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Contextualizing the impact of work organization on
employee satisfaction.

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CONTEXTUALIZING THE IMPACT OF WORK ORGANIZATION ON EMPLOYEE SATISFACTION

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Abstract – The paper assesses the relationship between the use of alternative workplace practices (AWP) and job satisfaction. Using a unique employer-employee data set with rich information on both firm and employee characteristics we test whether there is a positive impact of AWP on job satisfaction (motivation hypothesis) or it is negative (intensification hypothesis). We expand a growing empirical literature focusing on small and medium size firms from a southern European area. Our results show an overall positive effect, depending on the specific practice considered. We also obtain some sort of time-dependence with the effects turning from negative to positive once the practice has been implemented for some time.

Keywords: Job satisfaction, work organization, unobserved heterogeneity

JEL Classification:

1. Introduction

The analysis of individual well-being has long been a field of interest of psychologists and sociologists. Economists, on the contrary, were until recently only marginally interested. However, the increasing availability of large data sets with the necessary information included; validation by a number of tests of the usefulness of well-being self-reported data (Clark, et al, 2007; Kesebir and Diener, 2008); and the need to deal with some puzzling and persistent evidence as, among other, the lack of correlation between job satisfaction and monetary compensation (a particular version of the so-called Easterlin paradox) has certainly spur the interest of economists in this area of “happiness”, “well-being” or “job satisfaction”. Indeed, Clark (2009:1) reports that searching in mainstream economic journals one can find since the year 2000 more than one paper published every week related to these issues.

A specific strand of research within this area looks at the impact of alternative workplace practices (AWPs) on the quality of working life¹. According to Godard (2010: 468) AWP are centered around the process by which work is performed. They typically include practices such as autonomous or semi-autonomous teamwork, cross-training, and job rotation, and are often adopted within the context of a workplace re-engineering or quality management program. They also include various participatory mechanisms typically focused on work organization and processes, including problem-solving groups, information sharing, and joint steering committees. Finally, they very often include variable pay systems². What would be the effect of the introduction of these practices? Simplifying, it is argued that modern organizations are moving away from *tayloristic* jobs to *enriched* jobs (Mohr and Zoghi, 2006). The workplace becomes more motivating and challenging, encouraging workers to

¹ This interest is quite natural as it is well documented that over the last two decades many firms have undertaken significant organizational changes and implemented new human resource practices. See, for instance, the early paper by Osterman (1994) and the more recent review by Combs et al (2006).

² Note that, as it is becoming relatively common, we make a distinction between AWP and Human Resource Practices. HRP can be defined as the way in which employees are managed. They revolve around selection, formal training, development, appraisal and various employment relations practices.

improve productivity and product quality, and, at the same time, offering them a more fulfilling job that meets their psychological and social needs (Cappelli and Rogovsky, 1994). Therefore, we should expect a positive impact of these AWP on both, firm level outcomes and workers' well-being captured, for instance, in their self-reported sense of job satisfaction. There are, however, critics to this reasoning, arguing that these new forms of work organization carry on costs to workers: intensification of the working activity, reduction in working dead-times, psychological and physical pressures. Even though they could improve firm productivity, the cost would be on workers' shoulders.

The goal of this paper is to add some new empirical evidence to this debate. Research in this topic has been hampered by the scarce availability of the needed data. Fortunately, we were able to develop and implement our own survey and create a data set with information from a large number of firms and their employees. The richness of this unique data set allows us to deal with some problems stressed in this literature in earlier papers. First of all, we will exploit our ability to better control for individual-specific and workplace-specific variables to reduce unobserved heterogeneity at both levels. Analysis of the individual determinants of job satisfaction is rather developed and there also is some tradition in case-studies or studies with a small number of workplaces which facilitate to capture the firm dimension. There is, however, a smaller, though growing, number of papers with large multi-sector data sets with detail firm-level information. Our paper builds on this recent research and helps to expand it. Even though we have cross-sectional data, we will also discuss the issue of the direction of causality as it is important to disentangle whether is the introduction of AWP what impacts on workers' job satisfaction or "happy" workers allow firms to introduce new forms of work organization practices. Finally, we also want to stress the fact that our data set is made up of small and medium size firms. Godard (2004) argues that the effects of AWP on the quality of working life may critically depend on workplace context variables, especially the structure

