time*), ability to work productively with others (*Work Productivity*), ability to mobilize the capacities of others (*Mobilize Others*), ability to make their meaning clear to others (*Make Clear*), ability to use computers and the internet (*Use Computers*), willingness to question their own and others ideas (*Quest*), ability to present products, ideas and reports to an audience (*Present*), ability to write reports, memos and documents (*Write*) and ability to write and speak in a foreign language (*Foreign Language*). These variables are measured on a categorical-discrete scale which ranges from 1 (“very low”) to 7 (“very high”). Normally, this type of information on the required level of competencies is not available to researchers so having these variables at our disposal enable us to control for unobserved heterogeneity. Since we do not have a panel data set we were prevented from using the fixed effects which control for the unobserved (time-invariant) heterogeneity. Nevertheless, our concern is to control for some time-invariant variables which would not be the available strategy to follow with the fixed effects and it can also bias the estimates (see [Boyce \(2010\)](#)). For that matter, we opted to include the variables capturing workers abilities in order to control for the unobserved heterogeneity. In addition,  $G_i$  consists of another set of controlling variables such as a dummy variable for type of occupation, dummy variable for type of industry and country dummies. The specification of the job satisfaction regression that contains the previously mentioned variables can be written as

$$S_i = \alpha + \beta w_i + X_i \gamma + F_i \pi + G_i \kappa + Z_i \sigma + \epsilon_i \quad (15)$$

where  $\alpha, \beta, \gamma, \sigma, \pi$  and  $\kappa$  are parameters of interest to be estimated while  $\epsilon_i$  is the error term. At this stage it is crucial to understand the role of coefficients obtained from the satisfaction equation. Since our objective is to obtain information on individual preferences we will calculate the marginal rate of substitution between wage and each other (non-wage) job characteristics. Thus, we will use coefficients  $\beta, \gamma$  ( $\gamma_1, \dots, \gamma_8$ ) for obtaining the slopes of indifference curves for individuals. We are still left with coefficients  $\alpha, \sigma$  and  $\kappa$  which we do not use for estimation of individual preferences but they rather represent the scaling factors or shifters for labelling the indifference curves. We have assumed that our job satisfaction regression is linear in the parameters which then implies that the indifference curves are linear and parallel lines. In other words, the marginal rates of substitution between wage and other (non-wage) job characteristics are held constant. Nonetheless, we are aware the fact that the marginal rates of substitution may not be constant and therefore assuming linearity of parameters in the job satisfaction regression may be unrealistic. Another important issue concerns the heterogeneity of individual preferences that as we argued should be respected when estimating the job satisfaction regression. One way to achieve a more flexible functional specification of the job satisfaction regression is to permit the coefficients on wage and other (non-wage) job characteristics to vary between individuals who are having different socio-demographic or different job related characteristics. Thus, we have included the interaction terms between job characteristics and the variables which represent the socio-demographic and job related characteristics. We permit the coefficients on job characteristics to vary for different socio-demographic groups like gender, whether an individual is young (defined for age 25-34), has at least one child, lives with a partner, lives with his family or relatives. The coefficients on job characteristics are also allowed to vary for different job related characteristics which are based on whether an individual works in a medium sized company (a group of 50-249 employees), large company (a group of 250 and more employees), has followed any work-related course/training in the past 12 months and if she works in a public sector or not. We have assigned an index  $j$  ( $j \in (0, 1)$ ) to the coefficient of  $\beta$  and to every coefficient contained in  $\gamma$  depending on the information about the socio-demographic background of the worker, size of the company and



type of sector she works at. This can be written as

$$\begin{aligned}\tau_j = & \tau_{j0} + \tau_{j1}young_i + \tau_{j2}male_i + \tau_{j3}child_i + \tau_{j4}partner_i + \tau_{j5}family_i \\ & + \tau_{j6}compmed_i + \tau_{j7}complarge_i + \tau_{j8}training_i + \tau_{j9}sector_i + \tau_{j10}part_i\end{aligned}\quad (16)$$

where  $\tau_j(\beta_j, \gamma_j)$  is defined as a vector of coefficients to wage  $\beta$  and non wage job characteristics  $\gamma$ , which are having an index  $j$ . After we have made the interaction terms between job characteristics and variables which supposedly change the slope of individual preferences, then we are left to include these terms into our model given in equation 15. Therefore, the final specification of the satisfaction regression which includes an interaction terms can be written as

$$S_i = \alpha + \beta_j w_i + X_i \gamma_j + F_i \pi + G_i \kappa + Z_i \sigma + \epsilon_i \quad (17)$$

where  $\alpha, \beta_j, \gamma_j, \sigma, \pi$  and  $\kappa$  are parameters to be estimated while  $\epsilon_i$  denotes the error term. As a result of natural ordering of our dependent variable, we have estimated the equation 17 with the ordered logit model (see [Cameron and Trivedi \(2005\)](#) and [Train \(2009\)](#)). All parameters in our model are estimated by the maximum likelihood estimation (MLE).

## 5 Data

In our analysis we have used the Reflex (Research into Employment and professional flexibility) and Hegesco (Higher Education as a Generator of Strategic Competencies) data, which are two large-scale surveys among higher education graduates (i.e. including bachelor, master and doctoral graduates). While the Reflex data relates to the study programme which individuals have finished in 1999/2000, the Hegesco data relates to the study programme which individuals have finished in 2002/2003. Since the objective for collecting these data sets was (among others) to analyse the transitional process of individuals with higher education on the labour market, we could exploit the information about the the labour market status of individuals once they have left their education. More precisely, the information on the labour market status of individuals contained both the information about the first job after graduation and the current job of an individual. In our analysis we will use only the information on the current job of individuals although it may happen that the current job for some individuals is actually their first job after graduation. Both of these two surveys are compatible in their methodology and they contain information on a various topics such as socio-demographic conditions, a type of study programme individuals have finished, attained level of education, other educational and related experiences, job satisfaction, own level of competencies and the required level of competencies at work, job outcomes and job characteristics. Concerning the geographical coverage of the data, the Reflex data contains 14 countries (Austria, Finland, France, Germany, Italy, the Netherlands, Norway, Spain, the UK, Belgium (Flanders), Czech Republic, Portugal, Estonia and Japan) while the Hegesco data contains 5 countries (Slovenia, Turkey, Lithuania, Hungary and Poland).

The distribution of overall job satisfaction for each country is illustrated in [figure 4](#). The question on the overall job satisfaction that we have used for our analysis is formulated as follows: *How satisfied are you with your current work?* The responders were offered a discrete-categorical scale of possible answers which ranged from 1 denoting the category of “very dissatisfied” workers to 5 denoting the category of “very satisfied” workers. Each sub-figure in [figure 4](#) represents the estimated proportions and confidence intervals of the overall job satisfaction for a given country. Vertical bars represent the categories of job life satisfaction variable while the capped spike lines at each vertical bar represent 95 percent confidence intervals in given category. We have shaded vertical bars in darker color for men while the bars in lighter color denote women. One can immediately notice that the distribution of job satisfaction within countries does not differ much between men and women. Within each country, the highest proportion of individuals is to be found in the category “satisfied” while the smallest proportion of individuals is to be found in the category “very dissatisfied”. Moreover, the distribution of job satisfaction is gently skewed to the left for every country.

[Table 1](#) provides the descriptive statistics of the main variables (tabulated in rows) we used in the analysis. On average the job satisfaction level is highest in Norway and Austria while it is lowest in Turkey and Japan. The oldest higher graduates are found in Slovenia while youngest in Belgium. On average the highest share of couples are found in Norway and Finland while the lowest share is found in Japan. On the other side, we find the largest share of individuals living with their families in Japan while the lowest in Norway and Finland. The perception of risk at work is on average the lowest in Czech Republic and highest in Slovenia. The average wage is lowest in Turkey and highest in Germany. Moreover, on average the higher education graduates in Turkey earn around 11 % of their counterparts in Germany. In columns 15-23 we show the average values of non-wage job characteristics.

The highest level of work autonomy is found in Austria and lowest in Turkey. Job security and opportunity to learn new things is highest in Estonia. Workers in Norway are mostly confronted with new challenges while workers in France are the least confronted with new challenges. Good career prospects are highest in the UK and lowest in Germany. Chance of doing something useful for society is highest in Norway and lowest in Hungary. Good chance to combine work with family task is the worst in the UK and the best in Lithuania.

## 6 Results

In this section we first present the results obtained from the job satisfaction regression. Then we present the results that illustrate the average values and ranks of five different indicators of job quality. After we have compared different measures of job quality, we illustrate the gender differential in job quality across and within countries. The later results are computed for wage and equivalent wage measure of well-being on the job. Fourth, we present the results obtained from the Shapley value decomposition of the total willingness-to-pay to its contributions to non-wage job characteristics. Finally, we show the gender differences in the total willingness-to-pay over the entire distribution.

### 6.1 Job Satisfaction Regression

We illustrate the estimation results for the job satisfaction regression in [table 2](#). Our results represent five different specifications we have used for the job satisfaction model. We start from the most parsimonious specification (model I) and then we enrich each succeeding model with the additional control variables until we have reached the full specification (model V). We have estimated each model on a pooled sample of 19 countries. As our dependent variable is categorical and ordered (i.e. larger values designate higher outcome) we have used the ordered logistic regression to fit the model. In addition, we have applied the backward-selection estimation for each five models we have estimated. The logic of the backward-selection estimation is to fit the full specification of the model on all regressors where the least significant regressor will be removed from the estimation and then the model is re-estimated. Using this stepwise selection procedure, the model is re-estimated until all insignificant regressors are dropped from the specification of the model. The significance level for removal from the model was set at 5%. The only regressors which were not subjected to the stepwise-selection procedure were the job characteristics, socio-demographic and job related characteristics and county dummies. We have used the robust standard errors in order to weaken the assumption that regressors and error term are identically distributed although we have still assumed these terms to be independent. Thus, even if our models are not well specified (i.e. the error term is not identically distributed), yet the inference implied from our coefficients will be valid.

The results in the first column refer to the specification where we have controlled for the logarithm of wage ( $\ln w_i$ ), other (non-wage) job characteristics ( $X_i$ ) and personal characteristics ( $Z_i$ ). In addition, we have included the interaction terms between the job characteristics and personal characteristics which allow us to obtain the information on preferences. One can see that all job characteristics (i.e. wage and non-wage characteristics) have highly significant effect on the job satisfaction (except the social status). The gross monthly wage increases the likelihood of being more satisfied on the job. We have found that jobs with more autonomy (*Autonomy*), security (*Security*), opportunity to learn new things (*Learn*), new challenges (*Challenge*), good career prospects (*Career*), chance of doing something useful to society (*Valuable*) and a chance to combine work with family tasks (*Family Work*) have a positive effect on job satisfaction. The direct effects of personal characteristics on job satisfaction are operating through out the scaling factors (i.e. aspiration and expectations of individuals). These effects are picked up by variables measuring age (continuous variable), gender, number of children, whether living with the partner, whether living in a family, attained level of education, the degree of risk at work, industry, occupational and country dummies.

