5. The construction of a European job quality index

5.1. INTRODUCTION

In this chapter, we put our own ideas and recommendations into practice, constructing our own proposal of a job quality index for the European Union. To construct such an indicator, we follow the key principles outlined in previous pages:

1. The index should be based on a clear definition of job quality, and the elements included in the index should not go beyond the boundaries of such concept. We use the operational definition proposed earlier (see Chapter 1): job quality refers to the characteristics of jobs that have a direct impact on the well-being of workers. Such broad definition restricts considerably the type of information that a multidimensional job quality index should summarize: it should be restricted to information about the attributes of jobs, not of the workers that hold them (even if the information is reported by the workers themselves); it should not include contextual information (on institutional settings, unemployment levels, etc); and it should refer to results rather than procedures (unless such procedures have themselves a direct impact on the well-being of workers).
2. The selection of attributes to be measured, and the principles used for aggregating the information, should be based on a properly justified theoretical model. For this purpose, we draw from the literature review carried out in Chapter 2: our model of job quality has five dimensions that broadly correspond to the five main traditions of study of job quality (or the impact of job attributes on the well-being of workers) in the Social Sciences. There is only one broad area of job quality reviewed in the previous chapter but not included in the model (because unfortunately the EWCS does not cover it): participation and industrial democracy.[1]
3. The index should be calculated at the individual level in order to allow analysing the situation of specific groups of workers. The data used should be highly harmonized across countries to make the results

really comparable at international level. In order to fulfil both purposes, we use data from the 4th EWCS, which is without any doubt the best existing data source on job quality at the European level (and quite probably at a worldwide scale as well), although it has important limitations in terms of the size of the sample and periodicity.[2] With the single exception of participation at the workplace, the EWCS contains variables on virtually all the areas of job quality identified in the literature review and is, therefore, adequate for our purposes.

4. Finally, we should produce an aggregated index with which we can make an unambiguous evaluation of job quality for any subgroups of workers, but that is also decomposable in terms of its dimensions, components and indicators, so that we can make sense of any observed difference to a high level of detail.

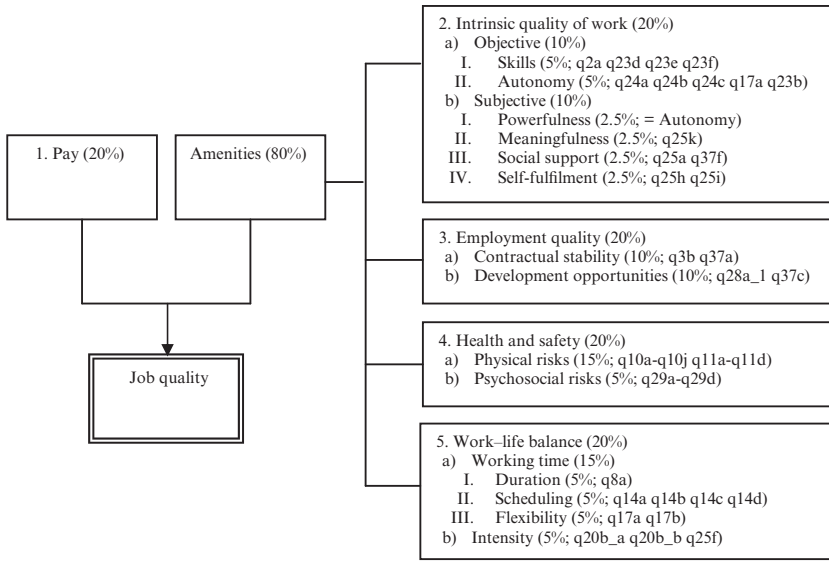
These are our goals for this chapter, which includes eight sections following these introductory remarks. In the next section, we discuss the general structure of the index and the principles followed in its construction, while in the subsequent five sections, we describe the construction of each dimension from the individual variables of the EWCS, evaluating their properties and the plausibility of the results obtained. Then in section 5.8, the overall index of job quality is presented, evaluating its distribution and results for a representative set of workers' categories. We conclude with a few final remarks and reflections on this attempt at constructing a Job Quality Index for the EU.

5.2. GENERAL STRUCTURE OF THE INDEX

Figure 5.1 presents the overall structure of the index, including the weight assigned to each component and subcomponent, and listing the individual variables from the EWCS used for constructing them. It is not necessary to give further explanations about this structure, because we have already devoted a full chapter for this purpose (Chapter 2).

The index comprises five dimensions: pay, intrinsic job quality, employment quality, health and safety and work–life balance. In the baseline formulation of the Job Quality Index, each dimension receives the same weight (20 per cent) and the aggregation is carried out using a weighted geometric average. In the next chapter we present the results of a sensitivity analysis performed in order to assess if the indicator is robust to other sorts of weighting and aggregation methods.

The following pages discuss the logic behind the construction of each



Source: Authors' elaboration.

Figure 5.1 The structure of the Job Quality Index

component, presenting the underlying variables and the specification used. We also look at the structure of correlations between the variables used for each dimension, which are supposed (unless otherwise stated) to capture essentially the same thing but from different angles: hence, we expect them to be positively correlated, though not so much as to be redundant. Finally, we focus on the scores of the main indicators of each component for five non-exclusive categories of the working population: all workers, employees, self-employed, construction workers, workers in hotels, restaurants and catering (HORECA), workers in the health sector, professionals and machine operators. The purpose of such exercise is not analytical, but illustrative and evaluative: by looking at the overall scores for these six disparate categories, we shall be able to make a quick assessment of the plausibility of results, trying to spot potential problems in the construction of each component. The actual analysis of the results of our index for different subgroups of the European working population is carried out in the following chapter.

Before getting into a detailed discussion of each component of the index, we should make some clarifications regarding the principles followed in its construction:

1. As already mentioned, there is only one dimension which was part of the literature review of Chapter 2, but that is not included in the operational model of Figure 5.1: participation and industrial democracy. The reason is simply the lack of relevant information in the EWCS. In future editions of the survey, such dimension may be covered, and hence the model may be expanded to cover such extra dimension; but for the moment, it is simply not possible.
2. The index is constructed by aggregating variables from the EWCS, which are selected according to their correspondence to the model shown in Figure 5.1. Whenever possible (that is, when there are several variables measuring the same underlying concept from different angles, we favour the use of more than one variable for each individual indicator/component in the model, aiming to increase the robustness of measurement: but because we are using a survey that was not specifically designed for this matter, this is not always possible.
3. Except in the case of pay, the original variables were consistently recoded into a metric of 0–100, according to a normative logic of how desirable in terms of job quality each job attribute is. Zero is the least desirable outcome, 100 the most desirable, and any existing intermediate values are graded accordingly. Because the answer categories of each variable vary considerably, there are different recodifications applied. For instance, the exposure to physical risk factors is measured in the EWCS with a 'Nordic' scale of relative time, going from 'Never' to 'Always', with such intermediate categories as 'One quarter of the time', 'Half of the time', etc. Because a physical risk is a bad thing for job quality, 'Never' is coded as 100 (that is, most desirable), 'Always' as 0 (least desirable), and the rest according to the relative time interval (so 'one quarter of the time' becomes 75). Another example: a series of dichotomous variables measuring autonomy in different areas of work (methods of work, order of tasks, etc.), is coded as 100 if the person has autonomy in such area, or 0 if she does not. In general (as it is stated in detail in the following pages), the coding of variables into a 0–100 normative job quality metric is sufficiently 'natural' as to be almost self-explanatory, although there are some possible exceptions that are explicitly addressed.
4. Besides such recoding into a 0–100 normative metric, we do not apply any further manipulation to the original variables. In particular, we do not standardize the original variables using Z-scores, a procedure that is sometimes followed when constructing this kind of composite index. Such standardization expresses the scores of each variable in standard deviation units, which means that the degree of dispersion of the original variables is also homogenized. Instead, we opt for making

the coding normatively meaningful, and hence a value of 100 means the presence of a positive attribute (or the absence of a negative one) and a value of 0 the opposite. If we express the variables in standard deviation units, we immediately lose such normative meaning. And furthermore, by homogenizing the spread of the different variables, we would be losing also information on the actual distribution (in absolute terms) of the different attributes. For instance, as will be shown in the following pages, the psychosocial component of the index has in general very positive values and very little dispersion: this is because there is a consistently low level of reporting of psychosocial risks. If we standardized this variable, because the level of dispersion is very low, values that are in fact very close to the average (even if they are the most distant of all) would appear as very far away and we would get the impression that there is more variation on the degree of exposure to psychosocial risks than there really is. So we prefer to keep the original variables as they are, even if this means that this particular component of the index has very little variability and therefore contributes very little to the variability of the overall score: we believe this procedure to be fundamentally correct, as long as it simply reflects the fact that there is very little dispersion in the exposure to psychosocial risks (as measured by the EWCS).

5. Unfortunately, not all variables used for constructing the index have values for all individuals. In other words, for some respondents of the 4th EWCS, some of the elements displayed in Figure 5.1 are missing, either as a result of a refusal to answer a particular question or because the information was not relevant for a particular category of worker. Possible solutions to this problem include: leaving out all respondents for which there is missing information, calculating the index using the information available for each individual (even if the model is in some cases incomplete) or imputing the missing information using a specialized computer algorithm. The first solution (eliminating the cases with missing values) is not a reasonable option, as it would mean leaving out of our analysis nearly half of the EWCS sample (more than 40 per cent of cases have at least one missing value in any of the 47 variables used for constructing the index), and obviously biasing our results in a totally uncontrollable way. The other two solutions are more reasonable, but have also some problems. The second solution (using the available information for each individual for the calculation of the index) means that the underlying model of job quality can differ between individuals (because in each case, the model depends on the available information). When the missing values were the result of logical filters in the questionnaire (for instance, the question on type

of contract is not asked to the self-employed), we have used this solution: after all, in this case it makes sense that the model of job quality changes for such particular dimension, since the information that is missing would be irrelevant anyway. The third solution (imputing the missing values) has the problem of being based in an ultimately hypothetical model, which requires making some relatively arbitrary assumptions. Nevertheless, it is useful when there is a key variable for which there is a high percentage of missing values and these missing values are likely to be biased. We have used this strategy in only one case, but a very important one: the variable on pay. This variable has nearly 15 per cent of missing values: had we used the second approach (model based on available information), for nearly one in six workers the job quality model would have totally excluded the pay dimension. We use an ordered *logit* imputation model, under the assumption that pay depends on sex, occupation, age, employment status and working hours, within each European country (the model was computed separately for each country). The imputed values tend to be higher than the average, because the categories of workers that are most likely to refuse answering to this question tend to be at higher layers of employment.

6. The aggregation of information within each dimension of the index is mostly done by arithmetically averaging the scores of individual variables following the hierarchical structure shown in Figure 5.1. In most cases, components that are at the same hierarchical level are assumed to be equivalent, and therefore receive equal weights within their branch (there are some exceptions, explained in detail in the following pages). Within dimension 4, each individual receives the score that corresponds to the highest risk that she faced at work (as it is discussed later, to average risks makes no sense in this context), although there is a final averaging aggregation of the two subcomponents of this dimension as well.
7. Finally, the aggregation of information at the highest level is carried out by geometrically averaging the five dimensions into the overall index score. Using a geometric rather than an arithmetic average in this final stage of the construction of the index has two important advantages for our purposes: first, the contribution of each dimension to the overall index is not linear, but decreasing (that is, an increase in a dimension from a low initial value produces a larger expansion of job quality than the same increase from a high initial value); and second, the contribution of each dimension depends on the values of all the other dimensions (that is, even if the sum of scores is the same, a job with more balanced values in the five dimensions would have

a higher quality than a job with very high values in two dimensions but very low in the other three). What this means is that our index of job quality assumes decreasing returns for the different work and employment attributes, and imperfect substitutability among the different attributes (with penalization for significant imbalances between them). A more detailed discussion of the theoretical implications of this type of final aggregation is presented in section 5.8 of this chapter.