of the employment relation. Distrust between employers and employees and lack of employee representation are among the main obstacles to the successful implementation of workplace innovations. SME's, especially family owned as it is in our sample, represent a working space where personnel relationships are more important and unions have a lesser impact than in the bureaucratized large firms. In this setting AWP's can have idiosyncratic effects that may have not been underscore in previous research because of the type of data used. Additionally, in a recent paper Godard (2010) claims that the implications of work and HR practices for the quality of working life are historically and institutionally contingent. Indeed, research comparing workers' job satisfaction at the country level shows significant differences, but most evidence using micro data on firms comes from the US or northern European countries. Our data is for a southern European region (Catalonia) that will allow us to test for specific effects of the introduction of AWP's depending on the concrete area analyzed.

The paper is organized as follows. In the next section we summarize the theoretical and empirical literature relevant to our interest. We then set our model and describe the data used in section 3. The econometric analysis is presented in section 4 with a careful discussion of the results. Conclusions follow in section 5.

2. Alternative workplace practices and job satisfaction: a brief discussion

In the theoretical debate on the impact of AWP's on job satisfaction it has been defended both, a positive as well as a negative effect. According to the two-factor theory (Robbins and Judge, 2008) or the job characteristics model of work motivation (Hackman and Oldman, 1980) workers derive intrinsic rewards from their jobs. This way, turning away from Tayloristic concepts of work organization (highly specialized tasks, rigid command structures,

centralized responsibilities) to introduce more task diversity, autonomy, team work, job rotation, horizontal communication and delegation of decision will give workers a more motivating and self-rewarding work activities developed in an environment that fosters the creation of trust between employees and supervisors. Both trust and intrinsic rewards are positively related to high job satisfaction (Appelbaum et al., 2000). In a similar vein, Frey, Benz and Stutzer (2002) argue that job design and job satisfaction are related through the concept of *procedural utility*, which means that individuals not only value outcomes, as usually assumed in economic theory, but the conditions and processes leading to these outcomes. Bauer (2004) also points to indirect positive effects of new forms of work organization in form of higher wages³ or through increased working time flexibility that allows a better coordination between workers' leisure time and the one of the rest of the family.

An additional interesting point is the claim that AWP's have the potential of generating win-win situations in terms of benefits accruing to both employers and employees (Osterman, 2000). The former obtain higher levels of productivity; the latter receive economic benefits, enjoy higher level of job satisfaction, are better trained, more motivated and capable of implementing and using their skills (Antonioli, et al, 2008).

In contrast, another view is less positive and points to a potential detrimental effects of AWP's. Godard (2001) argues that the negative effects can take the form of work overload, workers' stress and negative job-to-home externalities. This is what Antonioli et al (2008) call the *intensification thesis*, where management uses the new organizational practices to strengthen control over workers' efforts and to intensify the pace of work (what Handel and Levine (2004) refer to "management by stress"). Building on the work by Thompson and McHugh (1990), Mohr and Zoghi (2006) consider that workers may prefer narrowly defined

³ It has to be noted that that the empirical evidence on the effects of the new forms of work organization points to a positive effect but is not conclusive.

jobs in a tayloristic workplace because employers can easily define performance standards and, therefore, the boundaries of what the workers are expected to do are clear. Furthermore, there is also an increase in uncertainty when success (payment and employment) is contingent to performance rather than assured by the labor relationship. An additional source of reduction in job satisfaction may appear if the AWP's create incentives for peer surveillance (peer monitoring or peer evaluations) that affects negatively the internal working atmosphere. Not only "psychological" well-being can be jeopardized by the new forms of work organization, but there can also appear "physical" problems. Ergonomists have shown that some characteristics of these new practices can be associated with increased workplace hazards and injuries (Brenner et al, 2004). Note that this vision is rather skeptical about the possibility of win-win situations, and on the contrary, considers that employers gain at the expense of the employees (Ramsay et al, 2000; Harley, 2005).