The results from the model I show that the effect of age on job satisfaction is found to be convex with the minimum level of job satisfaction at age 40. Having a child increases the job satisfaction. Individuals who are living with their partners have a higher level of job satisfaction. The interaction terms between the personal characteristics and job characteristics allowing us to obtain the information on preferences. In other words, these indirect effects are representing the preference shifters for a certain socio-demographic and work characteristic an individual belongs to (i.e. represented by the equation 16). We interpret the statistical significance on the interaction terms as the evidence of preference heterogeneity that certain groups of individuals have over certain jobs. Notice that a job that has a higher social status is more preferred by young people. Higher autonomy on the job generates less job satisfaction for the young people. A job with good career prospects is more preferred by men while on the other hand men prefer less jobs which offer a chance of doing something useful for the society. Having a child reduces the preferences for a job where there is a possibility to learn new things. The positive effect of a job that brings new challenges is reduced for the individuals living with their parents, relatives or friends.

In the second column we illustrate the results obtained from the model II where in addition to the previous model we controlled for a set of variables capturing abilities and competencies of individuals. The following set of variables which are normally not available in the surveys represent the unobserved heterogeneity of individuals (see Di Tella et al. (2010)). Since the abilities and competencies may be correlated with the job characteristics and the job satisfaction it is important to consider the estimation strategy where we control for the former variables. In fact, a large number of studies in the economics have been devoted to the problem of dealing with the unobserved heterogeneity (see Ferrer-i-Carbonell and Frijters (2004), Frijters et al. (2004), Boyce (2010)). Our results indicate that the variables capturing abilities and competencies have a significant effect on job satisfaction. The effects coming from these variables capture dissimilarities in scaling factors (i.e. aspirations and expectations) between individuals. We have found that a higher mastery of their own field or discipline (*Masterfield*), higher ability to perform well under pressure (*Pressure*) and higher ability to use time efficiently (*Use Time*) increase the job satisfaction. On the other hand we have found that higher knowledge of other fields or disciplines (*Knowfield*), analytical thinking (*Think*), willingness to question your own ideas and ideas of others (*Quest*), ability to write reports (*Write*) and ability to write and speak in a foreign language (*Foreign Language*) reduce the job satisfaction. Comparing the results between model I and model II, we can see that once we have introduced the abilities and competencies of individuals, the coefficients on wage and non-wage job characteristics have slightly changed. The direction of this change went in both ways so that some of the variables capturing abilities and competencies were positively correlated with the job characteristics and others were negatively correlated with the job characteristics. In other words, the following evidence points out that individuals would have a higher or lower level of job satisfaction which is only due to the positive or negative effects of abilities and competencies but not due to the effects coming from the job characteristics. In model III we have included a set of country dummies where Italy represents the base country category. The country dummies are needed to capture the possible heterogeneity between countries. The significant coefficients on country dummies indicate that the job satisfaction in these countries is different from the job satisfaction in Italy. Although the coefficients on the job characteristics have not changed once we have introduced the country dummies, the coefficient on log wage has increased notably relative to the previous specifications. Thus, once we have taken the heterogeneity of countries into account we can see that the positive effect of (log) wage on job satisfaction have even increased.

In our forth specification, in model IV, we have decided to include a set of variables representing the objective conditions (attributes) of the job. The following set contains a dummy variable if an individual works in a medium company (50-249 employees), dummy variable if an individual works in a large company (250 employees and more), dummy variable if an individual followed any work related course or training in the past 12 months, dummy variable if an individual work in public sector, dummy variable if an individual works part time (i.e. less than 30 hours per week) and a categorical variable that measures risk at work. We treat the first four variables from this set as the preference shifters and therefore we interact them with our job characteristics. The last variable which measures the risk at work is treated as a scaling factor which means that it only has has a direct effect on the job satisfaction through a change in aspiration and expectations of individuals. While workers in the medium companies are less satisfied at their job than workers in the small companies, the opposite is true for those working in the large companies (although the later effect is not significant). Individuals who are working in a public sector have a higher job satisfaction. Job satisfaction is lower for a part-time workers which seems reasonable to expect from highly educated young people who do not want to waste their human capital investment (see Booth and Van Ours (2008) and Booth and van Ours (2013)). Increasing the degree of damage (risk) that could occur if an individual makes a serious mistake at their work has a positive effect on job satisfaction. Thus, it seems that the recent graduates prefer to take the risk.

Model V includes the additional control variables for the type of industry and occupation that an individuals belongs to. We have included a list of 17 dummy variables for the type of industry and 9 dummy variables for the type of occupation<sup>6</sup>. However, we have kept only a few of industry and occupational dummies in our regression since many of them failed to be significant after the backward selection estimation. The industry and occupational dummies are assumed to have only a direct effect on the job satisfaction or in other words we treat them as the scaling factors affecting aspirations and expectations. Clerks, craft and related trade workers and workers in elementary occupations have a lower level of job satisfaction than the legislators, officials and managers (i.e. the base category). Workers employed in the industries of accommodation, education, health and social work and other service activities are more satisfied at their job than the workers in the real estate, renting and business industry (base category). Notice that after we have introduced the industry and occupational dummies

<sup>6</sup>The dummies for the type of industry include the agriculture, hunting and forestry, fishing, mining and quarrying, manufacturing, electricity, gas and water supply, construction, wholesale and retailtrade, accommodation, transport, storage and communication, financial intermediation, real estate, renting and business, public administration and defence, education, health and social work, other services, activities of private households, extraterritorial organizations while the dummies for the type of occupation include the legislators, officials and managers, professionals, technicians and associate professionals, clerks, service workers and salesman, agricultural and fishery worker, craft and related trades workers, plant, machine operators and assemblance and elementary occupations.

in the regression, the coefficient on the log wage becomes more stronger. The non-wage job characteristics have positive and significant effect on the job satisfaction (except for the variable measuring social status which is not significant). This evidence of a positive effects of all job characteristics seems quite reasonable. One can notice that workers attach more weight to a new challenges on the job than to a higher wage. We have not found any significant gender differences in the job satisfaction. Obtaining the additional year of higher education decreases the job satisfaction. Although this result may seem surprising at the first point, it confirms the interpretation made by [Verhofstadt et al. \(2007\)](#) that the direct effect of education brings the expectations of more educated individuals upward and thus they feel less satisfied. Young people prefer less jobs that offer a higher salary but they prefer jobs with higher social status. Men have greater preferences for jobs which provide better career prospects but they less prefer jobs which offer a chance to combine work with family tasks. While those workers who have a child favour less jobs where there is a chance of doing something useful for society, on the other hand they favour more jobs where there is a good chance to combine work with family tasks. A job that provides new challenges is less preferred by those workers who are living with a partner or family. Workers in the large companies prefer less jobs that are secure and better paid. On the other hand, those working in large companies have higher preferences for jobs that offer opportunities to learn new things and jobs that offer a chance to combine work with family tasks. Workers in the public sector prefer less jobs that give a chance to learn new things.

## 6.2 Comparing Measures of Job Quality

Since we have already illustrated the conceptual framework for five different measures of well-being on the job, we can now compare the results obtained from these measures. Our first well-being measure is the gross monthly wage in full time equivalent<sup>7</sup> ( $WB^w$ ). Since we knew the earnings per contractual hours and for overtime hours and we knew the contractual and overtime hours individuals spent in main employment, we have derived the wage variable on the basis of both of these information. In addition, we made corrections for the purchasing power parity and for differences in CPI between 1999/2000 and 2002/2003 since the data for five countries (i.e. Hegesco data) were measured in 2000/2003 and all other data (i.e. Reflex data) was collected in 1999. The equivalent wage measure ( $WB^{w*}$ ) is computed from the equivalent wage equation (equation 14). The reference value for all non-wage job characteristics is set at the value of 4. In order to obtain the coefficients in the equivalent wage equation we have opted to use our results from the model V since in that specification we have controlled for the largest set of regressors and the following model had the best fit by the pseudo- $R^2$  score. The job satisfaction measure ( $WB^s$ ) is represented with the subjective job satisfaction score. An equal weights objective measure ( $WB^{o,ew}$ ) is computed as the arithmetic mean of the normalized values<sup>8</sup> of wage and non-wage characteristics. This measure includes the same wage and non-wage job characteristics that we used when we calculated the equivalent wage. The average preferences objective measure ( $WB^{o,ap}$ ) is computed from the job satisfaction equation (equation 9) but the values of variables in  $Z_i$  are replaced with their arithmetic means<sup>9</sup>. In [table 3](#) we present the average values and country rankings for each well-being measure. Ranking countries according to average wages indicates that the highest wages (i.e. lowest ranking) for recent graduates are in Germany, Norway and Belgium while the lowest wages (i.e. highest ranking) are in Poland, Hungary and Turkey. It is obvious that the wage measure does not respect individual preferences and it is not affected by scaling factors of expectations and adaptations. We can notice that a significant re-ranking occurs when we move from wage to the equivalent income measure, although the re-ranking is less pronounced for those countries which were at the bottom or top of the ranking. The equivalent wage measure respects individual preferences but it is not sensitive to scaling factors. We have found that the highest equivalent wage is in Norway, Belgium and Germany while lowest in Italy, Hungary and Turkey. A considerable increase in ranking occurred when we moved from the wage measure to the equivalent wage measure for France (an increase from [5] to [16]) and Japan (an increase from [6] to [15]). On the other hand, there has been a considerable drop in ranking as we moved from the wage to the equivalent wage measure for Spain (a drop from [12] to [6]), Czech Republic (a drop from [13] to [8]), Poland (a drop from [17] to [12]) and Estonia (a drop from [14] to [10]). As one can notice, the absolute values for the equivalent wages are substantially lower compared to wages. This is a consequence of the equivalent wage measure which respect individual preferences over job characteristics and it corrects the wage level for deprivations in non-wage job characteristics. The subjective job satisfaction measure which is given in the third column satisfies

<sup>7</sup>The full time equivalent wage is calculated on the basis of the mean contractual and overtime working hours in a given country.

<sup>8</sup>The normalization include the min-max method where the minimum value of job characteristic were subtracted from the actual value of that job characteristic and this difference is divided by the difference between maximum and minimum value of that job characteristic.