As we can see on the left-hand side of Figure 5.1, the five top-level dimensions are split into two categories: on the one hand, we have the pay dimension; on the other, we have the other four dimensions, which are all grouped under the heading 'amenities'. Such twofold categorization derives from the theory of compensating differentials which was originally proposed by Adam Smith and which is still the canonic theory on job quality in orthodox economics (see Section 2.3.1 of Chapter 2 in this book). According to this framework, pay plays a special function in the determination of job quality as the main compensating mechanism for the disagreeableness of work, reflected here in the other four dimensions of job quality. In fact, our model of job quality is closer to the multidimensional approach of the sociological tradition (with pay being just one of five dimensions of job quality) than to the binary approach of the theory of compensating differentials (which would require assigning a special salience to pay as a universal compensating mechanism); but the binary categorization of the top-level dimensions shown in Figure 5.1 is useful to illustrate the links between our model and this important economic approach to job quality. An alternative classification of the five areas (not shown in Figure 5.1) would include the dimensions of pay and employment quality within the general heading of 'employment', intrinsic quality of work and health and safety within the heading of 'work', and health and safety somewhere in between.

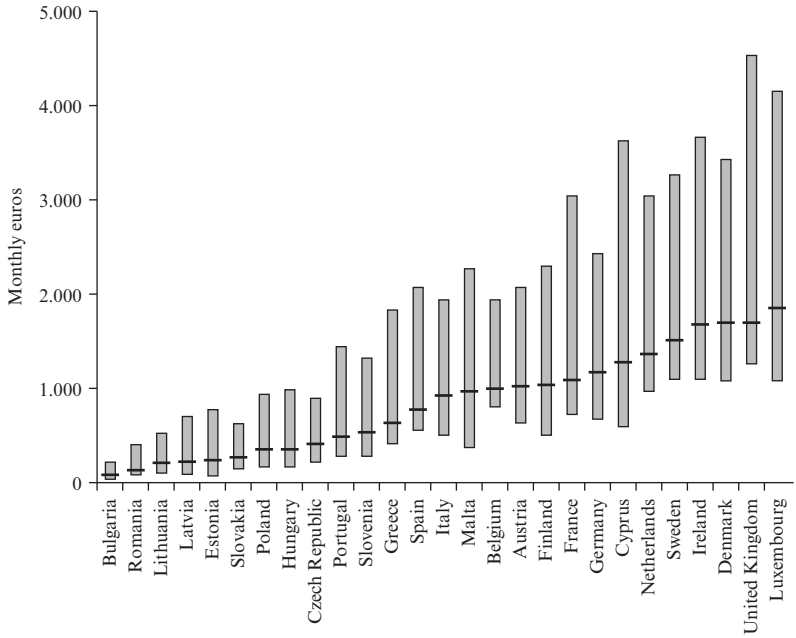
5.3. PAY

What kind of indicator on pay do we need for an index of job quality? Pay is the monetary compensation for work, and its importance derives mainly from the access to resources it grants (although secondarily it may be used as a proxy for the social valuation attached to each job). Therefore, in the context of an international analysis like the one we carry out here, it is important to take into account the wide differences in living standards across Europe: that is, we should not use exchange rates to put all pay levels within the same metric, but some type of purchasing power equivalence.

We thus aim to work with a continuous measure of pay expressed in comparable units, adjusted for purchasing power differentials.

However, the variable of pay included in the 4th EWCS is, first of all, not really a continuous variable. In general purpose surveys, the questions on pay routinely get very high rates of non-response: in many countries, pay is very sensitive information, which some people are reluctant to give. Using broadly defined pay intervals to be pointed at in a card rather than asking directly for an amount of money tends to yield better results in terms of response rates, and many surveys (including the 4th EWCS) opt for this alternative. In the survey, those pay intervals were broadly aligned with the boundaries between the pay deciles in each country, using information obtained from the European Earnings Structure Survey (see Fernández-Macías 2006). So rather than a continuous variable, what we have is an ordinal variable classifying each respondent into one of ten categories of pay: but as we know the amount of money which is associated to each point in this scale, we can use it for defining the distances between the categories. So in essence, we can use the pay variable of the 4th EWCS as a pseudo-continuous variable (with only ten categories, but known distances between them). The main disadvantage of this type of variable is that it incorporates less variability than the real distribution of pay, but it should be a reasonably good approximation (and the response rates obtained were surely higher than if the question had been more direct).

Drawing on the original income bands of the 4th EWCS, we proceed to harmonize the information to make it internationally comparable, and to standardize it in order to use it as an input variable for our index. First, the non-euro currencies are transformed into euros; second, they were adjusted to purchasing power differences using Eurostat conversion factors[3]; and finally, they were rescaled to a 0–100 range, subtracting to each value the minimum value and dividing it by the distance between the minimum and the maximum. To get an idea of the results of this process, Figure 5.2 shows the range of this pay variable before it was rescaled to 0–100 (so the units express euros in purchasing power parity, PPP): the grey bars show the distance between the highest and the lowest values (first and tenth deciles), and the line in the middle of the bar shows the middle value (fifth decile) in each country. This chart clearly illustrates the wide differences between countries in terms of the purchasing power granted by labour compensation: all the values of the nine countries with lowest wages (all of them Eastern Member States) are below the lowest decile of the five countries with highest wages (Luxembourg, the UK, Denmark, Ireland and Sweden). These differences are all captured in the pay component of the index: because the normalization method used is just a rescaling of the original variables, the relative distances between pay



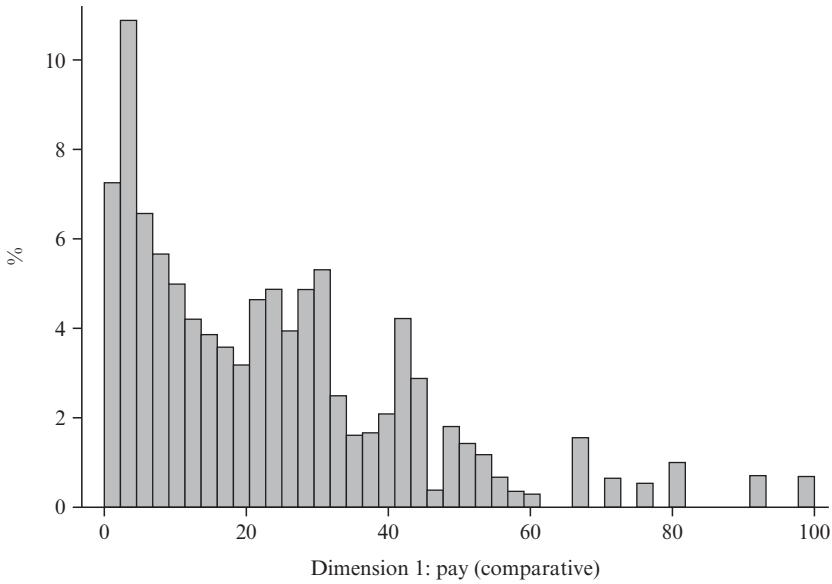
Source: Authors' analysis from EWCS 2005 micro-data.

Figure 5.2 Highest, lowest and middle pay intervals in PPP

levels shown in Figure 5.2 are kept intact in the variable (the only difference being the scale, which would go from 0 to 100 rather than from 0 to 5000 euros in PPP).

It is very important to understand that this variable does not only capture differences in income levels between countries: because respondents are positioned within a comparable 10-point scale, we can compare their individual positions nationally and internationally. For instance, although wages in Spain are generally much lower than wages in Luxembourg, the highest deciles in Spain are above the median wages in Luxembourg. The spread between the highest and lowest decile in each country (the size of the bars in figure 5.2) is in fact a measure of wage inequality: as is well known, the UK has the largest spread, followed by Luxembourg, Cyprus and Ireland; and it is much lower in Sweden or Denmark.[4]

After the mentioned normalization to a 0–100 scale, the distribution of the first dimension of our model of job quality is shown as a histogram in figure 5.3.[5] As could be expected, the distribution of pay is strongly skewed to the left-hand side of the chart: the median value in the sample is around

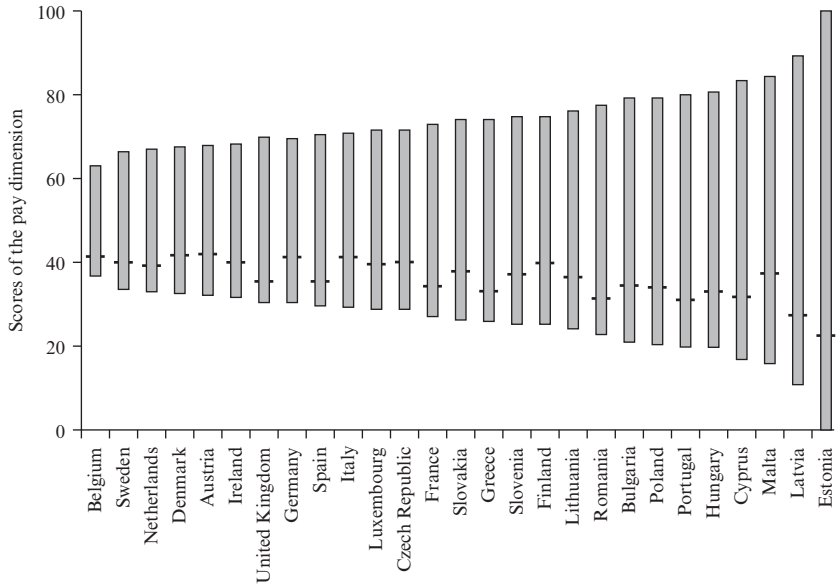


Source: Authors' analysis from EWCS 2005 micro-data.

Figure 5.3 Distribution of the comparative pay dimension

25, and more than 90 per cent of people are below 50 in this dimension. This not only reflects the well-known universal skewness of the distribution of wages, but the fact that we are putting together labour markets as widely different in their pay levels as shown previously in Figure 5.2. Also, the type of normalization applied to the original variable tends to emphasize such skewness: all values have been rescaled to the difference between the maximum and minimum value, and therefore the scores of this dimension reflect the proportion that each wage level represents over the highest decile in the UK, which is very high indeed (more than 4500 euros a month in PPP, according to this data). So the results are perfectly plausible, and do reflect the (striking) differences in pay levels across Europe, even after adjusting for PPP.

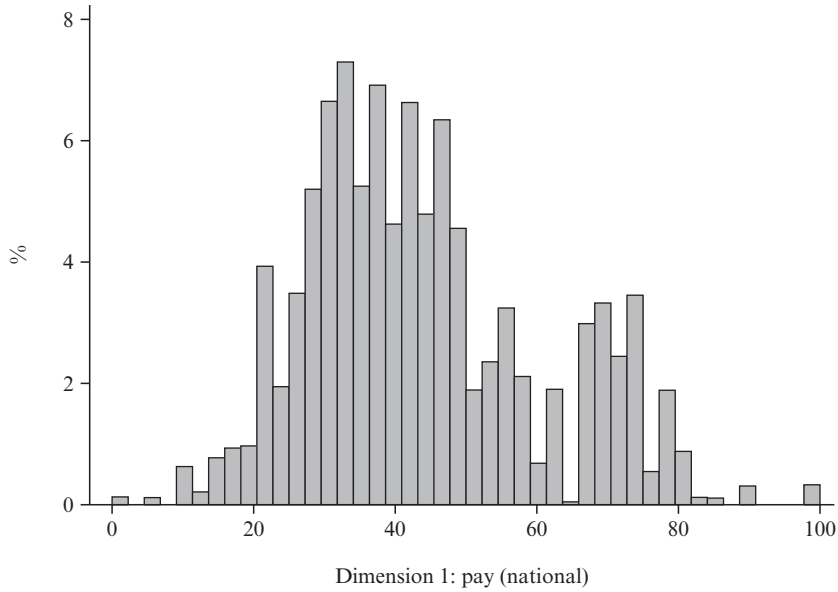
The variable whose distribution is shown in Figure 5.3 is perfectly adequate for the comparison of the pay dimension of job quality across the EU, and in the following chapter it is used intensively for such purpose. But if we are not interested in doing international comparisons, but on the distribution of job quality at the individual level or for the whole of the EU workforce, then the comparative pay indicator whose construction we have just outlined is not really adequate. Put simply, it is so sensitive to the



Source: Authors' analysis from EWCS 2005 micro-data.