It could be argued that the empirical evidence points to a positive effect, but a conclusive agreement on the sign of the impact has not been reached yet. Positive correlations between a variety of practices associated with the transformation of the workplace and workers' job satisfaction have been found in the US (Freeman and Kleiner, 2000; Batt, 2004), in Canada (Mohr and Zoghy, 2008), in Japan (Chuma et al., 2007) and in Finland (Kalmi and Kauhanen, 2008). Bauer (2004) uses individual data from the European Survey on Working Conditions covering all EU member states and finds that higher involvement of workers in high performance workplaces is associated with higher job satisfaction.

In contrast, some research has found negative effects. Askenazy (2001) and Askenazy and Caroli (2002) using French data and Fairris and Brenner (2004) using data on U.S. establishments find evidence of a positive relationship between AWP's and various occupational injuries. Brenner et al, (2004) present evidence showing that the adoption of new organizational practices are positively related to cumulative trauma disorders, possibly

because of increased work pace. Frick et al (2008) underscore a positive relationship between human resource management practices and the number and severity of work accidents and also with absence rates. In a recent paper, Askenazy and Caroli (2010) report that employees in French companies who are involved in innovative work practices are significantly worse off in terms of occupational hazards than those who are not. However, they also find that information and communication technologies reduce this negative relationship.

To sum up, the empirical literature does not offer a conclusive response. Opposite results could be related to historical and/or institutional contingencies (Godard, 2010) or simply because the variables capturing changes in the workplace are defined and measured differently. It also could be that specific sub-groups of the workforce do not react in the same way to similar changes in their working conditions. Indeed, Beckman et al (2009) show that in terms of job satisfaction fixed-term workers and their permanent counterparts respond differently to a number of organizational practices. Moreover, it is well established that when the effects of AWP are measured by union status, the positive impact is only observed for non-union members (Petrescu and Simons, 2008)⁴.

In any case, we agree with Macky and Boxall (2008) that conclude that the way workers are mobilized (“used”) is a management prerogative, therefore creating the possibility to find “high” and “low” roads to organizational success with different implications for workers well-being.

3. Empirical analysis

⁴ In a recent paper Bryson et al (2010) show that after controlling for self-selection into union membership, the negative effect is confined to non-covered employees.

The aim of the empirical analysis is to study the effect of AWP's on individual utility from working, as proxied by job satisfaction. We follow the standard strategy in this literature first suggested by Clark and Oswald (1996) that assumes that utility from work depends on a number of factors, including pay, hours worked, individual, firm and job characteristics. We therefore define utility from job as:

$$(1) \quad U_i = U_i(\tilde{Y}_i, H_i, I_i, E_i, J_i, AWP_i)$$

where \tilde{Y} is an individual's relative or comparison wage⁵, H is the number of hours worked, and I , E and J represent, respectively, individual, employer and job characteristics. Indicators for the presence of alternative working practices are denoted by the vector AWP .

3.1 Data

Our data comes from a unique employer-employee survey carried out with the support of the Small and Medium Size Employers Association in Catalonia (PIMEC) between September 2005 and May 2006. The data is for firms from 10 to 250 employees and belonging to 9 specific industries. Design and implementation of the survey was carefully done. A focus group made up of employers and experts was initially set up to help developing and customizing the survey to the specificities of each sector. A pilot survey was also carried out implementing the recommendations of the focus group. Firms were first approached by telephone to gain participation and once they agreed on it, questionnaires were sent by postal mail and picked up personally by a courier.