<sup>9</sup>In other words, we have computed the following equation

$$WB_i^{o,ap} = \alpha + (\beta + \Omega \bar{Z}) \ln w_i + (\gamma + \Lambda \bar{Z})' X_i + \bar{Z} \theta + \bar{\epsilon} \quad (18)$$



the *Same Preference Principle* but in addition this measure takes into account the difference in aspirations and expectations. The first thing one can notice about the subjective job satisfaction measure is that the average value of job satisfaction shows little variations across countries. The highest job satisfaction is found in Austria, Norway and Belgium while the lowest job satisfaction is found in Italy, Japan and Turkey. The last two columns illustrate two objective measures of job quality. The property of the equal weights objective measure and the average preference objective measure is that both of these measures satisfy the *Dominance Principle* but they do not pay attention on the individual preferences. According to the equal weights measure, the marginal rates of substitution between job dimensions are equal for all individuals. The objective equal weights measure shows that the job quality is highest in Norway, Czech Republic and Estonia, while the lowest job quality is in Italy, Belgium and Turkey. Measuring job quality with the average preference objective measure reveals that Germany, Norway and Belgium are having the highest well-being on the job, while the lowest well-being on job is in Italy, Japan and Turkey. This evidence shows that the rankings given by the two objective measures are giving us a quite distinctive picture on the well-being on the job across countries. Since the average preference objective measure uses the information on preferences of the average individual, this measure then produces a ranking which is closer to other two measures who are using information on individual preferences (i.e. the subjective job satisfaction and equivalent wage measures). The following reason explains why the two objective measures produce a quite distinctive ranking over countries.

In [table 4](#) and [table 5](#) we illustrate the average values and ranks of job quality measures for men and women, respectively. The results for the wage measure show that the average job quality for both men and women is highest in Germany and Norway, while the lowest job quality is in Hungary, Poland and Turkey. Comparing the gender wage differential we can notice that the average wages of recent graduates are higher for women in Norway and Belgium, while the opposite holds true for all other countries except Turkey where the average wage is the same for both men and women. Turning to the preference sensitive measure of equivalent wage we obtain a quite different picture of job quality over countries. The best job quality according to the equivalent wage measure is found in Germany, Norway and Austria for men and in Belgium, Norway and United Kingdom for women. On the other hand, the worst job quality for both men and women is found in Hungary and Turkey. Again we can see that for both men and women the absolute value of the equivalent wage has substantially decreased compared to the wage measure since the former measure is sensitive to preferences but also it is a multi-dimensional measure which takes into account deprivations in other non-wage job characteristics. This evidence points out that individuals across countries suffer to a large extent since they have not achieved the reference values of non-wage job characteristics. Comparing the measures within countries reveals that the average equivalent wage is higher for men in all countries except the United Kingdom, Norway, Czech Republic, Belgium Slovenia and Hungary. An interesting example is Norway where the average value of equivalent wage for women is higher (by around 100 euros per month) although the average wage between men and women are almost the same. Thus, men in Norway are willing-to-pay more to achieve the reference values of non-wage job characteristics although both men and women are earning the same average wage. Another interesting evidence concerns the changes in rankings for men and women as we move from the wage measure to the equivalent wage measure. We can notice that in some countries there is a substantial increase in ranking (i.e. worsening of the relative position) when we moved from the wage measure to the equivalent wage measure. For instance, in case of men we see an increase from [3] to [17] in France, an increase from [5] to [15] in Japan and increase from [6] to [13] in Belgium while in case of women we see an increase from [10] to [17] in Italy, an increase from [6] to [14] in France and increase from [7] to [16] in Japan. On the other hand, we have seen a substantial decrease in ranking (i.e. improving of the relative position) once we switched from the wage measure to the equivalent wage measure. For instance, in case of men we have observed a drop from [12] to [6] in Spain, drop from [15] to [10] in Czech Republic, drop from [18] to [14] in Poland, drop from [13] to [9] in Estonia and a drop from [9] to [5] in the Netherlands. In case of women we have observed a drop from [12] to [7] in Spain, drop from [13] to [6] in Czech Republic, drop from [14] to [10] in Estonia and a drop from [17] to [13] in Poland. The average job quality according to the subjective job satisfaction measure is highest for both men and women in Austria and Norway while it is lowest in Italy, Turkey and Japan. Finally, we will consider the two objective measures. The equal weight objective measure indicates that for men the average job quality is highest in Norway, Lithuania and Czech Republic while the lowest job quality is in Japan, Turkey and Belgium. The same measure tells us that for women the best job quality is in Norway, Czech Republic and Estonia, while the worst job quality is Italy, Portugal and Turkey. These findings raise doubts about the validity of the equal weights objective measure since the country rankings obtained with this measure differ noticeably from the rankings obtained with other measures. The average preferences objective measure indicates that for both men and women, the highest job quality is in Norway and Austria while the worst job quality is in Japan and Turkey.

### 6.3 Wage and Equivalent Wage Gender Gaps

Although in recent decades women have increased their participation in the labour market and they have caught up in the level of education with those of men we still observe inequality in labour market outcomes for women. The evidence has pointed out that over recent decades the gender wage gap has initially started to decrease across many countries but then the catching up trend slowed down (Blau and Kahn (2006a,b)). Thus, the gender wage inequality is still persistent across many countries<sup>10</sup> and the literature on the gender wage gap tells us that this evidence occurs as a result of inequality in the national wage structure, differences in employment rates of men and women, due to predominantly part-time work of women and due to gender differences in occupations (i.e. occupational segregation).

In order to analyse the gender differences in job quality we compare the gender ratios of wage and equivalent wage across and within countries. We will first compare the wage and equivalent wage ratios at the mean values over countries. In order to obtain more detailed knowledge about these differences, we will compute the ratios of wage and equivalent wage between men and women across percentiles. In order to keep the analysis of distributional inequality simple we first illustrate the ratios computed at the 10th, 50th and 90th percentile of the distributions and then we show the ratios computed over the entire distribution (i.e. from 5th till 95th percentile). The former results are given in table 6 while the later results are given in figure 6.

We start by inspecting the mean values of the wage and equivalent wage ratios. We can see that in Norway and Turkey there are no differences in the mean wages between women and men. The most unequal country is Lithuania where on average women are paid 68% of what men are paid. On the other hand in Belgium women are on average paid 16% percent more than men. In the fifth column of the table, we can see that the lowest inequality of the equivalent wage at the mean value is in Hungary and France with a 3 and 4% higher equivalent wage for women, respectively. The largest lagging behind (i.e. gap) is found in Germany and Italy where women have around 40% lower equivalent wage. We have found that on average women have higher equivalent wage in France, Finland, Norway, Czech Republic, Belgium, Slovenia and Hungary.

Turning to the results for the percentile ratios, we can immediately notice that the equivalent wage ratio show evidently larger distributional variation than the wage ratio. In other words, the evidence show that the distributional equality of wage is noticeably larger than for the equivalent wage (i.e. the percentile ratios are more alike for wage than the equivalent wage). The analysis of percentile ratios show higher distributional inequality between but also within countries. While in the United Kingdom both men and women earn almost the same wage at 10th percent (or more precisely women earn 2% more than men), in Lithuania women are paid only 71% of what men are paid. The opposite picture emerges in Turkey where women earn 34% higher wage at the 10th percent of distribution. At the median women earn less than men in all countries except Turkey where there is no wage gap. We can see that at the top 10th percent of distribution, women earn less than men in all countries apart from Turkey where women are paid 4% more. Percentile ratios of the equivalent wage show different picture which reflects primarily in larger distributional inequality of equivalent wage both between and within countries. At the bottom 10% of distribution women have higher equivalent wage in the Netherlands, United Kingdom, Norway, Japan, Estonia and Poland while in other countries women have lower equivalent wage. The magnitude of the differences in ratios at the bottom 10% percent of distribution between countries is striking. While in Lithuania women have the equivalent wage which is only 13% that of men, on the other hand in Norway women have a three-fold higher equivalent wage than men. As we move from the the bottom 10% to the bottom 50% of distribution, the ratios of equivalent wage between men and women increases for most of the countries (with the exception of the Netherlands, United Kingdom, Norway, Japan and Estonia). We see that the difference in ratios of equivalent wage at the median decreases between countries. The lowest ratio of the equivalent wage at the median is found in Lithuania where women have the equivalent wage which is 46% of equivalent wage for men while the highest ratio of the equivalent wage is found in Poland where women have the equivalent wage which is 39% higher than the equivalent wage for men. At the top 10% of distribution women have lower equivalent wages in all countries except the United Kingdom, Slovenia, Belgium, Lithuania, Hungary, Spain and Czech Republic. The results show that at top 10% of distribution, the lowest ratio of equivalent wage is found in Austria where women have 40% lower equivalent wage, while the highest ratio is found in the United Kingdom where women have the equivalent wage which is 15% higher.

A more detailed distributional picture of wage gender gaps and equivalent wage gender gaps is presented in figure 6 where we have plotted the women to men ratios of wage and equivalent wage from the 5th to 95th percentile. We can see that for almost all countries the wage ratio stays below one over the entire distribution which means that women earn less than men across the distribution. The only exception is Turkey where women earn more than men almost over the entire distribution. The wage ratio is closed to one across the distribution in Italy, Finland, Czech Republic and Belgium. In Germany, Estonia and Hungary the wage ratio is decreasing (i.e. women earn

<sup>10</sup>The average gender wage gap in most industrialized countries by the end of 2010 stands between 10% and 20%.



less compared to men) as we move from the bottom to the top of distribution while in the Netherlands the wage ratio is increasing as we move from the bottom to the top of distribution. The ratio of equivalent wage shows more complex patterns with group of countries where the ratio is decreasing over the distribution, increasing over the distribution and where the ratio has an inverted U-shaped pattern. In Italy, Spain, France, Portugal, Belgium, Turkey, Lithuania, Austria and Slovenia the equivalent wage ratio is increasing which means that women are catching up with men as we move from the bottom to the top of distribution. The opposite pattern is present in the United Kingdom, Finland, Norway, Japan, Estonia and Poland where at the bottom of distribution women are having higher equivalent wages but then as we move towards the top of distribution the ratio becomes smaller. An interesting pattern occurs in the Netherlands, Germany, Czech Republic and Hungary where the ratio is increasing up until the median and then the ratio decreases. Further, we can notice that within countries the ratio of equivalent wage and ratio of wage differ to a large extent. We observe that the ratio of equivalent wage is higher than the ratio of wage in the United Kingdom, Spain, Finland, Czech Republic; Norway, Japan, Poland and Estonia. In other words, this evidence points out that in the following countries women are faring relatively better than men in a job quality as soon as we go beyond wage measure or as soon as we accept the equivalent wage measure. On the contrary, women are lacking more behind men in job quality if we use equivalent wage measure instead of wage measure.