Figure 5.4 Highest, lowest and middle pay intervals in the national pay dimension

differences in average pay levels across countries that any individual-level analysis based on such variable will be totally biased by those country level differences. To deal with this problem, we construct a secondary pay indicator which eliminates the country differences, positioning each individual in one of 10 positions that correspond to the income deciles in each country. The spread of these positions in each country is a measure of inequality (broadly corresponding to the distance in euros between the lowest and highest income decile in each country): the distance between the values of 0 and 100 in this non-comparative pay dimension (from now on, we will call it national pay dimension) correspond to the distance between the lowest and highest decile in the country where this distance is larger (which is Estonia), with the spread of the values in the other countries being proportional to this most unequal country. The results are shown in Figure 5.4, which are analogous to the results shown in Figure 5.2 for the comparative pay dimension. We can see that this new variable does not reflect the country differences in average pay levels (it places each worker within each country's pay structure), but it does reflect the differences across countries in the levels of pay inequality (the lowest levels of



Source: Authors' analysis from EWCS 2005 micro-data.

Figure 5.5 Distribution of the national pay dimension

inequality in workers' compensation according to this variable would be in Belgium, Sweden, the Netherlands and Denmark, and the highest in Estonia, Latvia, Malta and Cyprus). Figure 5.5, on the other hand, shows a histogram of the distribution of this variable for the whole European working population according to the EWCS: if we compare it to Figure 5.3, we can see that this new variable is not skewed to the bottom as the comparative pay variable, but rather centred around the median values in each country. We use this national pay dimension when the objective of the analysis is not the international comparison.

Finally, Table 5.1 shows the values in the comparative and national pay dimensions for eight different categories of workers. As argued earlier, the intention of these quick profiles is not analytic (in the next chapter we perform a detailed analysis of the index and the top-level dimensions), but purely illustrative and evaluative: to check whether the results look plausible. In the case of the pay dimension, which is based on a single variable (the other four dimensions draw from several EWCS variables each), this exercise is exceedingly simple, even though we have two versions of this dimension (one for comparative purposes and the

Table 5.1 Average values of the pay dimension for different types of workers

	Total	Self-employed	Em-ployee	Construc-tion	HOR-ECA	Health sector	Profes-sionals	Machine operators
Pay dimension (compara-tive)	29.1	30.9	29.0	31.1	26.4	30.9	36.1	23.6
Pay dimension (national)	45.6	50.1	44.9	49.0	42.6	44.9	52.4	43.9

Source: Authors' analysis from EWCS 2005 micro-data.

other for individual-level analysis). The differences in pay for occupational levels are generally higher than for sectors: the value of professionals in our pay indicator is 50 per cent higher than the value of machine operators (with a smaller difference in the national pay dimension), whereas the differences in the three illustrative sectors shown in table 5.1 are considerably smaller (around 20 per cent between HORECA and construction). It may seem surprising that the overall value for construction is slightly higher than for health, but if we look at the internal differences by occupational levels (not shown here), we see that this results from the bigger dispersion of pay within the health sector.[6] The difference between the average values for self-employed and employees is very small, but the dispersion is much larger for the former. Finally, the mean for all workers (with little interest on its own) is around 29 (and roughly 46 for the national version of the pay dimension). Overall, the distribution of the pay indicator and its values for our illustrative set of categories of workers seems plausible.

5.4. INTRINSIC QUALITY OF WORK

This dimension derives from a humanistic concept of work as purposeful and conscious human activity: not only as a means to provide the resources necessary for survival, but as a form of human expression, realization and fulfilment. In Chapter 2, we argued that the roots of these ideas in the Social Sciences lie in the Marxist concept of alienation, and that this debate has been dominated by two main approaches: an objectivist one, focused on skills and autonomy, and a subjectivist one, focused

on the perception of alienation and self-estrangement. Following this argument, the 'intrinsic job quality' component of our index has two sub-components, each of them accounting for half of its total score.

The formulation of the 'objective' sub-component of intrinsic job quality we used here can be traced back to the classic work of Braverman (1974). It has two main elements: skills and autonomy. The concept of skills we use here is atypical in the sense that it refers to jobs and not workers: so instead of 'the ability to use one's knowledge effectively and readily in execution or performance' (Merriam-Webster 2010), we refer to the requirements associated to each job in terms of skills. For measuring this concept, we use the four broad skill levels of the International Standard Classification of Occupations (ISCO): by design, those skill levels correspond to the four levels of formal education of the International Standard Classification of Education (Elias and Birch 1994). But to widen the concept to non-formal skill requirements, we have made the ISCO classification to account for only half of the skills indicator, the other half being based on the respondents' own assessment about the monotony, complexity and learning requirements of their jobs. Box 5.1 shows the variables composing this skills indicator, as well as the values assigned to each individual item. Box 5.1 also shows the operationalization of autonomy, the other element defining objective intrinsic job quality. Autonomy refers to the degree of freedom or discretion that the worker has within her job: this concept is naturally measured at the job level, and the variables available in the EWCS permit an adequate operationalization. Following Breaugh (1985 and 1999), we identify three different facets of autonomy: methods, scheduling and criteria. As Box 5.1 shows, we have two variables for *methods* (whether the respondent can choose or change the order of tasks and methods of work), two for *scheduling* (whether the respondent can choose or change the speed of work, and whether he can decide on the work schedule), and one for *criteria* (whether the respondent has to assess by herself the quality of her own work).

For the operationalization of a subjective approach to intrinsic job quality, we draw from the classic model proposed by Blauner (1964) for measuring alienation at work. Although this model may seem outdated, it is still very much in use, despite its Marxist roots, it is in practice akin to work psychologists' studies on job satisfaction (see Edgell 2006: 36). To empirically measure alienation, Blauner identified four different dimensions: powerlessness, meaninglessness, social isolation and self-estrangement. Although the EWCS does not include all the variables used by Blauner in his original study, it includes several variables that fit such concepts rather closely (after all, Blauner himself had to adapt his concepts to variables from pre-existing surveys for his original study). In

BOX 5.1 INTRINSIC JOB QUALITY – OBJECTIVE COMPONENT

a) Skills (50%)

– Q2A What is the title of your main paid job? By main paid job, we mean the one where you spend most hours. (50%)
ISCO1-ISCO2 (100), ISCO3 (67), ISCO4-ISCO8, ISCO10 (33), ISCO9 (0).
– Q23 Generally, does your main paid job involve, or not . . .? (50%)
D – monotonous tasks – Yes (0), no (100).
E – complex tasks – Yes (100), no (0). [skill_3]
F – learning new things – Yes (100), no (0).

b) Autonomy (50%)
METHODS (33%)

– Q24 Are you able, or not, to choose or change. . .?
A – your order of tasks – Yes (100), no (0). [aut_1]
B – your methods of work – Yes (100), no (0). [aut_2]

SCHEDULING (33%)

– Q24 Are you able, or not, to choose or change. . .?
C – your speed or rate of work – Yes (100), no (0). [aut_3]
– Q17A How are your working time arrangements set? [aut_4]
1 – They are set by the company / organization with no possibility for changes (0)
2 – You can choose between several fixed working schedules determined by the company (33)
3 – You can adapt your working hours within certain limits (e.g. flexitime) (67)
4 – Your working hours are entirely determined by yourself (100)

CRITERIA (33%)

– Q23 Generally, does your main paid job involve, or not . . .?
B – assessing yourself the quality of your own work – Yes (100), no (0). [aut_5]

BOX 5.2 INTRINSIC JOB QUALITY – SUBJECTIVE COMPONENT

a) Powerfulness (25%)

= autonomy in box 5.1

b) Meaningfulness (25%)

– Q25 For each of the following statements, please select the response which best describes your work situation.

K – You have the feeling of doing useful work – Almost always (100) Often (67) Sometimes (33) Rarely (16) Almost never (0).

c) Social Support (25%)

– Q25 For each of the following statements, please select the response which best describes your work situation.

A – You can get assistance from colleagues if you ask for it – Almost always (100) Often (67) Sometimes (33) Rarely (16) Almost never (0).

– Q37 How much do you agree or disagree with the following statements describing some aspects of your job?

F – I have very good friends at work – Strongly agree (100), Agree (75), Neither agree nor disagree (50), Disagree (25), Strongly Disagree (0).

d) Self-fulfilment (25%)

– Q25 For each of the following statements, please select the response which best describes your work situation.

H – At work, you have the opportunity to do what you do best – Almost always (100) Often (67) Sometimes (33) Rarely (16) Almost never (0).

I – Your job gives you the feeling of work well-done – Almost always (100) Often (67) Sometimes (33) Rarely (16) Almost never (0).

total, nine EWCS variables are used for constructing this sub-component, as shown in Box 5.2. The normative direction of the concepts is inverted with respect to Blauner's proposal, because otherwise this sub-component would not be coherent with the rest.[7]

The first component of Blauner's model, powerfulness, is in fact so close to the idea of autonomy that we opt to use directly the same indicator we

constructed in the previous step. It may seem surprising to use the same indicator twice, but in fact this only means that we are giving it more weight in the final score. The model shown in Figure 5.1 is constructed by reviewing the most important traditions discussing job quality in the Social Sciences: if the same indicator plays an important role in two distinct important traditions, and for different reasons, it makes perfect sense to include it twice and thus give it twice the weight on the index score.[8] What could be argued, though, is that even if the underlying concept is basically the same, the previous sub-component is supposed to deal with autonomy from an objective perspective (and therefore, in principle, independently from the workers' perceptions) whereas the autonomy within Blauner's model refers to the subjective perception of latitude at work. The problem is that the EWCS, being a workers' survey, only includes measures of autonomy which are based on workers' own assessment. Hence, we have to rely on the same (subjective, or at least based on perceptions) variables for measuring autonomy in both cases. It seems reasonable enough to assume that in practice, the difference should be small.

The EWCS contains a few items measuring perceptions of meaningfulness, social support and self-fulfilment at work which seem adequate approximations to Blauner's concepts. These are 'soft' concepts, rather vaguely defined even in their original formulation, and it is fair to say that they may be more problematic than other more 'factual' variables in the context of an international survey like the EWCS. In any case, they should serve as a subjective approximation to the idea of intrinsic job quality. For meaningfulness, we include a single variable measuring whether the respondent feels she is doing useful work. For social support, two variables are used: one on whether the respondent feels he or she can have assistance from colleagues if needed, the other on whether she has good friends at work. Finally, the measure of self-fulfilment (which is the most vaguely defined concept of all, but which we take to mean something very similar to Veblen's 'instinct of workmanship', Veblen (1898)) is based on the perceptions of being able to do at work what the respondent does best, and whether the respondent has the feeling of 'work well-done'.[9]

Table 5.2 shows the pair-wise correlations between the 14 variables used for constructing the dimension of intrinsic job quality. In general, most correlation coefficients are moderate (between 0.10 and 0.20). They are generally higher (in many cases above 0.40 or 0.50) between variables included in the same component (which was to be expected considering that they are different measures of the same thing: for instance, a job involving complex tasks tends to require learning new things, their correlation being 0.42). There are three variables whose correlations with the rest are clearly lower: the level of monotony of the job, and the two

Table 5.2 Correlations among intrinsic job quality variables

	Objective variables related to skills				Objective and subjective variables related to autonomy					Subjective variables				
	ISCO level	Non monotonous tasks	Complex tasks	Learning of new things	Order of tasks	Methods of work	Speed of work	Working time schedule	Use of own criteria	Meaningfulness	Assistance from colleagues	Friends at work	Opportunity to do your best	Feeling the work well-done
Objective variables related to skills														
ISCO level	1.000													
Non monotonous tasks	0.181	1.000												
Complex tasks	0.260	0.049	1.000											
Learning of new things	0.275	0.109	0.421	1.000										

Table 5.2 (continued)

	Objective variables related to skills				Objective and subjective variables related to autonomy					Subjective variables				
	ISCO level	Non monotonous tasks	Complex tasks	Learning of new things	Order of tasks	Methods of work	Speed of work	Working time schedule	Use of own criteria	Meaningfulness	Assistance from colleagues	Friends at work	Opportunity to do your best	Feeling the work well-done
Objective and subjective variables related to autonomy														
Order of tasks	0.205	0.103	0.161	0.188	1.000									
Methods of work	0.224	0.138	0.181	0.207	0.568	1.000								
Speed of work	0.157	0.085	0.134	0.168	0.507	0.540	1.000							
Working time schedule	0.197	0.099	0.098	0.074	0.330	0.281	0.265	1.000						
Use of own criteria	0.153	-0.014	0.238	0.284	0.171	0.172	0.157	0.120	1.000					