Four types of questionnaires were developed and distributed to different groups of workers within each firm, i.e. general manager, managers, supervisors and core non-management

⁵ We discussed the use of a relative wage instead of its absolute value below.

employees. The questionnaire for general managers included questions on the main characteristics of the firm (size, ownership, degree of internationalization), evolution and position in the market, process technology, product strategy and innovation activities, HR practices and work organization. The questionnaire for managers, supervisors and core employees consisted of a detailed investigation on the nature and content of their jobs. Questions ranged from human capital and other specific characteristic of the worker, to a comprehensive description of the workplace, both in contractual terms (working hours, earnings, type of contract...) and in terms of what the job entailed (competences required, required time to reach the optimum level of productivity in the job, degree of intensity, degree of freedom to organize tasks).

Our final sample consists of 499 firms (about 17% of the universe) belonging to 6 different manufacturing industries (Food & beverages, Rubber & plastics, Fabricated metal products, exc. Machinery, Machinery & equipment, Office, accounting & computing machinery and Furniture) and 3 service industries (hotels, computer & related services and human health services). The sample of firms is representative at the industry level and we also checked the consistency of our sample with respect some key aspects of the firm, among others, size and productivity. It is more difficult to provide a validation of the representativeness of the sample at the employee dimension as we don't have an external source of what would be the universe from which the sample should be drawn. We have, however, the firm self reported number of employees within the three occupational groups we interviewed, and we could reach almost 63% of them.

In this paper we are interested in the specific effects of the presence of AWP in the "shop floor". Therefore, we restrict our analysis to the occupational group of "core-employees".

3.2. Variable definitions

Dependent variable: job satisfaction has been defined as the “positive emotional state resulting from the appraisal of one’s job” (Locke, 1976: 1300). It is rather obvious that the main source (if not the only one) of information on job satisfaction has been self-reported subjective data. It has traditionally been questioned as an economic construct, but recent specific studies on the reliability of self-reported job satisfaction measure show positive results (see for instance Kristensen and Westergaard-Nielsen, 2008). Following the standard procedure, we included in the survey a series of questions about workers satisfaction in different job domains: the feeling of succeeding at work, the possibility of using own initiative, the environment and relationship with supervisors, influence on own tasks, the training received from the firm, earnings, working schedule and hours, the environment and relationship with the managers of the firm and overall job satisfaction. They are measured by a five-point Likert scale, going from “1” not satisfied at all to “5” absolutely satisfied.

Independent variables: our key independent variable is the measure of the alternative workplace practices. In the general manager survey we asked about the presence of a number of workplace practices: workers’ suggestion program, information-sharing systems, job rotation program, workplace re-design program, teams for problem solving, semi-autonomous working groups, quality circles and total quality management. In the event that the firm has adopted any of these workplace practices, they are also asked whether it had been implemented for more than two years prior to the moment of the survey. This list of practices represents a bundle of the most cited and empirically used in this literature (Osterman, 2000; Lynch, 2007, Mohr and Zoghi, 2008), facilitating the comparison with previous research. Unfortunately, participation is not measured at the individual level but at the aggregate firm level. This way we know in which firm the practice exists but not who is involved in it. To

some extent this problem is ameliorated by the way we introduce the questions for we specifically asked whether core employees worked under these practices. In addition, in our site visits to some firms of the sample we could see that, most often, once the firm had decided to introduce a new workplace practice it was applied to all employees.

Wages is another relevant variable in determining job satisfaction. Although it is expected that higher wages increase the utility derived from the job, and hence job satisfaction, most empirical studies do not find that higher wages lead to more job satisfaction. Instead, the recent empirical literature (see e.g. Clark and Oswald 1996; Groot and van den Brink, 1999) seems to suggest that what matters are relative or reference wages. In other words, it is relative income, rather than absolute income, what gives utility (Rees, 1993). In our study we use as relative wages the earnings of a reference group that consists of the predicted values from an earnings equation. That is, instead of observed wages, we take the wages that a person with a given characteristic is expected to earn. Our wage equation is the typical mincerian equation

$$\ln(w_i) = M_i\beta + u_i \quad (6)$$

where $\ln(w_i)$ is the natural logarithm of net monthly salary, M is a matrix containing the determinants of wages, u_i is a normally distributed random error term. Since our salary variable is based on wage intervals, we do not estimate $E[\ln(w)|M\beta]$ but $E[\ln(w)|\delta_{j-1} \leq \ln w < \delta_j]$, where δ_{j-1} and δ_j are the lower and upper bounds, respectively.⁶