#### 6.4 Shapley decomposition of willingness-to-pay

In this section we discuss the results of the Shapley value decomposition (see [Shapley \(1988\)](#) and [Shorrocks \(2013\)](#)) of the total willingness-to-pay ( $WTP$ ) which enabled us to compute the individual contributions of each non-wage job characteristics to  $WTP$ . As one of the property of the following decomposition is exactness, thus the sum of all non-wage contribution should add up to the total  $WTP$  without having a residual term. The non-wage contributions to  $WTP$  include Autonomy ( $WTP^{Au}$ ), Security ( $WTP^{Se}$ ), Learn ( $WTP^{Le}$ ), Challenge ( $WTP^{Ch}$ ), Career ( $WTP^{Ca}$ ), Social Status ( $WTP^{So}$ ), Valuable ( $WTP^{Va}$ ) and Family Work ( $WTP^{Fa}$ ). Figure 6 shows the shares of  $WTP$  contributions in total  $WTP$  for the entire sample (top panel), men (middle panel) and women (bottom panel).

The results in the top panel show that on average the most important non-wage job characteristic for all countries is to have a good career prospect. The following evidence make sense since we are considering relatively younger and more educated individuals who are usually having stronger preferences for making a career. We can notice that the relative importance of a career is the most important in Austria and Germany, while in the UK and Spain this job characteristic is the least important. One reason why we observe these differences comes from the fact that Austria and Germany are having lower average value of career characteristic than the UK and Spain have. Thus, we observe that suffering in the former countries is higher. Nevertheless, we are measuring the relative importance of the  $WTP$  contribution attributed to a certain non-wage characteristic and therefore the size of this term will depend on the size of all other  $WTP$  contributions taken together. The second most important non-wage job characteristic across most of the countries is to have a valuable job. Although there are several exceptions like France, Japan, Czech Republic, Slovenia and Turkey who are valuing challenging job more than a valuable job car and Norway, Portugal and Hungary who are valuing the social status more than a valuable job. When it comes to think about the job that is challenging, France and Czech Republic workers are on average ready to give up relatively the most of their total  $WTP$  (i.e. around 1/5). We can see that the social status and a good chance to combine work with family tasks are somehow of the same importance over countries. The opportunity to learn new things is of highest importance in Japan while in Finland is the least important job characteristic. Job autonomy is for the most countries on the next to last place of importance. The relative importance of job autonomy is highest in Turkey and lowest in Germany. Job security is taking the last place according to the importance of job characteristics. Although, one will find this evidence a bit surprising at first, however it should be noted that we are concerned with the preferences of young and educated individuals who have just recently entered the labour market. It turns out that the evidence we have found should not be surprising since worries about job security come later in life but also more educated people should be less concerned with the issue of job quality. Comparing the previous findings with the relative  $WTP$  contributions to non-wage job characteristics for men and women, we can see that the picture is nearly the same. The relative importance of having a valuable job is the most important priority for both men and women in almost every country. On the other hand, both men and women are willing to give up relatively the smallest amount of their  $WTP$  to achieve a perfect job security. The following evidence that says that men and women are having similar relative  $WTP$  contributions for non-wage job characteristics comes from the fact that the preferences between these two groups are not significantly different (although women prefer more challenging jobs and jobs with a good chance to combine work with family tasks, while men prefer more to have a good career prospects) but also due to the fact that on average both men and women experience similar deprivation in non-wage job characteristics.

## 6.5 Gender differences in willingness-to-pay

In previous section we have shown the results from the Shapley value decomposition of the total willingness-to-pay on its contribution to each non-wage characteristic. The following results have provided us with the information about the relative importance of various non-wage characteristics. In this section we illustrate the (total) willingness-to-pay for men and women across the distribution (i.e. ventiles) and we compare the gender differences in willingness-to-pay. We present the results for each country in figure 7.

We can immediately notice that men have higher willingness-to-pay over the entire distribution in each country except Turkey where women have higher willingness-to-pay at the first half of the distribution. This evidence points out to the fact that in absolute terms men suffer more than women for not being at the reference levels of non-wage job characteristics and thus they are willing to give up more of his wages to reach the reference points. Nevertheless, the following evidence is not surprising since we know that the willingness-to-pay is a function of wage and since we have seen that men are having higher wages across the distribution in all countries except Turkey where women earn more. Thus, regardless of the actual job characteristics of men and women and regardless of the differences in preferences across gender, we can clearly see that men more able to afford a job of higher quality. However, once we normalize the (total) willingness-to-pay with the wage level the evidence points out that the differences in willingness-to-pay between gender almost disappear (see figure A3). We can notice that the willingness-to-pay for both men and women is monotonically increasing over percentiles with the sharp increase on the top of distribution. The following pattern is observed across all countries. While the differences in willingness-to-pay between men and women are less pronounced at the bottom of distribution across countries, these differences start to widen at the top of distribution. A few countries like Italy, Netherlands, Japan, Belgium and Turkey are having a quite equal distributions of willingness-to-pay for men and women while on the other hand in Germany, Hungary and Lithuania the gender difference in the willingness-to-pay increases substantially at the top of the distribution although the differences are less pronounced at the bottom of the distribution. It is important to note that the gender differences in willingness-to-pay within countries are resulting from the gender differences in wages but also due to differences in preferences and differences in actual job characteristics between men and women. Nevertheless, the evidence we have found have shown only minor differences in preferences between men and women so that gender differences in willingness-to-pay can be explained by differences in job characteristics and wage differences between men and women.

## 7 Conclusion

The objective of this article was to analyse the well-being on the job as one important sphere of life of many individuals. We have limited our analysis to a specific sub-population of recent graduates in a large sample of countries. Since the literature on well-being on the job have been predominantly concerned with understanding job quantity, we have decided to broaden the literature by analysing the important topic of job quality. In doing so, we first have to select a reasonable well-being measure which evaluates the well-being of individuals on their jobs. We have distinguished between five different well-being measures which include wage, equivalent wage, subjective job satisfaction score, average preferences objective measure and equal weights objective measure. It is important to bear in mind that the choice for each of these measures is based on the normative assumptions that these measures materialise.

The approach for measuring the well-being on the job which is gaining a lot of interest in recent years refers to a subjective satisfaction measure of well-being. Although the implementation of this measure does not require a lot of effort, we have seen that the following measure does not allow us to introduce one important normative assumption for measuring well-being, that of respecting individual preferences. The underlying reason why this conflict occur lies in fact that the subjective satisfaction measure is contingent on scaling factors (i.e. adaptations, expectations and aspirations) which may differ across different individuals in a given point of time or it may differ across time for a given individual. In order to satisfy the later requirement we have decided to use the equivalent wage measure (see [Fleurbaey et al. \(2009\)](#), [Schokkaert et al. \(2011\)](#) and [Decancq et al. \(2015\)](#)) which respect individual preferences but on the other hand it is not dependent on scaling factors. We have also illustrated two objective well-being measures (i.e. equal weights and average preferences) which do not respect individual preferences over job characteristics but instead they are based on the aggregation procedure that ascribes objective weights to all job characteristics contained in such a measure. The reason why some of researchers favour these objective well-being measures comes from the fact that they are in line with the so-called Dominance Condition (Principle) which neither the subjective satisfaction measure nor the equivalent wage measure satisfy. Nevertheless, as we have argued, the objective well-being measures may be deceptive since they rely on a paternalistic nature of ascribing weights to job characteristics. The results we have presented clearly indicate that different well-being measure leads to different conclusion and thus it is important to take well-being measurement seriously.

In this work we have raised an important critique of the prevailing measures which seem to neglect the multidimensional concept of individual well-being. It is reasonable to argue that individual well-being on the job does not only depend on wage but also on other non-wage job characteristics like job security, job autonomy, etc. Taking into account both wage and non-wage job characteristics we are able to construct a genuine measure of well-being which reflects more closely the job quality of individuals. Accepting the idea that the well-being is a multidimensional concept introduces additional challenge of dealing with the correlation between job characteristics and finding a proper way to aggregate various dimensions into a single well-being measure. Accomplishing these tasks do not seem to be a trivial thing to do for the creators of public and social policies and ultimately it is up to them to consider whether these additional steps are worthwhile doing. As we have argued we find these additional steps for constructing a well-being measure indeed fundamental if one is interested in making appropriate inter-personal comparisons of well-being.

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Table 1: Summary Statistics

	Countries																		
	IT	ES	FR	AT	DE	NL	UK	FI	NO	CZ	JP	PT	BE	EE	SI	TR	LT	PL	HU
Satisfaction	3.51	3.69	3.84	3.98	3.81	3.76	3.72	3.73	3.98	3.88	3.46	3.64	3.90	3.89	3.74	3.38	3.79	3.70	3.71
Age	32.28	29.83	29.16	33.17	33.16	30.58	30.31	32.11	33.41	29.36	28.51	30.53	28.28	31.34	34.22	29.20	29.21	29.90	29.47
Male	46.72	36.29	34.90	47.62	52.33	41.47	40.26	39.26	40.06	45.78	51.27	35.76	42.59	33.70	37.13	62.21	33.77	33.75	32.00
Child	16.63	8.96	25.82	27.87	29.28	21.54	16.93	38.80	55.73	19.13	10.02	23.78	20.16	49.96	53.56	19.02	40.78	38.62	28.37
Partner	45.70	44.81	64.18	63.83	65.66	67.76	55.10	75.29	75.86	61.55	27.76	53.80	64.61	66.97	71.93	44.82	67.37	66.45	62.93
Family	38.24	40.96	4.89	5.10	3.17	5.73	22.22	1.85	1.81	22.35	41.50	30.44	16.10	9.46	14.27	38.66	13.26	18.05	22.65
Education	5.05	4.47	4.20	5.18	5.02	3.45	3.22	4.17	4.13	4.68	4.40	4.04	4.65	4.69	5.23	4.64	4.99	4.89	4.47
Company Small	35.24	30.34	17.92	31.34	23.37	20.68	20.28	21.39	22.36	32.49	17.70	28.80	21.05	31.42	29.77	35.32	30.20	29.56	40.13
Company Medium	20.71	17.22	13.50	18.71	13.79	20.47	16.77	20.28	19.19	24.08	18.26	20.39	18.59	31.45	31.13	24.44	29.29	27.44	27.90
Company Large	39.09	47.15	56.87	45.94	42.16	56.18	59.49	54.21	50.96	40.34	59.61	42.97	52.80	35.69	35.86	33.47	34.15	38.68	31.40
Training	55.38	71.62	48.87	72.15	66.69	64.71	68.79	71.71	53.21	73.52	57.15	61.71	69.27	66.98	68.13	48.81	65.92	68.07	54.31
Sector	28.75	31.37	40.99	39.07	43.32	50.11	47.94	42.84	60.07	35.05	27.81	40.32	32.78	48.51	55.09	38.54	42.15	46.00	47.55
Work Risk	3.95	3.56	3.18	4.00	4.02	3.88	3.82	3.51	3.91	2.26	3.47	4.05	3.85	3.98	4.49	3.49	3.48	3.49	4.20
Part Time	13.90	11.50	8.50	11.14	10.67	12.58	6.16	8.34	8.39	8.29	14.68	9.41	6.05	8.11	6.20	8.78	7.13	14.00	7.48
Wage (€/month)	2057	1812	2815	2853	4531	2464	2680	2441	3531	1680	2770	1982	3093	1653	1546	178	1447	1294	1282
Autonomy	3.61	3.77	4.04	4.47	4.42	3.80	3.66	3.91	4.20	4.30	3.54	4.08	4.14	3.68	3.89	3.27	4.33	4.23	3.75
Security	3.47	3.68	3.72	3.68	3.52	3.72	3.78	3.68	3.95	3.92	3.70	3.57	3.61	4.18	3.91	3.58	3.85	3.97	3.84
Learn	3.67	3.64	3.65	3.91	3.73	3.69	3.80	3.92	3.83	3.87	3.27	3.56	3.77	4.09	3.75	3.60	3.84	3.70	3.60
Challenge	3.30	3.40	3.24	3.76	3.64	3.53	3.66	3.73	3.87	3.50	3.30	3.33	3.52	3.73	3.43	3.25	3.38	3.45	3.45
Career	2.77	3.24	2.88	2.72	2.56	3.01	3.41	2.75	2.91	3.48	2.84	2.76	2.92	3.13	2.92	3.02	2.92	3.05	2.66
Social Status	2.91	3.05	3.21	3.40	3.20	3.14	3.02	3.15	3.06	3.47	3.08	3.01	3.13	3.63	3.03	3.26	3.47	3.34	2.73
Valuable	3.01	3.25	3.46	3.44	3.28	3.32	3.29	3.15	3.69	3.37	3.46	3.44	3.16	3.51	3.41	3.40	3.25	3.32	3.20
Family Work	3.24	3.32	3.41	3.17	3.03	3.49	2.77	3.59	3.62	3.24	3.12	3.07	3.37	3.14	3.24	3.22	3.65	3.37	3.20
Observations	1315	2593	953	1111	1054	2219	1063	1831	1625	4500	1517	438	971	649	2085	629	609	947	431