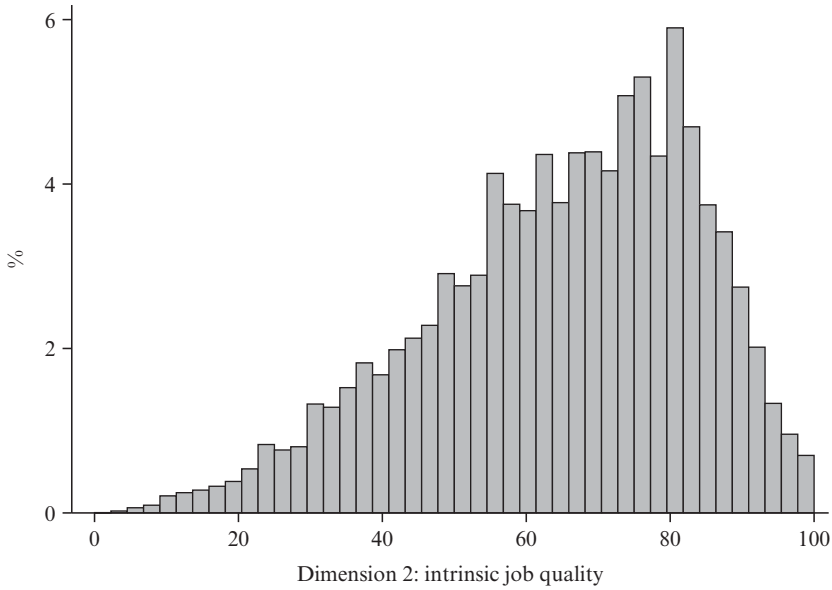
Subjective variables														
Meaning-fulness	0.146	0.155	0.169	0.217	0.162	0.200	0.177	0.113	0.163	1.000				
Assistance from colleagues	0.066	0.029	0.105	0.174	0.041	0.033	0.049	-0.126	0.053	0.153	1.000			
Friends at work	0.055	0.049	0.040	0.085	0.038	0.026	0.033	-0.062	0.054	0.191	0.273	1.000		
Opportunity to do your best	0.157	0.098	0.117	0.145	0.257	0.214	0.239	0.204	0.170	0.415	0.131	0.170	1.000	
Feeling the work well-done	0.114	0.159	0.132	0.178	0.175	0.193	0.188	0.127	0.164	0.642	0.157	0.199	0.512	1.000

Source: Authors' analysis from EWCS micro-data.

variables measuring social support (support from colleagues and having good friends at work). In the case of monotony, such low level of correlation may signal that although monotony and skill deployment at work are surely related issues, monotony is not a direct component of skills. But even if we are not sure about where to locate it in our model, it is such a key concept for intrinsic job quality from an objective perspective that we opted to leave it in. In the case of the two variables measuring social support, the case for leaving them in is even stronger: even if it is relatively uncorrelated to the other elements of intrinsic job quality, it is obviously a desirable job attribute that fits into this component, as it is reflected in the literature. In any case, an important thing to note in Table 5.2 is that nearly all correlation coefficients are positive, which means that all the job attributes included in the table tend to go together. There is only one exception: schedule flexibility and social support are negatively correlated, which seems quite plausible considering that working with people does involve some limitation of the degree of autonomy in the timing of work. So in general, the structure of correlations between the source variables of the EWCS fits reasonably well the assumptions of our model.

Figure 5.6 shows the distribution of scores for the second dimension of our index according to the EWCS. Contrary to the pay indicator, our indicator of intrinsic job quality is skewed to the right-hand side of the chart, with a median value of around 67, only 22 per cent of cases below the value of 50, and an interquartile range that roughly goes from 52 (percentile 25) to 79 (percentile 75). If we take the overall values of our dimensions as an evaluation of job quality for the whole of the EU working population (which, to some extent, they are: although as usual, these indices are better used for comparisons than for absolute evaluations), we could say that European jobs are much better in terms of their intrinsic qualities (according to the evaluations made by workers themselves) than in terms of pay. This, again, seems reasonably plausible, and consistent with previous research on intrinsic job quality and job satisfaction.

Table 5.3 shows the average values of the intrinsic job quality dimension, each of its components, and their sub-components for our list of illustrative categories of the working population. The first column shows the average score for all workers. In general, the scores are higher for the subjective than for the objective intrinsic job quality indicators: particularly, the values are lower for skills than for the other sub-components. This, of course, results from the way each component has been constructed and the source variables specified. The skills measure is largely based in ISCO levels, and there are a relatively large proportion of workers with mid-low values in such variable. Most of the other variables are of a very



Source: Authors' analysis from EWCS 2005 micro-data.

Figure 5.6 Distribution of the intrinsic job quality dimension

subjective nature (in fact, they are close to measures of job satisfaction, though specific), and tend to have quite positive replies and hence quite high scores in the index. It is a well-established finding of the socioeconomic literature that job satisfaction measures tend to receive surprisingly positive answers, and to have a rather low variance (see Muñoz de Bustillo and Fernández-Macías 2005).

Looking at specific groups of workers, we can see that the self-employed exhibit higher scores than employees in both the objective and subjective components of this dimension, especially in the autonomy subcomponent, as could be expected. Workers in hotels, restaurants and catering (HORECA) have rather low values, especially in the objective component (skills and autonomy), while workers in the health sector have quite high scores in the subjective component, particularly with respect to meaningfulness and social support. Professionals have very high scores in all components and subcomponents of intrinsic job quality, especially in skills and autonomy, while machine operators and assemblers have very low values in general, especially in autonomy and self-realization (this core group of industrial workers still fits Braverman's classic arguments about

Table 5.3 Average values of the intrinsic quality dimension and its components for different types of workers

	Total	Self-employed	Employee	Construction	HORECA	Health sector	Professionals	Machine operators
Dimension 2: intrinsic job quality	64.3	74.9	62.3	64.2	58.5	70.2	78.7	51.3
Intrinsic objective job quality	59.1	72.8	56.5	58.1	50.5	66.2	81.4	41.3
Skills	55.7	60.9	55.0	53.7	43.7	69.4	90.0	39.3
Autonomy	62.4	84.7	58.0	62.4	57.3	63.0	72.8	43.3
Intrinsic subjective job quality	69.5	76.9	68.1	70.4	66.5	74.1	76.0	61.3
Powerfulness	62.4	84.7	58.0	62.4	57.3	63.0	72.8	43.3
Meaningfulness	77.0	83.1	75.9	78.6	70.9	86.7	84.4	70.7
Social support	68.4	57.0	70.9	69.1	70.6	72.7	70.8	67.6
Self-fulfilment	70.4	82.2	68.1	71.8	67.6	74.1	75.9	64.1

Source: Authors' analysis from EWCS 2005 micro-data.

the degradation of work in the twentieth century). All these results seem plausible and within expectations.

5.5. EMPLOYMENT QUALITY

If the previous component conceptualized job quality from the perspective of the *human* contents of work, this one looks at jobs as relationships between agents in the labour market. Our model differentiates two main components of employment quality: contractual stability and development opportunities. The first element tries to measure the stability of the contractual bond between employer and employee, the second the opportunities that the current job affords the worker in terms of training and career development. Box 5.3 provides details on the variables and scoring used for constructing this component.

Type of contract accounts for half the indicator of contractual stability: the desirable outcome is having an indefinite contract, which is coded as 1, whereas any other type of contract (fixed-term, temporary agency, apprenticeship or no contract) is coded as 0. Although it seems undisputable that having an indefinite contract is (*ceteris paribus*) more desirable in terms of job quality than having any of the other types of contract specified in question about the kind of contract, the dichotomous coding used is certainly an oversimplification with respect to the underlying idea of contractual stability. On top of this, we must bear in mind that the 'indefiniteness' of an indefinite contract is not the same across all of Europe (because of the very important differences in labour regulation), and therefore this variable on its own probably misrepresents to some extent the degree of stability of the labour relation across countries. For these reasons, we include a second variable (that accounts for the other half of the indicator of contractual stability) that measures the *perception* of stability: this variable is more nuanced (it is measured as a scale with five ordered values) than the previous one, and it should be less affected by the mentioned institutional differences. Also, this variable is asked to all workers, whereas the previous one is asked to employees only: this way, we can have a value of employment stability for the self-employed as well.

The second element of employment quality (development opportunities) is also based on two different variables, and again one is factual and the other a perception. The first one is a dichotomous variable measuring whether the respondent has received training provided by the employer (or herself if self-employed) in the previous twelve months; the second one, a variable holding the level of agreement of the respondent to the statement 'my job offers good prospects for career advancement'.

BOX 5.3 EMPLOYMENT QUALITY

a) Contractual stability (50%)

– Q3B What kind of employment contract do you have? (50%)
  An indefinite contract (100); a fixed-term, temporary agency, apprentice or no contract (0).
– Q37 How much do you agree with the following statements describing some aspects of your job? (50%)
  A – I might lose my job in the next 6 months – Strongly agree (0), Agree (25), Neither agree nor disagree (50), Disagree (75), Strongly Disagree (100).

b) Development opportunities (50%)

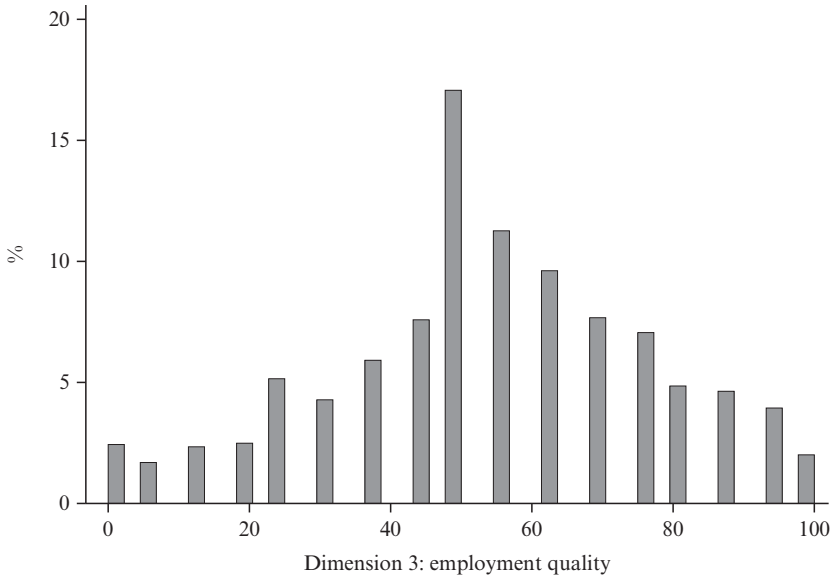
– Q28 Over the past 12 months, have you undergone training paid for or provided by your employer, or by yourself if you are self-employed? – Yes (100), no (0). (50%)
– Q37 How much do you agree or disagree with the following statements describing some aspects of your job? (50%)
  C – My job offers good prospects for career advancement– Strongly agree (100), Agree (75), Neither agree nor disagree (50), Disagree (25), Strongly Disagree (0).

Table 5.4 Correlations among employment quality variables

	Type of contract	Subjective job security	Training	Development opportunities
Type of contract	1.000			
Subjective job security	0.219	1.000		
Training	0.069	0.081	1.000	
Perspectives on career advancement	0.046	0.138	0.182	1.000

Source: Authors' analysis from EWCS 2005 micro-data.

Table 5.4 shows the pair-wise correlations between the four variables that make this second dimension of the index. The correlation between the variables forming each component is moderate (around 0.20), and the correlation between the variables of different components low (.05 to



Source: Authors' analysis from EWCS 2005 micro-data.

Figure 5.7 Distribution of the employment quality dimension

0.14). All correlations go in the same direction, and generally seem to fit reasonably well the model assumptions.

Figure 5.7 shows a histogram with the distribution of scores of this third dimension of our index for the whole of the EU working population according to the EWCS. The values of this dimension are less skewed to the left or right of the distribution than in the two previous cases, although there are slightly more cases above than below the mean, which is approximately 55. But what may seem most unusual in Figure 5.7 is that this dimension is not distributed as a more or less continuous variable, as was the case for the two previous dimensions: instead, the cases are concentrated on a limited set of discrete values, corresponding to the relatively few and separated bars in the histogram. This type of distribution is the result of the way the dimension was constructed: we only used information from four variables, two of them dichotomous, hence the limited range of possible outcomes. In principle, a more continuous variable would have been preferable (if the EWCS had had more than four relevant variables for this dimension), because an implicit assumption is that the underlying concept that we are trying to measure (employment quality) is itself continuous: but this is a very minor problem as long as the values do reflect

the level of employment quality of the different jobs (even if less precisely). We can try to check this by looking at the values for a representative set of workers' categories, which is done in Table 5.5.