The wage determinants collected in matrix M are; years of schooling, age, tenure in the firm, gender, natural logarithm of weekly hours worked, individual or firm incentives in wages,

⁶ See Amemiya (1973) for further details about the estimation methodology.

duration of the contract and industry dummies. Results of estimated equation are according to expectations. Estimated potential wages are included in the models predicting job satisfaction.

An additional important variable is working time. We include average weekly number of hours, counting both regular shifts and overtime. Other covariates included in equation (1) are individual and firm characteristics. We rely on the abundant literature on the individual determinants of job satisfaction to select our individual level controls (Diaz-Serrano and Cabral Viera, 2005; Gazioglu and Tansel, 2006; for a review see Pugno and Depedri, 2009:14-16). This way, we introduce worker's age, tenure, gender, education and self-reported level of under/over education.

3.3. Descriptive statistics

Table 1 reports summary statistics for the different questions on job satisfaction.

[Insert table 1, around here]

It can not be observed substantial differences among them. The lowest average self-reported satisfaction is observed for training (2,72), followed by satisfaction with earnings (3,00) and with own influence (3,09). Recall that “moderately satisfied” corresponds to a value of 3 and “very satisfied” corresponds to a value of 4 (on a scale of 1 to 5). It is difficult to compare these values to other figures obtained in related research, but we consider that they would be in the lower bound of the reported results. For instance, Mohr and Zogui (2008: table 1) report a level of 3.26 for overall job satisfaction but in a scale 1 to 4 and Kalmi and Kauhanen (2008: table 2) 2.26 in a scale 0 to 3. This rather low level of job satisfaction is in accordance

with results by country reported in Bauer (2004) where Spain is one of the countries with the lowest level of worker satisfaction or in Clark (2009) who obtains that Spanish workers have experienced a reduction in overall job satisfaction from 1997 to 2005. It is interesting to observe that the two domains with the highest average satisfaction are those related to interpersonal relations, with the relation with managers scoring 3,46 and the relation with one's direct supervisor 3,42. It reinforces the idea that in SMEs personal relationships are very important. Finally, it does not come to be a surprise that the lowest satisfaction level is for the training received as it is well known the low level of investment on training their production workers Catalan firms do.

In table 2 we present the incidence of the different work organization practices by firm and industry. Overall we can consider that a substantial fraction of the firms in the sample had implemented the different types of workplace practices. However, we can observe considerable variance across practices and, especially across industries. Information sharing systems (the practice easiest to implement) is the one with the highest incidence and Total Quality Management has the lowest. By industry, there is a higher mean incidence in the service industries than in the manufacturing, with the private health industry presenting the highest incidence. Note that below the figure for the percentage of firms reporting having implemented the practice we present the percentage of them who had done it at least two years before the survey. In this case, there is less variance and we can observe that a large part of the firms had been using the practice for more than two years. Differences across industries are not very significant.

Table 3 reports the sample mean values of the overall job satisfaction broken by each of the different organizational structures. We also test whether average job satisfaction differ

statistically between the firms that adopt a given organizational structure and those who do not. Assessing statistical significant at five percent level, the results indicate that the difference in the average level of job satisfaction is not the same across structures. We observe that average overall job satisfaction is significantly, from a statistical point of view, larger for those firms that adopt a given organizational structure respect to those that do not. The differences are not very large (around 15% of a standard deviation) but almost all of them are significant. Therefore, there seems to be a correlation between AWP.