Notes: Mean values of variables computed at the country level. The job satisfaction variable takes an integer value from 1 to 5. The variables that are given in percentages pertain to age, male, child, partner, family, education, company small, company medium, company large, training and sector. Work risk and non-wage job characteristic variables take an integer value that ranges from 1 to 5. The results are weighted using the weights that do sum up to 1.

Table 2: Satisfaction Equation

	MODEL I		MODEL II		MODEL III		MODEL IV		MODEL V	
	$\beta$	S.E.	$\beta$	s.e.	$\beta$	S.E.	$\beta$	S.E.	$\beta$	s.e.
Log Wage	0.211***	(0.017)	0.196***	(0.018)	0.260***	(0.024)	0.306***	(0.039)	0.375***	(0.037)
Autonomy	0.364***	(0.029)	0.353***	(0.031)	0.349***	(0.032)	0.285***	(0.016)	0.275***	(0.017)
Security	0.072***	(0.011)	0.065***	(0.012)	0.062***	(0.012)	0.095***	(0.016)	0.102***	(0.017)
Learn	0.341***	(0.018)	0.348***	(0.018)	0.350***	(0.018)	0.329***	(0.024)	0.315***	(0.023)
Challenge	0.287***	(0.017)	0.301***	(0.018)	0.303***	(0.018)	0.336***	(0.022)	0.384***	(0.034)
Career	0.240***	(0.016)	0.251***	(0.017)	0.260***	(0.017)	0.257***	(0.018)	0.268***	(0.019)
Social Status	0.028	(0.033)	0.016	(0.036)	0.014	(0.036)	0.068	(0.041)	0.068	(0.042)
Valuable	0.253***	(0.014)	0.251***	(0.015)	0.251***	(0.015)	0.205***	(0.016)	0.176***	(0.015)
Family Work	0.084***	(0.011)	0.093***	(0.011)	0.093***	(0.011)	0.066***	(0.016)	0.075***	(0.019)
Age	-0.051*	(0.022)	-0.068**	(0.023)	-0.076**	(0.026)	-0.079**	(0.027)	-0.081**	(0.028)
Age squared/1000	0.629*	(0.283)	0.855**	(0.302)	0.975**	(0.332)	0.970**	(0.338)	0.997**	(0.349)
Male	-0.047	(0.092)	-0.038	(0.095)	-0.029	(0.096)	0.100	(0.110)	0.151	(0.122)
Child	0.392***	(0.112)	0.393***	(0.117)	0.371**	(0.117)	0.291*	(0.119)	0.007	(0.114)
Partner	0.067*	(0.032)	0.044	(0.033)	0.045	(0.033)	0.044	(0.033)	0.283*	(0.121)
Family	0.140	(0.105)	0.153	(0.110)	0.168	(0.110)	0.195	(0.111)	0.413**	(0.142)
Education	-0.013	(0.011)	0.004	(0.012)	-0.020	(0.013)	-0.022	(0.013)	-0.036**	(0.013)
Masterfield			0.166***	(0.014)	0.156***	(0.014)	0.147***	(0.015)	0.138***	(0.015)
Knowfield			-0.060***	(0.012)	-0.059***	(0.012)	-0.065***	(0.012)	-0.066***	(0.013)
Think			-0.027*	(0.013)	-0.030*	(0.013)				
Pressure			0.064***	(0.012)	0.063***	(0.013)	0.064***	(0.013)	0.069***	(0.013)
Use Time			0.036**	(0.013)	0.036**	(0.013)	0.030*	(0.013)	0.029*	(0.014)
Work Productivity			0.046**	(0.014)	0.043**	(0.015)	0.050***	(0.015)	0.050**	(0.015)
Use Computers									0.031*	(0.014)
Quest			-0.050***	(0.013)	-0.041**	(0.013)	-0.044***	(0.013)	-0.053***	(0.014)
Present							-0.022*	(0.011)	-0.034**	(0.011)
Write			-0.064***	(0.012)	-0.061***	(0.012)	-0.062***	(0.012)	-0.057***	(0.013)
Foreign Language			-0.019*	(0.008)	-0.028***	(0.008)	-0.020*	(0.008)	-0.024**	(0.008)
Company Medium							-0.111**	(0.035)	-0.096**	(0.036)
Company Large							0.355	(0.306)	0.403	(0.325)
Training							-0.190	(0.283)	0.379***	(0.090)
Sector							0.540***	(0.104)	0.505***	(0.107)
Part-time Work							-0.407**	(0.142)	-0.178***	(0.050)
Work Risk							0.069***	(0.013)	0.073***	(0.014)
Clerks Occ.									-0.236***	(0.057)
Craft/Trade Occ.									-0.488*	(0.220)
Elementary Occ.									-0.876***	(0.233)
Accommodation Ind.									0.452**	(0.163)
Education Ind.									0.356***	(0.042)
Health/Social Ind.									0.177***	(0.044)
Other Services Ind.									0.288***	(0.064)
Log Wage*Young							-0.040*	(0.018)	-0.043*	(0.018)
Social Status*Young	0.106**	(0.034)	0.114**	(0.037)	0.116**	(0.037)	0.107**	(0.039)	0.112**	(0.039)
Autonomy*Young	-0.076**	(0.028)	-0.076*	(0.030)	-0.078*	(0.030)				
Challenge*Male							-0.070*	(0.029)	-0.070*	(0.030)

Table 2: Satisfaction Equation (Continued)

	MODEL I		MODEL II		MODEL III		MODEL IV		MODEL V	
	$\beta$	S.E.	$\beta$	S.E.	$\beta$	S.E.	$\beta$	S.E.	$\beta$	S.E.
Career*Male	0.065**	(0.022)	0.064**	(0.023)	0.061**	(0.023)	0.086**	(0.027)	0.083**	(0.028)
Valuable*Male	-0.068**	(0.021)	-0.060**	(0.021)	-0.060**	(0.022)	-0.044*	(0.022)		
Fam. Work*Male									-0.051*	(0.023)
Valuable*Child									-0.052*	(0.026)
Learn*Child	-0.085**	(0.028)	-0.091**	(0.030)	-0.091**	(0.029)	-0.068*	(0.030)		
Fam. Work*Child									0.057*	(0.026)
Challenge*Partner									-0.065*	(0.032)
Challenge*Family	-0.076**	(0.029)	-0.080**	(0.030)	-0.081**	(0.030)	-0.086**	(0.031)	-0.143***	(0.039)
Log Wage*Co. Large							-0.086*	(0.038)	-0.091*	(0.041)
Security*Co. Large							-0.093***	(0.023)	-0.090***	(0.024)
Learn*Co. Large							0.081**	(0.026)	0.078**	(0.026)
Fam. Work*Co. Large							0.044*	(0.022)	0.056*	(0.023)
Log Wage*Training							0.082*	(0.037)		
Social Status*Training							-0.069*	(0.027)	-0.058*	(0.028)
Learn*Sector							-0.085**	(0.027)	-0.101***	(0.027)
Fam. Work*Part Time							0.081*	(0.038)		
Spain					0.055	(0.068)	0.070	(0.068)	0.065	(0.071)
France					0.254*	(0.103)	0.320**	(0.105)	0.283**	(0.106)
Austria					0.250**	(0.092)	0.211*	(0.093)	0.179	(0.094)
Germany					0.020	(0.083)	-0.049	(0.085)	-0.097	(0.088)
Netherlands					-0.023	(0.072)	-0.069	(0.073)	-0.103	(0.075)
United Kingdom					-0.235*	(0.092)	-0.248**	(0.094)	-0.315***	(0.095)
Finland					-0.136	(0.070)	-0.147*	(0.071)	-0.199**	(0.073)
Norway					0.103	(0.076)	0.089	(0.077)	0.032	(0.078)
Czech Republic					0.014	(0.065)	0.087	(0.070)	0.046	(0.071)
Japan					-0.071	(0.082)	0.029	(0.083)	0.064	(0.088)
Portugal					-0.025	(0.104)	-0.038	(0.105)	-0.089	(0.106)
Belgium					0.197*	(0.083)	0.162	(0.084)	0.138	(0.086)
Estonia					0.129	(0.093)	0.085	(0.094)	0.052	(0.095)
Slovenia					0.172*	(0.070)	0.094	(0.072)	0.083	(0.073)
Turkey					0.389**	(0.121)	0.437***	(0.123)	0.311*	(0.132)
Lithuania					0.239	(0.122)	0.204	(0.122)	0.167	(0.126)
Poland					0.021	(0.099)	0.014	(0.099)	-0.015	(0.100)
Hungary					0.451***	(0.098)	0.388***	(0.100)	0.317**	(0.114)
Occupation	No		No		No		No		Yes	
Industry	No		No		No		No		Yes	
Country	No		No		Yes		Yes		Yes	
Pseudo- $R^2$	0.1201		0.1266		0.1283		0.1322		0.1353	
Observations	30714		28439		28439		27927		26540	