As we can see in the first column of Table 5.5 (which represents all workers), the stability component tends to be higher than the development one, because of the way both indicators were constructed. Most European workers (86 per cent) have an indefinite contract, while just one-third of European workers received training in the last 12 months: as these variables account for half of each component, and they are coded as dichotomous variables (with 100 being the positive outcome), the score of stability tends to be higher than that of development opportunities.

Because the self-employed do not have an employment contract as such, they have no value in that variable and as Table 5.5 shows, their score in this component is entirely dependent on the other variable (perceived employment stability, which is generally higher than for employees). And although the self-employed did answer the question on training (which is in this case paid for by themselves, whereas for the rest of the working population it refers to training paid for by the employer), their values are much lower than for employees: but this is partly compensated by a perception of higher development opportunities for this group of workers. Regarding the three sectors included in Table 5.5, workers in construction and HORECA have low scores in stability and very low values (especially HORECA) in development opportunities, whereas health workers are above average in both components of this second dimension of our index. In terms of occupations, professionals have very high values in both components, whereas operators are near average in terms of stability but very low in development opportunities. These scores look generally plausible and according to expectations.

5.6. HEALTH AND SAFETY (RISKS)

The fourth dimension of the index deals with environmental factors with a potential negative impact on the physical and psychological health of workers: in other words, with risks. The total score of the dimension is calculated by averaging the scores of two components: physical and psychosocial risks, which receive a score of 75 per cent and 25 per cent respectively. This unequal weight reflects the importance of both types of risks in the health and safety literature, and also the fact that the former are much better measured in the EWCS than the latter.

For assigning a score to each worker in the component of physical risks, the method of aggregation of information from the individual variables is different from the method followed in other components of our index.

Table 5.5 Average values of the employment quality dimension and its components for different types of workers

	Total	Self-employed	Employee	Construction	HORECA	Health sector	Professionals	Machine operators
Dimension 3: employment quality	55.1	53.5	55.7	51.8	43.7	60.5	64.4	48.8
Contractual stability	76.8	83.3	75.6	72.6	64.1	79.0	81.9	74.5
Type of contract	77.5	0.0	77.5	72.9	53.3	78.2	83.5	80.0
Subjective job security	75.4	83.3	73.9	70.8	68.5	79.5	80.5	68.6
Development opportunities	34.2	27.2	35.9	31.5	24.4	42.4	47.4	23.5
Training	26.1	12.2	29.1	18.5	11.9	40.8	40.9	16.4
Perspectives on career	42.9	43.3	43.0	45.3	37.2	44.5	54.3	30.9

Source: Authors' analysis from EWCS 2005 micro-data.

BOX 5.4 HEALTH AND SAFETY

a) Reported exposure to physical risks (50%)

[All variables use the Nordic scale, and are equally coded in the following way: Always (0), almost always (10), three quarters of the time (25), half of the time (50), one quarter of the time (75), almost never (90), never (100). The individual receives the score that corresponds to the higher level of exposure.]

– Q10 Please tell me, using the following scale, are you exposed at work to. . .?
  - A – Vibrations from hand tools, machinery, etc.
  - B – Noise so loud that you would have to raise your voice to talk to people
  - C – High temperatures which make you perspire even when not working
  - D – Low temperatures whether indoors or outdoors
  - E – Breathing in smoke, fumes (such as welding or exhaust fumes), powder or dust (such as wood dust or mineral dust) etc.
  - F – Breathing in vapours such as solvents and thinners
  - G – Handling or being in skin contact with chemical products or substances
  - H – Radiation such as X rays, radioactive radiation, welding light, laser beams
  - I – Tobacco smoke from other people
  - J – Handling or being in direct contact with materials which can be infectious, such as waste, bodily fluids, lab materials, etc

– Q11 Please tell me, using the same scale, does your main paid job involve. . .?
  - A – Tiring or painful positions
  - B – Lifting or moving people
  - C – Carrying or moving heavy loads

b) Psychosocial risks (50%)

[The individual receives a score of 0 if exposed to two or more of these risks, 25 if exposed to one, 100 if exposed to none.]

– Q29 Over the past 12 months, have you or have you not, personally been subjected at work to. . .?

A – threats of physical violence
B – physical violence from people from your workplace
C – physical violence from other people
D – bullying/harassment

Rather than averaging the level of exposure to the different physical risks, we take the highest level of exposure to any of the risks as the value that determines the score of each individual.[10] The reason is that each one of the risks (listed in Box 5.4) can on its own have a serious impact on the health of the worker, and in most cases it is almost impossible to be exposed to more than one or two of them simultaneously: hence, if we would average the levels of exposure of each individual to all of them, the resulting scores would be misleadingly low. Therefore, in the physical risks component, an individual gets a score of 100 (most desirable) when she is *never* exposed to *any* of the risks listed in Box 5.4 (which is the case for around 13 per cent of workers according to the EWCS), a score of 0 (least desirable) when she is *all the time* exposed to *at least one* of the risk factors (around 23 per cent of the working population), and the intermediate values correspond to the highest level of exposure to any of the risks listed in box 5.4 (so if a worker is exposed 75 per cent of the time to radiations, she gets a value of 25, etc.).

The second component, psychosocial risks, is constructed differently, because the relevant EWCS variables are not measured on the same type of Nordic scale, but as dichotomous variables holding a value of 100 if the individual suffered one of the situations shown in Box 5.4 over the previous year. This is very unfortunate, because it is impossible to construct an indicator of psychosocial risks which is really comparable to the indicator previously constructed for physical risks. The reported levels of exposure to the four psychosocial risks shown in Box 5.4 are extremely low: the maximum level is for threats of violence, and it is below 6 per cent for the whole European sample. Hence, we have to resort to a relatively ad hoc coding, in which the individual receives a value of 0 (most undesirable) if she reports exposure to at least two of the psychosocial risks, a value of 25 if the individual reports exposure to just one psychosocial risk, and a value of 100 if the individual reports no exposure to any of the psychosocial risks. Despite this rather generous coding, almost 90 per cent of the working population receives a value of 100 in this component of risks, only 5 per cent a value of 25 and 5 per cent a value of 0.

For inspecting the correlation between the physical factors, rather than looking at the full matrix of correlations for the 13 original variables, we carry out a principal components analysis, whose results are displayed in

Table 5.6 Results of the factor analysis of the variables related to exposure to physical risks

	Factor 1	Factor 2	Factor 3	Uniqueness
Vibrations	0.63	0.41	−0.15	0.42
Noise	0.66	0.39	−0.13	0.40
High temperatures	0.69	0.23	0.04	0.47
Low temperatures	0.71	0.05	0.04	0.49
Smoke	0.50	0.60	−0.09	0.38
Vapours	0.20	0.80	0.04	0.33
Chemical products	0.11	0.74	0.21	0.40
Radiation	0.03	0.51	0.24	0.68
Tobacco	0.30	0.26	0.05	0.84
Infectious materials	0.01	0.34	0.70	0.39
Tiring positions	0.66	0.06	0.29	0.48
Moving people	0.08	−0.06	0.82	0.32
Heavy loads	0.70	0.07	0.26	0.44
Variance explained (%)	23.9	18.2	11.3	
Cumulative variance explained (%)	23.9	42.2	53.5	

Source: Authors' analysis from EWCS 2005 micro-data.

Table 5.6. Principal components analysis is a data reduction method that generates a set of new variables (factors) which are linear combinations of the original variables and which successively account for as much variability of the original variables as possible. It is the correlation between the original variables which makes it possible to construct these summarizing factors: hence, we can use this method to study the structure of correlations between the 13 physical risk variables more succinctly. In Table 5.6, the rotated loadings of the first three factors are shown: as can be seen in the two lowest rows of the table, these three factors account for more than 50 per cent of the variance of the 13 original variables (the first factor for 24 per cent, the second for 18 per cent, and the third for 11 per cent).

The rotated factor loadings (which show basically the correlation between each of the original variables and the generated factors rotated to show clearer patterns) allow us to identify what each factor stands for. The first factor is associated with work of an intensely physical nature (moving heavy loads, tiring positions), which takes place outdoors (high and low temperatures) and with mechanical tools (vibrations, noise and smoke). Overall, these are the risks traditionally associated with agriculture,

construction and some industrial sectors. The second factor seems to reflect exposure to chemical risks, typical of some types of industrial occupations: this factor is highly correlated with breathing in vapours (such as solvents or thinners), smoke, fumes and handling chemical materials; it is also moderately correlated with vibrations and noise. Finally, the third factor seems to summarize the types of risks exposure usually associated with caring jobs in the health sector: moving people, contact with infectious materials, and to a lesser extent radiation and chemicals. The final column of Table 5.6 shows the *uniqueness* of each variable, which summarizes the degree of non-correlation between each variable and the three factors extracted. The most *unique* variables (that is, the most uncorrelated to the factors and therefore, to the other variables) are breathing in tobacco smoke and exposure to radiation: these risks tend to happen in isolation, whereas the other mentioned risks are more likely to happen simultaneously in some particular types of employment.

Table 5.7 shows the structure of correlations between the four individual variables used for constructing the psychosocial component, and we have also added for illustrative purposes the three factors generated by the principal components analysis of the 13 physical risks discussed earlier. There is a fair degree of correlation between the exposure to the four psychosocial risks shown in Table 5.7: in particular, those suffering threats were also likely to suffer violence from coworkers and other people outside work. There is a rather low correlation between the psychosocial and the physical risk factors: only those who are exposed to the physical risks usually associated with care professions are also likely to be more exposed to psychosocial risks (especially threats and violence).[11]

The distribution of scores of the resulting fourth dimension of our index is shown in Figure 5.8, as a histogram. The shape of this diagram is considerably different from that of the previous dimensions: it is not only a very bumpy distribution, but it is clearly bimodal (with the two most frequent values being 25 and 100). Although the most frequent value is 25 and the median 43, there are more values above than below 50, so that the overall mean is 53.8. Overall, the implicit assessment of job quality with respect to health and safety made by indicator is slightly more negative than for the two previous dimensions, though less negative than for pay.

Finally, Table 5.8 shows the average scores for the same set of representative worker categories discussed in previous sections. The first column shows that the scores of psychosocial risks are much more positive than those of physical risks, because as we discussed earlier, the reported levels of exposure are really much lower in the former case. There are few differences between employees and the self-employed on both components, so there is not much to comment there. Much more telling are the differences across the three

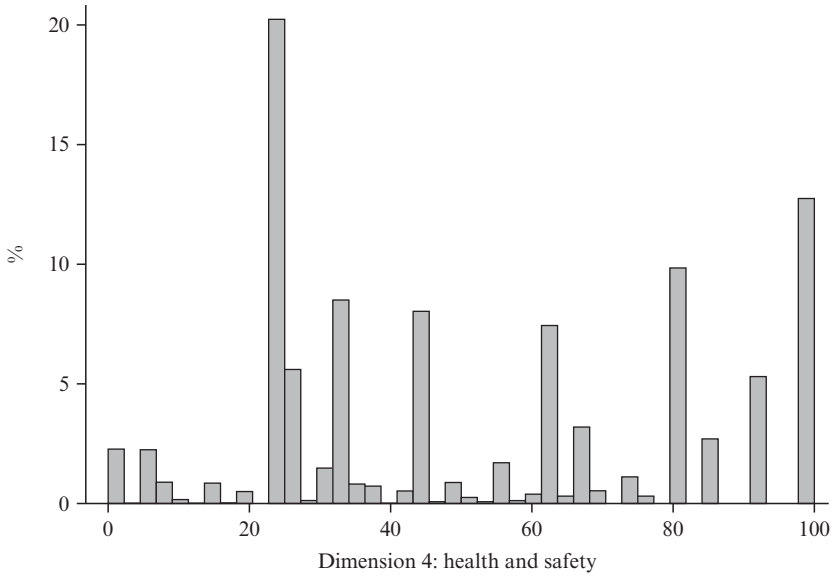
Table 5.7 Correlations among health and safety variables

	Physical risks			Psychosocial risks			
	Intense physical risks (1st factor)	Chemical risks (2nd factor)	Risks in caring jobs (3rd factor)	Threats of violence	Violence from work-mates	Violence from others	Bully-ing
Physical risks							
Intense physical risks (1st factor)	1.000						
Chemical risks (2nd factor)	0.000	1.000					
Risks in caring jobs (3rd factor)	0.000	0.000	1.000				
Psychosocial risks							
Threats of violence	0.041	−0.009	0.139	1.000			
Violence from workmates	0.056	0.027	0.142	0.412	1.000		
Violence from others	0.040	−0.020	0.145	0.586	0.228	1.000	
Bullying	0.071	0.024	0.056	0.287	0.166	0.222	1.000

Source: Authors' analysis from EWCS 2005 micro-data.

representative sectors shown in Table 5.8. Construction workers face the higher levels of physical risks (that is, their score is lower, at 22.9), and health workers the lower (score of 35.1). But the scores are totally inverted when we look at psychosocial risks: health workers suffer them considerably more often than construction workers. A similar contrast (even more pronounced) can be observed between professionals and operators.