In table 3, we repeat the same type of analysis than in table 2, but now we compare the satisfaction level between firms that adopted a given organizational practice less than two years ago and those where is has been already implemented at least for two years. By comparing these results with those reported in table 4 we can determine whether the success in terms of workers satisfaction of these organizational strategies is time-dependent or are simply unsuccessful per se. The comparison of the results reported in table 3 with those in table 2 provides quite revealing results. After two years, the satisfaction gap becomes negative for the worker information sharing system, the quality circles and the total quality management, though the satisfaction gap is not statistically significant in any of them. On the contrary, the satisfaction gap becomes more positive and statistically significant in favour of those firms that adopted the structure more than two years ago for the job rotation practice, teams for problem solving and the semi-autonomous working groups. These results suggest that the acceptance by workers of these structures is not straightaway, though we can only disentangle this puzzle by means of the econometric results.

[Insert table 2 and 3, around here]

4. Econometric results

We assume that the propensity of individual i to report a certain level of job satisfaction is driven by the following structure:

$$S_i^* = \beta' X_i + e_i \quad i = 1, \dots, N \quad (1)$$

where S_i^* is the latent outcome, X_i are the determinants of the outcome, and e_i is the random error term. Note that we do not observe S_i^* , but observe an indicator variable with an ordered structure of the type:

$$S_i = \begin{cases} 1 & \text{if } S_i^* \leq \mu_0 \\ j & \text{if } \mu_{j-1} < S_i^* \leq \mu_j, \\ J & \text{if } S_i^* > \mu_{J-1} \end{cases} \quad j = 1, \dots, J-1 \quad (2)$$

According to the observability rule defined in (2), the conditional probability of observing $S_i=j$ is:

$$\begin{aligned} P(S_i = j | X_i) &= P(\mu_{j-1} \leq S_i^* \leq \mu_j) = P(\mu_{j-1} \leq \beta' X + e_i \leq \mu_j) \\ &= P(e_i \leq \mu_j - \beta' X) - P(e_i \leq \mu_{j-1} - \beta' X) \end{aligned} \quad (3)$$

If we assume that e_i follows a standard normal distribution, the probability expressed in equation (3) can be estimated using the ordered probit model, whereas the ordered logit model is to be used if we assume a logistic distribution.

In our dataset, individuals are asked to report on a five-point scale how satisfied they feel with their job. The lowest level of the scale stands for individuals who were not satisfied at all (1), whereas the highest stands for fully satisfied individuals (5). This is our endogenous variable (S_i). Assuming an ordinal structure implies that a five-point scale indicates five satisfaction levels, where a score of 5 is better than a score of 3. The common assumption of cardinality implies that an individual reporting a satisfaction score of 4 feels twice more satisfied than an individual reporting a score of 2. Analogously, the satisfaction gap between two individuals reporting satisfaction scores of 4 and 5 is assumed to be the same than between two individuals reporting scores of 2 and 3, respectively. This treatment of the ordinal outcomes is unrealistic, since assumes linearity.

Although the use of an ordered model in estimating equation (1) is supposed to avoid cardinality, Van Praag and Ferrer-i-Carbonell (2004) show that to some extent this approach also implies a cardinal treatment of the outcome variable. They use this shortcoming to reformulate the ordinal model specified in equation (3) to an OLS setting (Van Praag and Ferrer-i-Carbonell, 2006). Their approach implies transformation of the response category $S_i=j$ to $\ln(z_j)$, where

$$\ln(z_j) = \frac{\phi(\mu_{j-1}) - \phi(\mu_j)}{\Phi(\mu_j) - \Phi(\mu_{j-1})} \quad (4)$$

where $\phi(\bullet)$ and $\Phi(\bullet)$ are the normal density function and the cumulative normal distribution, respectively. This reformulation of the problem avoids a number of technical difficulties of the ordered response models. Recall that one problem when interpreting the relationship between the outcome variable and the covariates in the ordered model is that the scaling of the coefficients is arbitrary. Hence, estimated parameters lack of any economic meaning and the

comparison in the magnitude of the estimated effects across alternative models and samples requires the calculation of marginal effects for each of the satisfaction scores (5 in our case).