Notes: Results obtained from the ordinal logistic regression. The estimation procedure includes weighting. Robust standard errors in parentheses where \*, \*\* and \*\*\* indicate statistical significance at the 5% level, 1% level, and 0.1% level, respectively

Table 3: Job Quality Indicators: Mean and Rank

	$WB^w$			$WB^{w*}$			$WB^s$			$WB^{o,ew}$			$WB^{o,ap}$		
	Mean	Rank		Mean	Rank		Mean	Rank		Mean	Rank		Mean	Rank	
Italy	2057	10		258	17		3.513	17		0.575	17		7.408	17	
Spain	1812	12		378	6		3.692	15		0.615	10		7.847	13	
France	2815	5		267	16		3.843	6		0.622	6		8.196	5	
Austria	2853	4		459	4		3.983	1		0.622	9		8.487	1	
Germany	4531	1		569	3		3.813	7		0.584	14		8.087	7	
Netherlands	2464	8		372	7		3.759	9		0.603	11		7.928	9	
United Kingdom	2680	7		458	5		3.717	12		0.624	5		7.907	10	
Finland	2441	9		353	9		3.731	11		0.622	7		7.843	14	
Norway	3531	2		664	1		3.979	2		0.666	1		8.451	2	
Czech Republic	1680	13		366	8		3.880	5		0.640	2		8.182	6	
Japan	2770	6		276	15		3.461	18		0.577	16		7.287	18	
Portugal	1982	11		316	11		3.644	16		0.579	15		7.717	16	
Belgium	3093	3		584	2		3.903	3		0.572	18		8.226	3	
Estonia	1653	14		332	10		3.888	4		0.636	3		8.216	4	
Slovenia	1546	15		285	14		3.739	10		0.596	13		7.907	11	
Turkey	178	19		32	19		3.377	19		0.566	19		7.130	19	
Lithuania	1447	16		286	13		3.795	8		0.622	8		8.076	8	
Poland	1294	17		290	12		3.702	14		0.626	4		7.841	15	
Hungary	1282	18		159	18		3.713	13		0.598	12		7.853	12	

Notes: Mean values of indicators computed at the country level. The indicators of job quality include wage ( $WB^w$ ), equivalent wage ( $WB^{w*}$ ), job satisfaction score ( $WB^s$ ), equal weights objective indicator ( $WB^{o,ew}$ ) and average preference objective indicator ( $WB^{o,ap}$ ). The results are weighted using the sampling weights.

Table 4: Job Quality Indicators for Men: Mean and Rank

	$WB^w$			$WB^{w*}$			$WB^s$			$WB^{o,ew}$			$WB^{o,ap}$		
	Mean	Rank		Mean	Rank		Mean	Rank		Mean	Rank		Mean	Rank	
Italy	2085	11		331	11		3.508	17		0.583	16		7.500	17	
Spain	1940	12		393	6		3.700	13		0.609	9		7.817	15	
France	3300	3		261	17		3.854	4		0.610	8		8.222	5	
Austria	3142	4		531	3		4.003	1		0.623	4		8.557	1	
Germany	5111	1		712	1		3.848	5		0.584	15		8.147	6	
Netherlands	2628	9		415	5		3.729	11		0.597	12		7.947	10	
United Kingdom	2831	7		427	4		3.643	16		0.599	11		7.778	16	
Finland	2635	8		387	7		3.731	10		0.619	6		7.865	13	
Norway	3520	2		607	2		3.911	2		0.652	1		8.394	2	
Czech Republic	1783	15		355	10		3.867	3		0.625	3		8.117	8	
Japan	2980	5		292	15		3.317	19		0.580	17		7.316	18	
Portugal	2276	10		370	8		3.654	14		0.604	10		7.905	11	
Belgium	2840	6		319	13		3.836	6		0.570	19		8.244	4	
Estonia	1923	13		365	9		3.826	8		0.621	5		8.142	7	
Slovenia	1671	16		276	16		3.706	12		0.593	13		7.952	9	
Turkey	178	19		34	19		3.364	18		0.576	18		7.222	19	
Lithuania	1830	14		328	12		3.785	9		0.636	2		8.270	3	
Poland	1516	18		317	14		3.644	15		0.614	7		7.827	14	
Hungary	1587	17		156	18		3.833	7		0.590	14		7.894	12	

Notes: Mean values of indicators computed at the country level. The indicators of job quality include wage ( $WB^w$ ), equivalent wage ( $WB^{w*}$ ), job satisfaction score ( $WB^s$ ), equal weights objective indicator ( $WB^{o,ew}$ ) and average preference objective indicator ( $WB^{o,ap}$ ). The results are weighted using the sampling weights.

Table 5: Job Quality Indicators for Women: Mean and Rank

	$WB^w$			$WB^{w*}$			$WB^s$			$WB^{o,ew}$			$WB^{o,ap}$		
	Mean	Rank		Mean	Rank		Mean	Rank		Mean	Rank		Mean	Rank	
Italy	2032	10		194	17		3.518	18		0.568	17		7.327	17	
Spain	1738	12		370	7		3.687	14		0.618	9		7.864	12	
France	2555	6		271	14		3.837	6		0.629	6		8.182	6	
Austria	2590	4		394	5		3.965	2		0.621	8		8.424	2	
Germany	3893	1		411	4		3.775	9		0.584	14		8.020	7	
Netherlands	2347	8		341	8		3.780	8		0.607	11		7.915	10	
United Kingdom	2579	5		479	3		3.768	10		0.641	4		7.994	8	
Finland	2315	9		331	9		3.730	13		0.624	7		7.829	15	
Norway	3539	2		703	2		4.024	1		0.675	1		8.489	1	
Czech Republic	1593	13		375	6		3.890	5		0.652	2		8.237	4	
Japan	2550	7		259	16		3.612	17		0.574	15		7.255	18	
Portugal	1818	11		286	12		3.638	16		0.566	18		7.612	16	
Belgium	3280	3		780	1		3.953	3		0.574	16		8.213	5	
Estonia	1516	14		316	10		3.919	4		0.643	3		8.254	3	
Slovenia	1471	15		291	11		3.758	11		0.598	13		7.880	11	
Turkey	178	19		28	19		3.398	19		0.551	19		6.978	19	
Lithuania	1252	16		265	15		3.800	7		0.615	10		7.977	9	
Poland	1181	17		276	13		3.732	12		0.632	5		7.849	13	
Hungary	1138	18		161	18		3.657	15		0.601	12		7.833	14	

Notes: Mean values of indicators computed at the country level. The indicators of job quality include wage ( $WB^w$ ), equivalent wage ( $WB^{w*}$ ), job satisfaction score ( $WB^s$ ), equal weights objective indicator ( $WB^{o,ew}$ ) and average preference objective indicator ( $WB^{o,ap}$ ). The results are weighted using the sampling weights.

Table 6: Ratios of Wage and Equivalent Wage between men and women

	$W_w/W_m$				$W_w^*/W_m^*$			
	Mean	$p_{10}$	$p_{50}$	$p_{90}$	Mean	$p_{10}$	$p_{50}$	$p_{90}$
Italy	0.97	0.96	0.92	0.97	<b>0.59</b>	0.40	0.63	0.69
Spain	0.90	0.89	0.90	0.92	0.94	0.75	1.08	1.03
France	0.77	0.91	0.77	0.79	1.04	0.29	0.83	0.84
Austria	0.82	0.79	0.84	0.85	0.74	0.66	0.71	<b>0.60</b>
Germany	0.76	0.84	0.83	0.74	<b>0.58</b>	0.92	0.97	0.66
Netherlands	0.89	0.85	0.93	0.92	0.82	1.08	1.08	0.76
United Kingdom	0.91	1.02	0.87	0.86	1.12	2.57	1.07	<b>1.15</b>
Finland	0.88	0.84	0.80	0.85	0.86	0.99	1.06	0.81
Norway	1.01	0.91	0.87	0.90	1.16	<b>3.08</b>	1.10	0.90
Czech Republic	0.89	0.93	0.88	0.89	1.06	0.91	1.18	1.01
Japan	0.86	0.88	0.86	0.94	0.89	1.99	1.18	0.97
Portugal	0.80	0.83	0.78	0.85	0.77	0.36	0.60	0.63
Belgium	<b>1.16</b>	0.97	0.96	0.99	<b>2.44</b>	0.89	0.98	1.07
Estonia	0.79	0.93	0.76	0.74	0.86	1.72	0.97	0.92
Slovenia	0.88	0.89	0.85	0.85	1.06	0.47	1.04	1.10
Turkey	1.00	<b>1.34</b>	<b>1.00</b>	<b>1.04</b>	0.81	0.56	0.67	0.79
Lithuania	<b>0.68</b>	<b>0.71</b>	0.73	<b>0.60</b>	0.81	<b>0.13</b>	<b>0.46</b>	1.06
Poland	0.78	0.79	0.77	0.78	0.87	1.19	<b>1.39</b>	0.90
Hungary	0.72	0.89	<b>0.67</b>	0.75	1.03	0.31	1.29	1.06

Notes: Numbers denote the ratios of Wage ( $W$ ) and Equivalent Wage ( $W^*$ ) between women and men at the mean, 10th percentile ( $p_{10}$ ), 50th percentile ( $p_{50}$ ), 90th percentile ( $p_{90}$ ). The results are weighted using the sampling weights.