Table 5.8 also shows the scores for each of the physical factors (just shown for illustrative purposes) and each of the psychosocial risks. The highest levels of exposure, in general, are for the risks related to intensely physical work (the first factor): but there are important differences by groups of workers, from 51.2 for construction workers to 68.3 and 68.5 for health workers and professionals. The exposure to chemicals is higher in



Source: Authors' analysis from EWCS 2005 micro-data.

Figure 5.8 Distribution of the health and safety dimension

construction workers and operators (near 70 in both cases). And confirming that the third factor refers to physical risks associated with caring jobs, its highest levels of exposure are by far for workers in the health sector (61 in health against 78.9 in construction or 77.6 in HORECA, for instance). All psychosocial risks show very low levels of exposure (and hence, high scores in terms of job quality), for almost all groups: only the health sector displays relatively lower scores, with workers in this sector reporting higher exposure to threats of violence and bullying. All these results look plausible and within expectations.

5.7. WORK–LIFE BALANCE

The fifth and final dimension of our job quality index is work–life balance. The key work characteristic for this dimension is, without any doubt, the organization of working time: in particular, the duration, scheduling and flexibility of working hours. A secondary aspect which is also mentioned in the specialized literature is the intensity of the work effort. The weight assigned to each of these two components within the dimension of

Table 5.8 Average values of the health and safety dimension and its components for different types of workers

	Total	Self-employed	Em-ployee	Construc-tion	HOR-ECA	Health sector	Profes-sionals	Machine operators
Dimension 4: health and safety	53.8	52.2	54.0	40.6	42.3	46.1	64.9	38.5
Physical risks	41.6	38.5	42.2	22.9	27.8	35.1	57.0	20.8
Intense physical risks	61.7	59.9	62.1	51.2	58.8	68.3	68.5	53.7
Chemical risks	71.4	72.5	71.2	67.7	73.6	70.9	72.0	68.9
Risks in caring jobs	77.3	77.3	77.3	78.9	77.6	61.0	76.0	79.9
Psychosocial risks	90.4	93.2	89.7	93.7	85.6	78.8	88.7	91.4
Threats of violence	94.0	95.1	93.7	96.3	90.8	83.6	92.3	94.2
Violence from workmates	98.2	99.5	97.9	98.1	98.7	93.9	98.2	98.5
Violence from others	95.7	95.7	95.6	98.1	92.5	88.6	95.2	95.3
Bullying	94.9	97.3	94.4	97.0	91.5	91.3	94.2	95.5

Source: Authors' analysis from EWCS 2005 micro-data.

work–life balance is unequal, trying to reflect the relative importance that each of them receives in the literature: working time accounts for 75 per cent of the dimension, and intensity for 25 per cent.

Box 5.5 provides details on the construction of this dimension of the index. The working time component has three sub-components. The duration of work is based on the standard question on the number of hours usually worked in the main paid job on a normal week. For standardizing the values of this variable (to rescale it to our 0–100 desirability scores), rather than using the max-min method on the original continuous variable, we have opted for generating five categories of working hours and then manually assign scores within the 0–100 range to each category. The reason is that although working hours is in theory a continuous variable, in practice (as a result of regulations and cultural norms) it behaves as a discrete or categorical variable. In other words, workers do not really have the chance to choose any number of hours of work, but a few discrete options such as working full-time or part-time: for this reason, the variable is in many cases better specified in intervals (Creedy and Kalb 2005). This also allows us to use a non-linear metric for the coding of hours of work. Working less than 20 hours a week is the most desirable outcome and hence receives a value of 100; working between 20 and 38 (a long part-time or a short full-time) receives a value of 75; the standard 40 hours a week (plus or minus two hours) receives a value of 50; long full-time hours between 42 and 48 receives a value of 25; and very long hours (in principle, not even allowed by European legislation) above 48 a week receive a value of 0. Considering the often disadvantaged conditions of employment of part-time workers, it may seem surprising that working less than 20 hours is considered as the most desirable outcome in this component of our index: but we must bear in mind that this is just one indicator within a composite index that includes many other job quality measures. If part-time workers have worse employment conditions, that will be accounted for by the employment quality dimension. Each attribute has to be evaluated on its own, and working less hours is, *ceteris paribus*, better than working more hours.

The second subcomponent of working time is scheduling. The idea behind the specification of this subcomponent is that working outside 'normal' hours is undesirable because it interferes with social and family life. We have four variables measuring the extent to which the respondent works at nights, evenings, Saturdays and Sundays: in each case, the outcomes have been coded as 100 if the respondent never works on such atypical schedules, 0 if they always (or very often) do, and a gradation for the values in between, as shown in Box 5.5. The overall score of this subcomponent is, as usual, the average of such four variables.

Finally, the third subcomponent of working time is flexibility/control.

BOX 5.5 WORK–LIFE BALANCE

a) Working time (75%)

a.1. Duration (25%)

– Q8a How many hours do you usually work per week in your main paid job?
  0–20 hours (100), 20–38 (75), 38–42 (50), 42–48 (25), 48–168 (0).

a.2. Scheduling (25%)

– Q14A Normally, how many times a month do you work at night, for at least 2 hours between 10.00 pm and 05.00 am?
  Never (100), 1–5 (75), 6–10 (50), 11–20 (25), more than 20 (0).
– Q14B And how many times a month do you work in the evening, for at least 2 hours between 6.00 pm and 10.00 pm?
  Never (100), 1–5 (75), 6–10 (50), 11–20 (25), more than 20 (0).
– Q14C And how many times a month do you work on Sundays?
  Never (100), 1 (75), 2 (50), 3 (25), 4 or 5 (0).
– Q14D And how many times a month do you work on Saturdays?
  Never (100), 1 (75), 2 (50), 3 (25), 4 or 5 (0).

a.3. Flexibility/control (25%)

– Q17A How are your working time arrangements set?
  1 – They are set by the company/organization with no possibility for changes
    If schedules change regularly (according to variable q17b), coded as (0).
    If schedules do not change (according to variable q17b), coded as (25).
  2 – You can choose between several fixed working schedules determined by the company/organization (50)
  3 – You can adapt your working hours within certain limits (75)
  4 – Your working hours are entirely determined by yourself (100)

b) Work intensity (25%)

– Q20B And, does your job involve. . .? *[Nordic scale, same code as in box 5.4]*

A – Working at very high speed
B – Working with tight deadlines
– Q25 For each of the following statements, please select the response which best describes your work situation. . .
F – You have enough time to get the job done – Almost always (100) Often (67) Sometimes (33) Rarely (16) Almost never (0).

The idea here is that the more control the worker has of her own work schedule, the better she will be able to adapt it to her non-work commitments (and vice versa). So the most desirable outcome (receiving a score of 100) is having total control over one's working times, and the less desirable (score of 0) is having schedules which not only are imposed on the worker, but which change regularly.

With respect to the second component of the work–life balance dimension, which, as mentioned, receives one fourth of the weight, it was constructed by averaging three variables that measure work intensity from slightly different angles: whether the respondent works at very high speed, with tight deadlines, and whether she has enough time to get the work done (see Box 5.5).

Table 5.9 shows the pair-wise correlation coefficients between the variables used for the construction of the work–life balance dimension of our index. The duration and scheduling of working time are positively and moderately correlated, as happens with most variables within our index (in most cases, the desirable and undesirable work attributes tend to go together). But the correlation between the flexibility/control indicator and the other two working time indicators goes in the opposite direction, and although it is not very high, it is significant. This is important, because it is one of the few cases in which we find a *compensation* rather than an *accumulation* between different work attributes: generally, jobs that have very long and unsocial schedules (and therefore, a low score in those two indicators) tend to involve a higher degree of flexibility and control by the worker (and a high score in this third indicator), and vice versa. This involves some kind of trade-off, and means that the aggregated variability of the working time component is lower than the variability of the three indicators used for constructing it: averaging values which go in opposite directions, we end up with more middling scores. This is perfectly correct and fitting the logic of our index: it simply reflects the fact that there is, in this particular case, compensation between positive and negative attributes. But as we have already seen, there are very few

Table 5.9 Correlations among work–life balance variables

	Working time			Work intensity		
	Duration	Scheduling	Flexibility	Speed of work	Tight dead-lines	Enough time to do the work
Working time						
Duration	1.000					
Scheduling	0.347	1.000				
Flexibility	−0.162	−0.123	1.000			
Work intensity						
Speed of work	0.140	0.127	0.085	1.000		
Tight deadlines	0.154	0.074	0.049	0.622	1.000	
Enough time to do the work	0.072	0.024	0.058	0.243	0.258	1.000

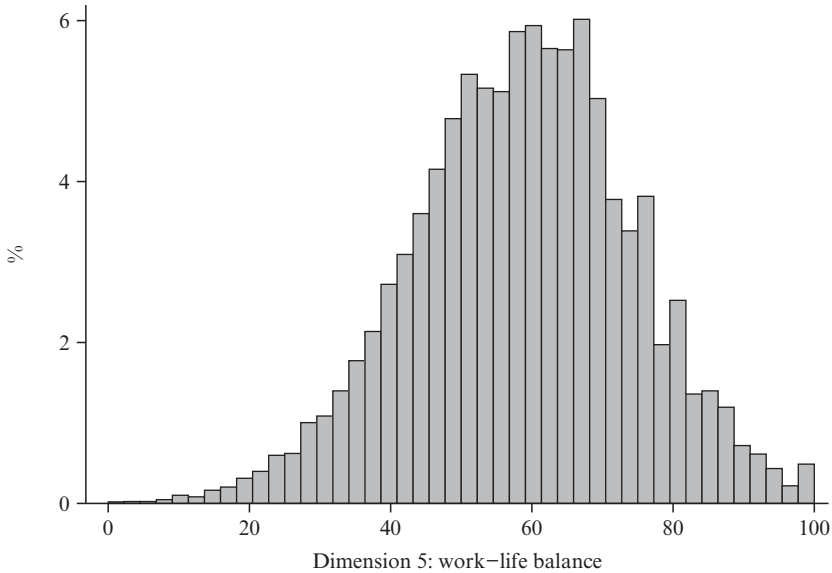
Source: Authors' analysis from EWCS 2005 micro-data.

cases of compensation between different job attributes: instead, the predominant mechanism seems to be one of accumulation of good and bad attributes.

The rest of Table 5.9 is less noteworthy. There is a rather high correlation between the three variables measuring intensity, as could be expected considering that they are really three different ways of measuring the same thing. The correlation between working time and intensity is less strong, though significant in the case of work duration. It is interesting to note that those working longer hours also tend to feel that they have tight deadlines and work at high speed.

Figure 5.9 presents the distribution of the fifth dimension of our index. This is the dimension whose distribution is closest to normality, although with a slight skewness to the right-hand side. The average value is 59, the median is 59.5, and the interquartile range roughly goes from 49 to 69.

The average scores for our representative categories of workers (shown in Table 5.10) look rather plausible, and quite interesting in some cases. The contrast between employees and self-employed illustrates the trade-off between flexibility and duration/scheduling mentioned earlier: whereas the self-employed (as expected) have extremely high values in terms of control of their working time, they have very low values (the lowest in the table) for duration and scheduling. But the overall value for self-employed



Source: Authors' analysis from EWCS 2005 micro-data.

Figure 5.9 Distribution of the work–life balance dimension

and employees are relatively similar (61.8 *versus* 58.3), because in both cases the positive and negative attributes (which are inverted) compensate each other. There are no significant differences in terms of intensity between employees and self-employed workers.

The profiles of the three representative sectors are also fitting to expectations. In terms of sectors, the worst overall scores are for HORECA, the best for health workers. HORECA have low values in two of the three working time indicators (long and unsocial schedules), near average values in the third one (so there is not much compensation in this case), and below average values in two of the three intensity indicators. Construction workers have good scores in terms of schedules, but they are slightly below average in duration, control and intensity. Health workers have good scores in duration, slightly above average in intensity and slightly below in control and scheduling. Finally, it is interesting to see that the lowest values for control of the whole table are for operators, a category that is slightly below average in most other indicators of work–life balance.

Table 5.10 Average values of the work–life balance dimension and its components for different types of workers

	Total	Self-employed	Employee	Construction	HORECA	Health sector	Professionals	Machine operators
Dimension 5: work–life balance	59.1	61.8	58.3	56.1	49.9	60.3	62.6	51.2
Working time	58.7	61.4	57.9	57.7	48.4	60.7	62.6	50.0
Duration	51.9	31.7	55.4	40.9	47.5	63.3	56.4	43.4
Scheduling	78.7	63.2	81.8	86.0	50.7	76.2	82.0	75.7
Flexibility	45.2	86.1	36.5	45.5	46.0	42.7	49.1	30.7
Work intensity	60.2	62.9	59.5	51.4	54.4	59.2	62.5	54.9
Speed of work	57.8	58.6	57.4	48.0	44.0	55.6	64.8	49.1
Tight deadlines	55.5	56.9	54.9	42.9	50.6	57.3	57.5	47.0
Enough time to do the work	67.5	73.0	66.3	62.8	69.0	64.9	65.3	68.6

Source: Authors' analysis from EWCS 2005 micro-data.

5.8. THE OVERALL JOB QUALITY INDEX

As briefly explained earlier, the overall job quality index is then calculated using the following weighted geometric mean formula:

$$EJQI = \prod_{i=1}^{n} X_i^{\alpha_i} \qquad [5.1]$$

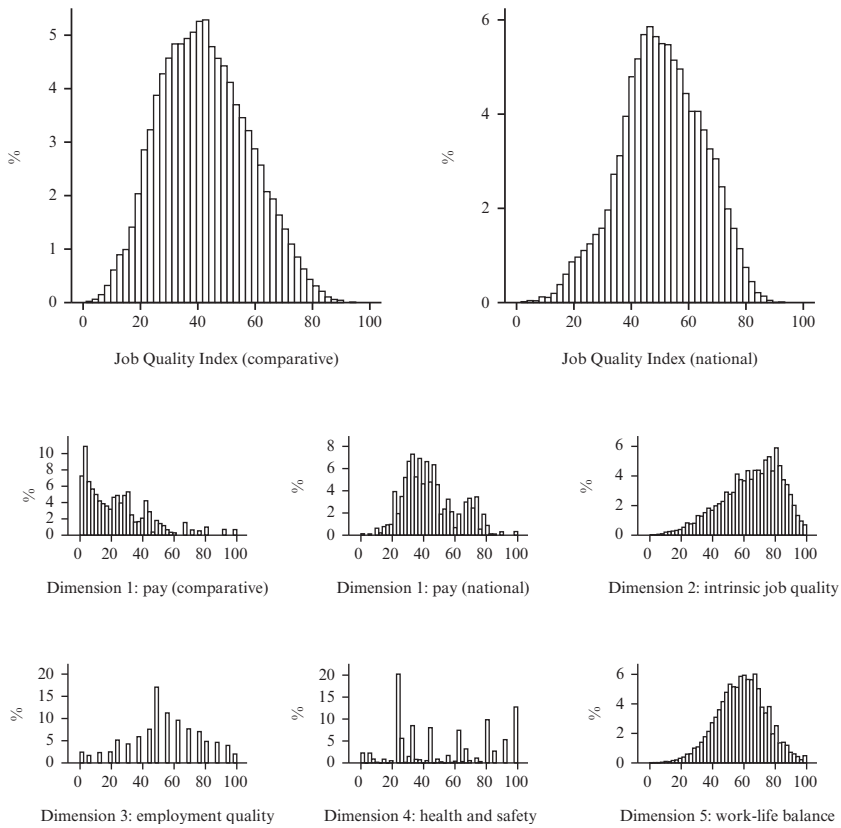
where α_i is the weight given to each dimension X_i and $\Sigma_{i=1}^{n}\alpha_i = 1$.

The main disadvantage of using a geometric aggregation in the final stage of construction of the index is that its decomposition is not as obvious as with an arithmetically aggregated index. It is possible to do an additive decomposition of the index, but the dimensions have to be transformed into logarithms and the index exponentiated: this makes such decomposition less intuitive and therefore less useful.

On the other hand, the proposed aggregation method has very desirable properties for our purposes. The weighted geometric mean is formally equivalent to a modified Cobb-Douglas production function, a specific type of production function that is widely used in economics and whose properties are well-known.[12] In the context of job quality, the production function yields the level of job quality that corresponds to different combinations of amenities (the five dimensions of our index).

There are some properties of the Cobb-Douglas production function that are desirable for our purposes. The first one is the assumption of constant returns to scale. This property means that a variation of the same scale of every dimension of the index results in a variation of the overall index of exactly that same scale. In the second place, the marginal contribution of each component to overall job quality is decreasing, that is, other things being equal, an increase in a certain dimension of job quality produces a rise in job quality progressively less and less important. The last relevant feature of this function is that it implies that the production function of job quality is concave: if two different combinations of job attributes yield the same overall job quality, then any combination resulting from the weighted average of the original combinations leads to at least the same job quality. In other words, this property means that more balanced sets of amenities yield higher job quality than extreme combinations of job attributes (where some dimensions take very high and others very low values). At the same time, this feature implies that, other things being equal, in order to hold job quality constant, a reduction of the level of quality in a certain dimension requires a compensating larger increase in another. This increase has to be larger (in absolute terms) the more scant is the first attribute.[13]

As we have two versions of the pay dimension, there are two versions of



Source: Authors' analysis from EWCS 2005 micro-data.

Figure 5.10 Distribution of the Job Quality Index and its five dimensions

the index as well: one specifically designed for international comparisons and one designed for individual-level (non-comparative) analysis. Figure 5.10 shows the distribution of both versions of the index as histograms, and for reference we show again the histograms of each dimension below. Table 5.11 displays some summary statistics and Table 5.12 the pair-wise coefficients of correlation between both versions of the index and their dimensions. The scores of the comparative index lean slightly to the left-hand side of the chart (both the mean and the median are slightly below 50), and their distribution looks relatively normal and continuous (the skewness and kurtosis statistics in Table 5.11 show that the distribution of the index is quite close to normal, more than any of the individual

Table 5.11 Descriptive statistics of the Job Quality Index and the five dimensions

	Mean	Standard deviation	Coefficient of variation	Skewness	Kurtosis	5th percentile	25th percentile	50th percentile	75th percentile	95th percentile
Job Quality Index (comparative)	45.7	15.3	0.34	2.58	0.03	20.8	35.0	45.5	56.7	71.3
Job Quality Index (national)	51.6	14.1	0.27	2.83	−0.20	26.7	42.4	51.6	61.9	74.4
Dimension 1: pay (comparative)	29.1	20.4	0.70	4.94	1.18	3.0	14.3	26.8	39.8	67.0
Dimension 1: pay (national)	45.6	15.6	0.34	2.28	0.54	24.4	32.9	41.7	55.9	72.9
Dimension 2: intrinsic job quality	64.3	19.2	0.30	2.70	−0.54	28.5	52.0	66.7	79.6	91.6
Dimension 3: employment quality	55.1	22.2	0.40	2.92	−0.26	12.5	43.8	56.3	68.8	93.8
Dimension 4: health and safety	53.8	29.9	0.56	1.69	0.20	10.9	25.0	43.8	81.3	100.0
Dimension 5: work – life balance	59.1	15.7	0.27	3.05	−0.17	32.5	49.0	59.6	69.3	84.8

Source: Authors' analysis from EWCS 2005 micro-data.

Table 5.12 Correlations between the Job Quality Index and the five dimensions

	Job Quality Index (comparative)	Job Quality Index (national)	Dimension 1: pay (comparative)	Dimension 1: pay (national)	Dimension 2: intrinsic job quality	Dimension 3: employment quality	Dimension 4: health and safety	Dimension 5: work–life balance
Job Quality Index (comparative)	1.000							
Job Quality Index (national)	0.923	1.000						
Dimension 1: pay (comparative)	0.658	0.411	1.000					
Dimension 1: pay (national)	0.500	0.468	0.674	1.000				
Dimension 2: intrinsic job quality	0.528	0.576	0.260	0.294	1.000			
Dimension 3: employment quality	0.601	0.634	0.279	0.255	0.353	1.000		
Dimension 4: health and safety	0.613	0.695	0.135	0.114	0.192	0.172	1.000	
Dimension 5: work–life balance	0.402	0.426	0.065	−0.031	0.202	0.056	0.328	1.000

Source: Authors' analysis from EWCS 2005 micro-data.

dimensions). Comparing the distribution of the index with its five building dimensions, we see that it represents a fair summary of them, although the fact that we have used a geometric method for aggregating the information from the five dimensions means that it is a summary that emphasizes certain aspects of them. In particular, the geometric aggregation penalizes having low values in any of the dimensions, and hence it gives more prominence in the final overall scores to dimensions 1 and 4, because their values are lowest and their dispersion highest (as shows the column with the coefficients of variation in Table 5.11).

This is also reflected in the pair-wise correlations between both versions of the index and the dimensions of Table 5.12: the comparative index is most highly correlated with the pay dimension (0.658), followed by the health and safety and employment dimensions (around 0.6), and finally by the intrinsic job quality (0.528) and the work–life balance dimensions (0.402). In the case of the national version of the index, as the systematic country differences are eliminated from the first dimension, the dimension that has a larger influence on the overall index scores is health and safety (0.695) followed by employment quality (0.634).

Table 5.12 also allows us to inspect the correlations between the dimensions among themselves, which has significant interest on its own. With a single exception, all the coefficients of correlations are positive, which means that at the level of the dimensions, there is more accumulation than compensation of positive and negative job attributes (we must remember that in our detailed analysis of the components of each dimension, we only found two clear cases of compensation, between flexibility and duration of working time, and between flexibility and social support). The five dimensions of the index seem to cluster in two different groups, highly correlated among themselves but not so much across: pay, intrinsic job quality and employment quality are quite highly correlated (around 0.3–0.35), as are health and safety and work–life balance (0.328), but the correlations between the former and the latter are below 0.2. Work–life balance, in particular, has nearly no correlation with pay and employment quality (and a very moderate correlation with intrinsic job quality), which probably reflects some kind of trade-off that we have already mentioned in previous pages: some workers with very long and unsocial schedules (and hence low values in the work–life balance dimension) have very good conditions of pay, employment and intrinsic rewards from work, and vice versa. We discuss these patterns in more detail in the next chapter.

Finally, Table 5.13 shows the scores of the index and the five dimensions for our representative categories of workers, for a final evaluation of the plausibility of our results. The mean score of the comparative index for the EU27 as a whole is 45.7, with highest values for the intrinsic

Table 5.13 Average values of the Job Quality Index and its dimensions

	Total	Self-employed	Employee	Construction	HORECA	Health sector	Professionals	Machine operators
Job Quality Index (comparative)	45.7	47.2	45.6	43.3	37.4	46.2	54.9	36.5
Job Quality Index (national)	51.6	54.1	51.3	48.6	42.3	51.1	60.9	43.2
Dimension 1: pay (comparative)	29.1	30.9	29.0	31.1	26.5	30.9	36.1	23.6
Dimension 1: pay (national)	45.6	50.1	44.9	49.0	42.6	44.9	52.4	43.9
Dimension 2: intrinsic job quality	64.3	74.8	62.3	64.2	58.5	70.2	78.7	51.3
Dimension 3: employment quality	55.1	53.5	55.7	51.8	43.7	60.5	64.4	48.8
Dimension 4: health and safety	53.8	52.2	54.0	40.6	42.3	46.1	64.9	38.5
Dimension 5: work–life balance	59.1	61.8	58.3	56.1	49.9	60.3	62.6	51.2

Source: Authors' analysis from EWCS 2005 micro-data.

job quality dimension (64.3), above 50 for the other three dimensions of amenities (employment quality, health and safety and work–life balance), and a much lower value of 29.1 for the dimension of pay (we have already discussed at length the differences in the distribution of scores for the five dimensions). The self-employed receive a slightly higher score than employees, with most of the difference coming from the intrinsic job quality dimension (as we saw earlier, most of this difference is explained by the difference in autonomy levels). Of the three illustrative sectors shown in Figure 5.13, the lowest value is for workers in Hotels, Restaurants and Catering (HORECA), which receive an overall value of 37.4, with very low scores in employment quality, work–life balance and pay. Workers in the health sector have rather high scores in terms of intrinsic job quality and employment quality, whereas construction workers have higher scores in terms of pay. The job quality score of professional workers is 50 per cent higher than the score for operators and assemblers: and although the difference in favour of professionals appears in all five dimensions, it is highest in health and safety (nearly double), pay and intrinsic job quality. This final set of illustrative results look plausible and within expectations.