Figure 4: The overall job satisfaction across countries: Proportions by years

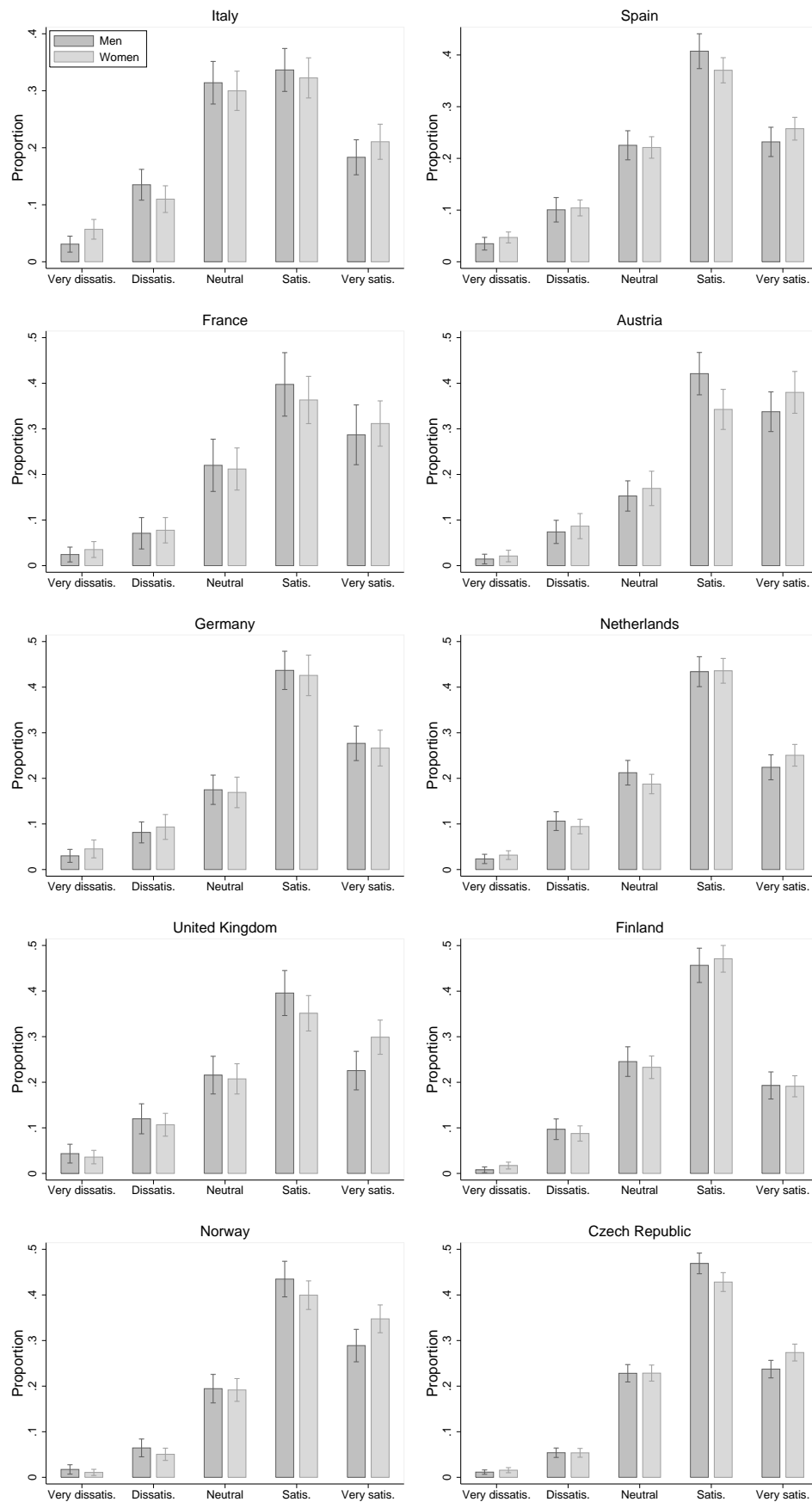


Figure 4: The overall job satisfaction across countries: Proportions by years (continued)