5.9. SOME FINAL REMARKS

Once we have constructed our Job Quality Index for the EU, we can go back to the objectives we set ourselves in the introduction to this chapter and try to evaluate to what extent our index fulfils such objectives.

First, is our Job Quality Index clearly delimited? Are all the areas of information covered relevant for the underlying concept of job quality? We believe they are, to a larger extent than most of the indices evaluated in Chapter 4. The fact that the selection of relevant job attributes was based on an extensive literature review, and the use of a wide-ranging working conditions survey (the EWCS), ensured that the coverage of our index was reasonably exhaustive (with the exception of participation in the workplace, which is unfortunately absent from the EWCS). And we have been very strict in leaving out issues which may be related, but are not attributes of job quality: in particular, we have not included in our index information related to the worker rather than the job (such as job satisfaction or employment history), nor information related to the labour market (such as unemployment levels) or the institutional environment (such as labour regulation or unemployment benefits). Such restraint does not only ensure that our index is strictly about job quality, but in fact it shall facilitate evaluating the links between all those secondary elements and job quality at a later stage.

That said, we have to acknowledge that there is some degree of unavoidable *contamination* of some of those alien elements in our index. Although we have tried to leave job satisfaction out of our index, some of the variables used for constructing it are strongly subjective in nature, and therefore in practice relatively similar to job satisfaction (in particular, some of the variables included in dimension 2, intrinsic job quality). Such 'subjective' contamination (which is at odds with our concept of job quality, focused on the attributes of jobs, and therefore unrelated to the subjectivity of individual workers) is unavoidable when constructing an index based on a workers' survey, as is the case here. The other alternative would involve doing some type of external evaluation of job quality (by specialized surveyors measuring job quality attributes on site, for instance), which would have problems on its own and is obviously impractical. There is also some degree of contamination of the institutional environment in our index: to the extent that the institutional environment affects the responses of workers, the differences across countries may partly reflect them. For instance, countries with a high degree of institutional protection against workplace risks may paradoxically reveal higher levels of exposure, because workers are more aware of them (for instance, this is almost certainly happening with psychosocial risks, as mentioned earlier). This is also very difficult to avoid in an international index such as this one: the cultural and institutional differences across countries tend to permeate the index in one way or another, even if the objectives of the index are defined in more or less institutionally-neutral terms. These minor problems of contamination of alien elements in our index should be taken into account when its results are analysed.

Second, is our Job Quality Index based on a clear and coherent model, which guides the selection of attributes and the logic of aggregation of information? We believe it is, to a larger extent than most of the proposals reviewed in the previous chapter. Rather than coming up with a new model of job quality, we opted for building a model based on a review of the main arguments found in the Social Sciences with respect to the impact of jobs on the well-being of workers. Such review provided an extensive list of relevant attributes to be included in our index, as well as some type of conceptual structure that was used for constructing the model shown earlier in figure 5.1, and which provided some logic for the aggregation of different pieces of information into an overall index. In that sense, our index of job quality is transparent in its construction, grounded in a long tradition of research (which facilitates the interpretation of results) and meaningful in its structure and components.

That said, it must be acknowledged that there is some degree of unavoidable arbitrariness in the selection of elements and in the allocation

of weights to the different pieces of information, even in a more or less theoretically-grounded index as ours. Our literature review did provide us with a list of concepts to be covered: but the actual operationalization of such concepts into the variables used for the index is not obvious, and therefore involves making decisions which can always be challenged. The need to confine our choices to an existing questionnaire, however good, makes this problem even larger (the clearest example being the need to leave out a full dimension because of lack of information in the EWCS questionnaire). The weights assigned to each variable, indicator, component and dimension in their aggregation are also at most loosely suggested by the literature review. Nevertheless, it would be completely naïve to expect that any model of job quality can unambiguously determine the areas to be covered and the logic to be followed for the aggregation of information: rather than that, we should aim at a reasonably transparent selection and aggregation of information, that provides a justification for each important decision so that it can be challenged in its own terms. We believe that our index fulfils such goals.

An important decision with respect to the operationalization of concepts into variables and indicators is the logic followed for recoding the original variables into a homogeneous metric so that they can be aggregated. For constructing our index, we decided to avoid the usual practice of standardizing into Z-scores, and proposed a transformation of the original values into a 0–100 range according to their meaning in terms of job quality. This was a risky decision, which can be criticized for bringing even more arbitrariness into the index. But we believe that the Z-score standardization (or any derivation) would imply even more problems for our purposes: most importantly, it involves homogenizing the variability of the different job quality attributes, and therefore distorting the real differences in such variability, which is crucial information in this case. For instance: most people have similarly high scores in the psychosocial component of the fourth dimension (health and safety), while the physical component has much more variability. If we standardize both components, we end up with two variables with an apparently similar variability: the existing small differences in the psychosocial components would be magnified, and both components would contribute similarly to the variability of the aggregated health and safety dimension. In our view, this amounts to a misrepresentation of the distribution of job quality. If the component of psychosocial risks has a low variability, the index should reflect that, because it means that psychosocial risks have in general a low impact on the overall distribution of job quality. Hence, we opted for a method of standardizing the variables that respected their original variability. An implication of this choice is that the resulting index has a lower degree of variability than

otherwise (because some of its components have a low variability that has been left intact), which makes the analysis slightly more difficult, but the results slightly easier to interpret (as they have a more direct meaning).

Third, can our Job Quality Index be computed at the individual level to do analysis by subgroups? Is the information sufficiently harmonized across countries to do meaningful comparisons? The use of the EWCS to construct our index ensured that both goals were fulfilled to a larger extent than most of the indices reviewed in the previous chapter. Our index was fully constructed at the individual level, which not only enables the analysis by subgroups, but also the evaluation of the micro-level interaction between the different job attributes (for instance, whether there is compensation or accumulation of good and bad job attributes). But the source used imposes some restrictions as well: the EWCS has a relatively small sample at the country level, which means that, in practice, our capacity to deepen the analysis to very specific subgroups at the country level is limited. In this sense, it would be more than desirable that in future editions the EWCS expands its sample size at the country level to at least five or ten thousand respondents, which would boost its analytic potential. With respect to the comparability of information in the EWCS, we can be certain that it is one of the most harmonized surveys at the European level, but this does not mean that there are no problems in this respect. We have already mentioned that differences in the cultural and institutional contexts can contaminate the answers to some questions, so that they not only reflect differences in the job attributes but also in how such attributes are socially constructed (we exemplified such effect with the differences in the reported levels of psychosocial risks across Europe). The only solution to this problem, again, is to be careful when analysing the data, and keep a critical eye on possible cultural effects in the responses to some variables.[14]

Finally, does our Job Quality Index provide a clear and unambiguous evaluation of job quality for any type of subgroup of the working population? Is it possible to decompose the overall score transparently, to identify the attributes which are behind any difference found? Our index has been generated by aggregation, following a nested structure that makes it very easy to decompose any observed difference to a very detailed level (from the overall scores to the dimensions, then to the components and subcomponents, then to the indicators and finally to the original variables from the EWCS). The final index, which allows clearly and unambiguously evaluating and ranking the job quality of any subgroup of workers, has been computed through a geometric rather than an arithmetic aggregation. This gives the final index some desirable properties: most importantly, the contributions of the different dimensions to the overall score are decreasing rather than linear, and the contribution of each dimension

is not independent from the contribution of the other four (the index takes into account the interaction between them).

Our Job Quality Index for the European Union is, therefore, reasonably close to the objectives we set ourselves in the beginning of this chapter, following our own recommendations from previous pages. But the real test of its value, nevertheless, will be carried out when we use it for evaluating the quality of jobs across the European Union, which is the main task of the next chapter.

NOTES

1. It is important to note that, following our definition, these job attributes would only be included in our model insofar as they have a direct impact on workers' well-being (for communicational/expressive reasons, for instance), but not as a tool for improving job quality. Although in our view, it is undisputable that workers' participation and political action at the workplace has historically been one of the main drivers of the improvement of job quality, it is a determinant and not a component of job quality as such (except, as mentioned earlier, as an element of workers' autonomy and communicational possibilities). In any case, the EWCS does not cover this very important aspect of work and employment, so we are forced to leave it out of our model.
2. For a review of the characteristics of the EWCS see Section 3.3 of Chapter 3.
3. See http://epp.eurostat.ec.europa.eu/portal/page/portal/purchasing_power_parities/introduction.
4. Of course, this is not intended to be a measure of inequality, and as such it is problematic: in particular, it is very conservative compared to others, because it only compares the values of the highest and lowest deciles, ignoring the disparities which exist within the deciles, which are in fact enormous in the top category.
5. As in the rest of the analysis, the data has been weighted to make it representative of the employed population in the European Union of 27 members.
6. In construction, half of the people are in the category of craft workers, with a value of around 33 in the pay indicator. In health, one-fourth of the workers are professionals (doctors, with a value of approximately 38), another third technicians (nurses, with a value of 26) and another third service and support workers (with values ranging from 17 to 25).
7. Powerlessness thus becomes powerfulness, meaninglessness meaningfulness, social isolation social support and self-estrangement self-fulfilment.
8. In fact, it is not twice the weight, but one and a half times the weight. The overall weight of autonomy in the job quality index is 7.5 (5 per cent in the previous component, 2.5 per cent in this one).
9. Some of the variables used in this component, as shown in box 5.2, had a coding problem in the original EWCS questionnaire (which was simply the result of a mistake): the missing values of their response scales ('always' and 'never') were not included in the answer cards. We can assume that the people that would have given those answers chose instead the closest values ('almost always' and 'almost never'), so we have given those items the values of 0 and 100 in the scores.
10. Only if the individual is equally exposed to more than one risk do we combine (multiply) their values (for instance, if the exposure is 50 to two risks, the value assigned to the individual is lower, 25).
11. The factors generated by principal components analysis are totally uncorrelated among themselves (orthogonal).

12. The simplest Cobb-Douglas function, when there are only two inputs, capital (K) and labour (L), is written as $Y = AK^{\alpha}L^{1-\alpha}$, where A and α are constants. If $A = 1$, the Cobb-Douglas function would be a weighted geometric mean of the quantity of inputs. A generalized Cobb-Douglas function would be $Y = A\Pi(X)_i 0^{\alpha_i}$, where $\Sigma\alpha_i = 1$ and X_i denotes the input I, with a weight α_i.
13. This function has an additional – and much more technical – property: it has a constant elasticity of substitution (equal to unity). The constant elasticity of substitution measures the ease with which one production factor can be substituted by another holding the output constant. Formally, this measure is the ratio between the proportional change in the ratio of two inputs and the ratio of their marginal productivities (which here can be interpreted as the marginal contribution of each dimension to overall job quality). If the elasticity of substitution is high, then a percentage change in the marginal contribution of each dimension will lead to a large percentage change in the mix of dimensions embedded in the preferred job. Particularly, the worker would choose a job with a larger weight of the amenity whose return increased.
14. It could be argued that, to some extent, it does not matter whether the evaluations given by workers to the job attributes across countries are affected by these cultural differences, because after all, what affects people's well-being is not necessarily the reality as such (what is the reality as such, anyway?) but the way such reality is experienced, which is mediated by social norms and cultural values.