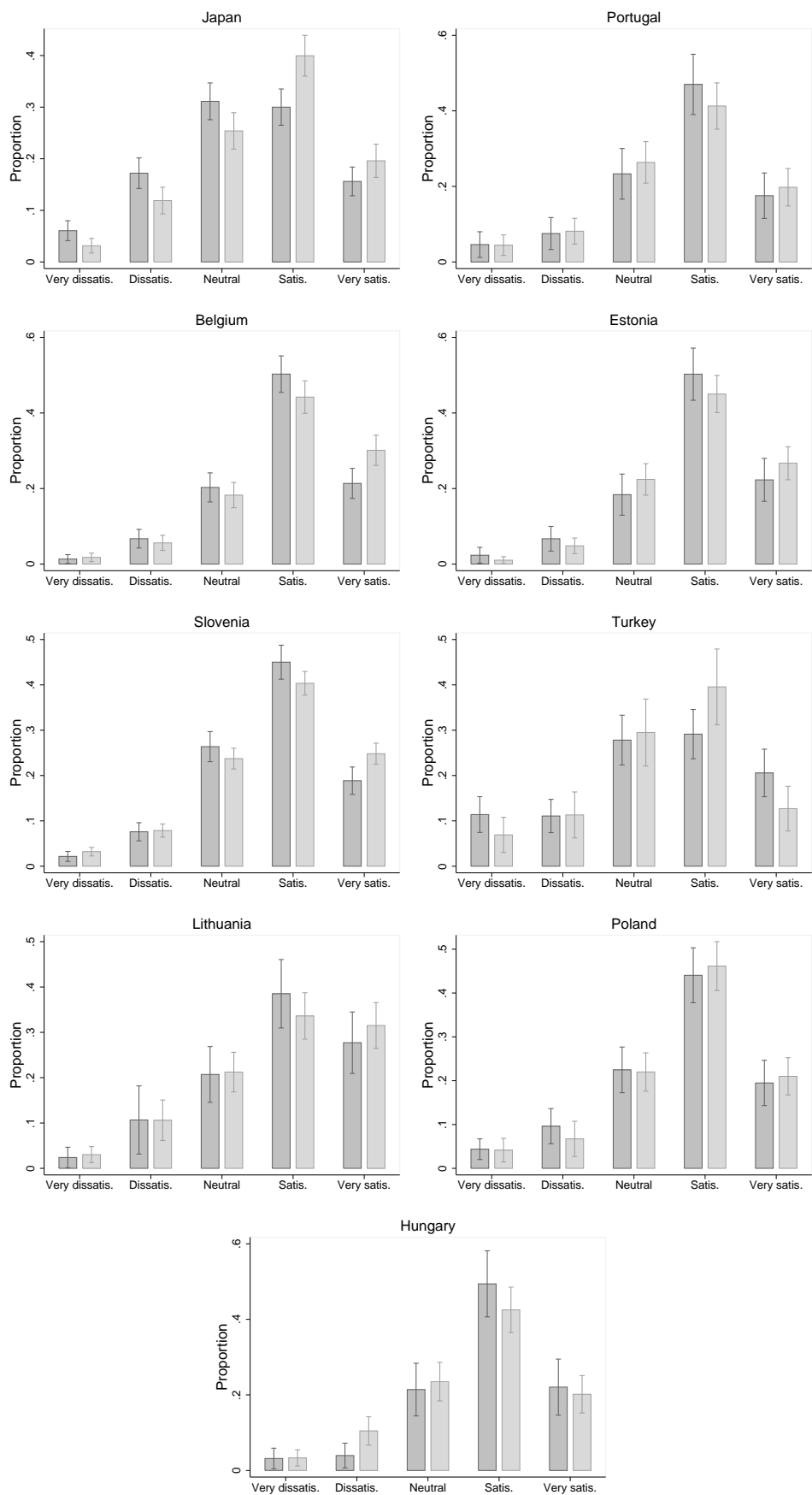


Figure 5: Shapley Decomposition of WTP

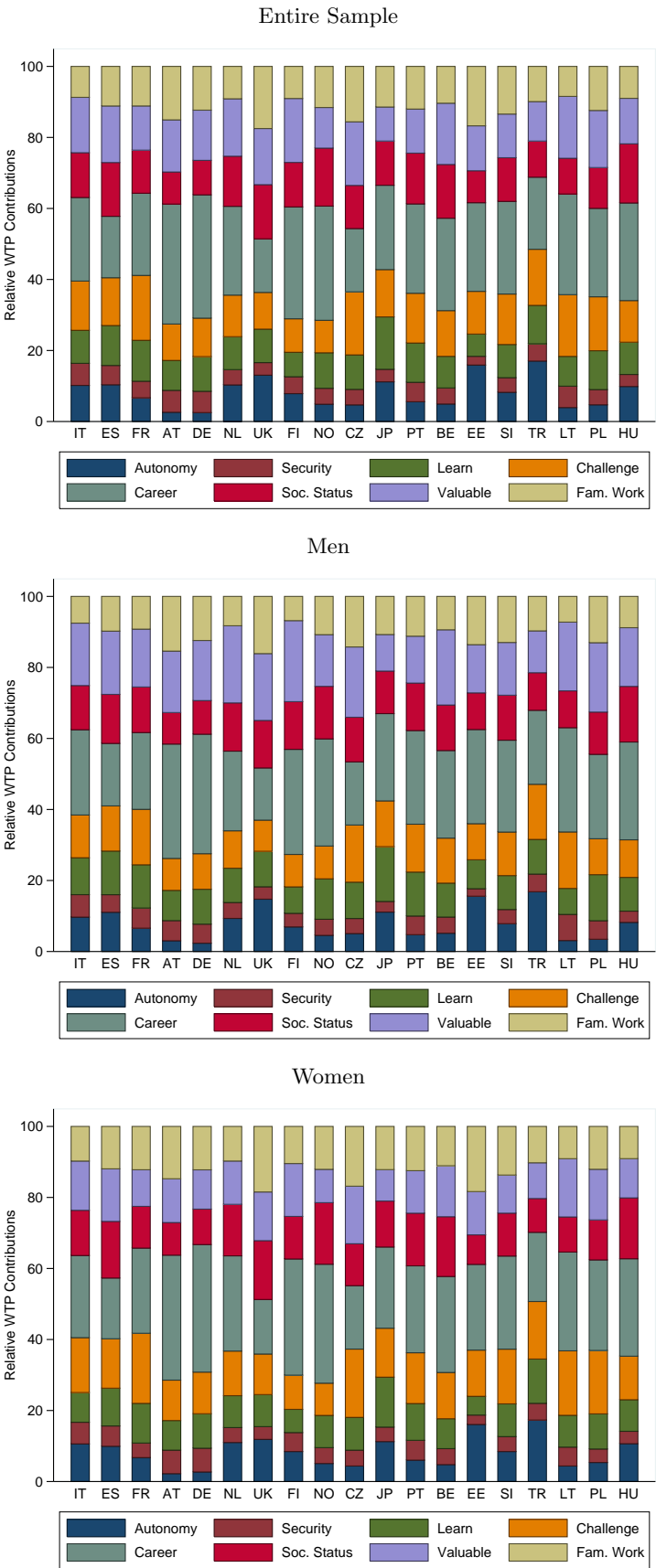


Figure 6: Wage and Equivalent Wage Gender Gaps

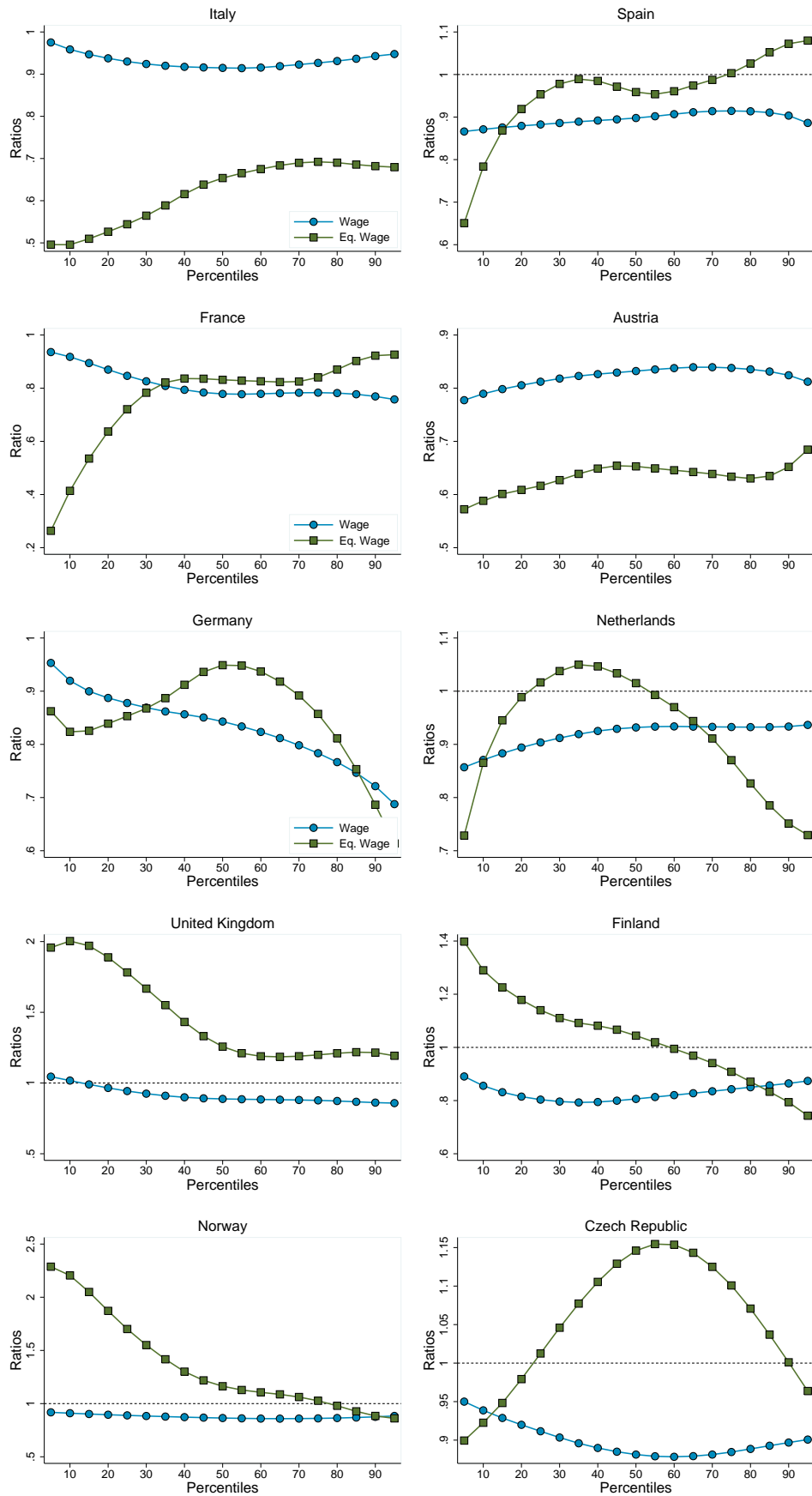


Figure 6: Wage and Equivalent Wage Gender Gaps (continued)

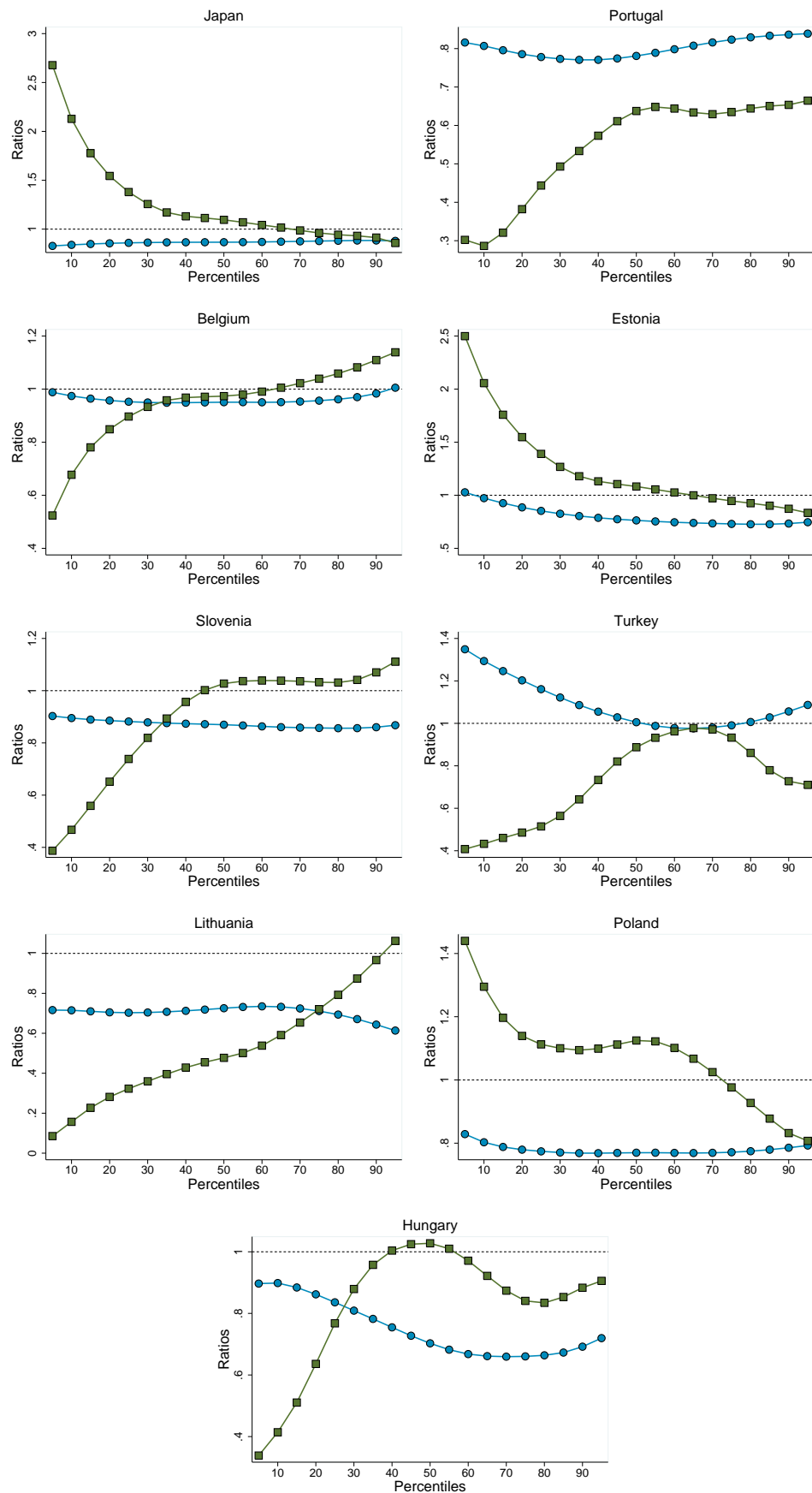


Figure 7: Total WTP for Men and Women

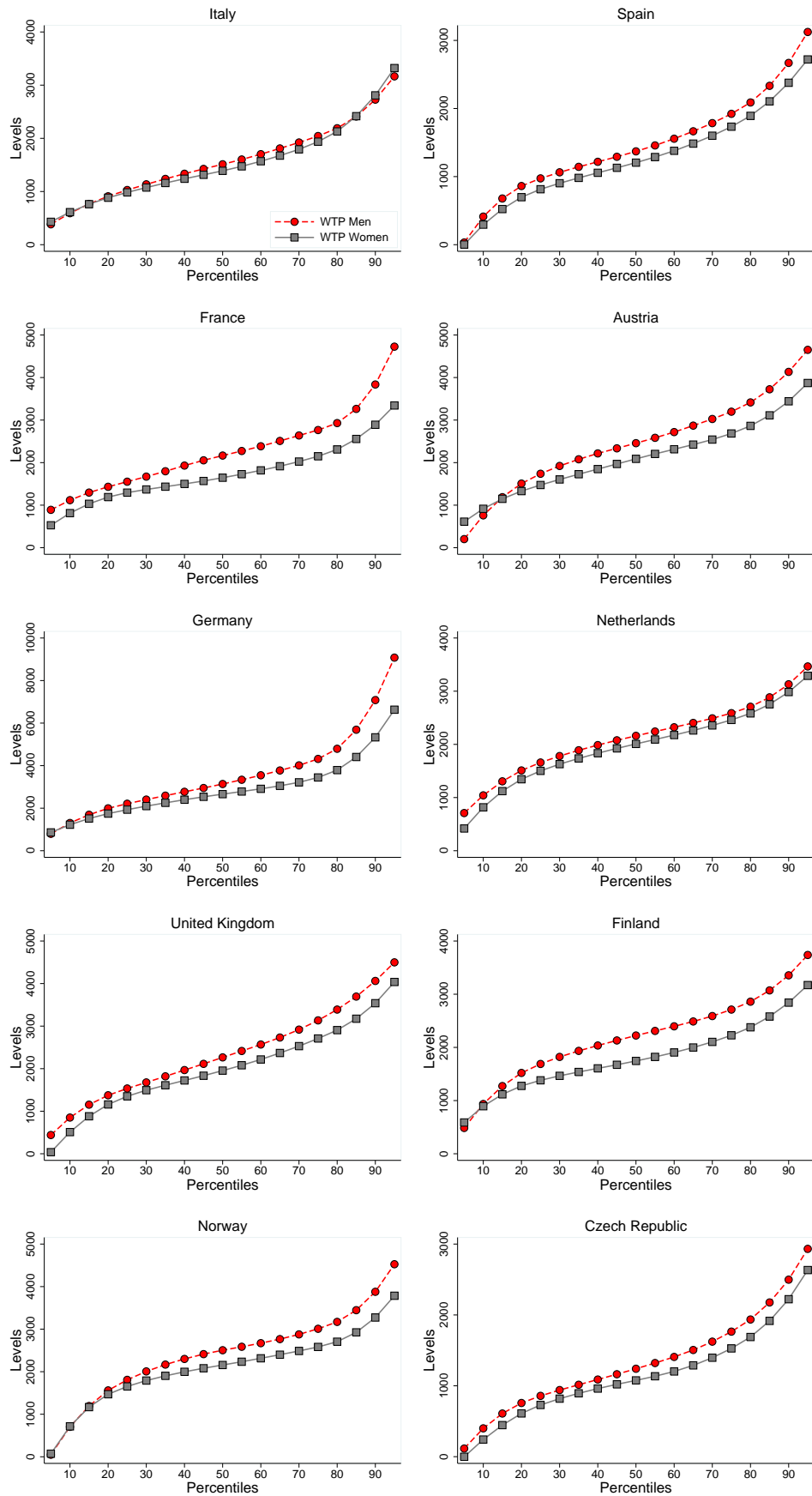


Figure 7: Total WTP for Men and Women (continued)