Now equation (1) can take the following form:

$$\ln(z_i) = \beta' X_i + e_i \quad i = 1, \dots, N \quad (5)$$

In a cross-section context, the main advantage of the OLS estimation of equation (5) is that estimated parameters are elasticities and semi-elasticities. This specification provides a straightforward interpretation of the estimated effects, which are comparable among alternative models. This approach is called “probit adapted OLS” (POLS). They show that differences in the estimated parameters between the POLS and the ordered probit model differ only because of a multiplication factor.⁷

For the estimates of the satisfaction equation (5), we consider two alternative specifications. The first only uses as covariates the characteristics of the worker, i.e. squared polynomials on age and tenure, years of schooling, gender, relative wages, the log of the weekly hours worked and two dummies reflecting whether the worker considers herself undereducated or over educated for the task she does. In the second specification we also consider the eight different organizational structures. In order to avoid the well-known multicollinearity problems in this type of analysis, we have grouped the eight structures in four factors by means of the principal component analysis, which has the attractive feature of providing uncorrelated factors. The data reduction is satisfactory, since the four factors extracted explain around 70 percent of the variability contained in the eight original variables. The first factor, labelled as “quality”, groups the quality circles and the total quality management. The second factor, labelled as “participation”, is composed by the worker suggestion program and the

⁷ See van Praag and Ferrer-i-Carbonell (2006) for further details.

information sharing system. The third factor, labelled as “workplace”, refers to job rotation and workplace redesign. Finally, the fourth factor, labelled as “teams”, collects the teams for problem solving and the self-governing teams.

We are going to use a strategy based on sequential regression estimates. We first estimate the satisfaction equation (5), but regressing self-reported satisfaction in the different job domains on overall job satisfaction. This analysis allows us to determine the relative importance of the different satisfaction domains. Then, we regress the organizational structures on overall job satisfaction and on any of the job satisfaction domains. This second stage allow us two disentangle whether some of the structures could have a direct incidence on workers’ job satisfaction, or on the contrary the effect of the different organizational structures on overall job satisfaction could be mediated by their incidence on the satisfaction in any of the different job domains. Results are reported in table 6 and 7.

The estimates of the effect of the satisfaction in the different job domains on overall satisfaction provide interesting results. We assess significance at five percent level. By far, the most important effects are exerted by the variables reflecting the satisfaction with the feeling of success and the relation with supervisors. Estimated elasticities are 0,267 and 0,329, respectively. While the estimated elasticities of the effect of satisfaction in the remaining job domains ranges from 0,039 for earnings to 0,093 for the relation with managers. The only satisfaction domain that has turned out to be not statistically significant is the one referring to the own influence. These results reflect quite nicely some of the evidence published on what workers believe a good job should be (Clark, 2005). Interpersonal relationships are consistently at the top of the list. This is what we can see in our data, as the relationship with your supervisor and with the managers are important determinants of one’s overall job satisfaction. It is clear, however, that what’s important for the workers in our sample is the direct contact with the supervisor not that much with the general manager. Therefore, it is the

immediate “environment” what affects one’s well-being, not the overall situation in the firm. This idea is reinforced if we consider which types of decisions are taken at these two hierarchical levels (supervisor-manager). Simplifying, you negotiate with your supervisor aspects related to the developing of everyday tasks, while with the manager the bargaining will be on more general issues like wages or the schedule.

The second most important job domain is the feeling of success. It reflects the quality of the match between workers expectations about the job and what they actually do. Therefore, it is related to job content which is, again, one of the dimensions ranked highest in surveys describing job quality. In this case, it is interesting to note that we obtain this high coefficient despite the inclusion in the estimation of three specific dimensions describing one’s job (own influence, own initiative and earnings). It seems that Catalan workers (recall that our sample is made up of production workers most of them blue collar) put a lot of value in how they develop their jobs but autonomy and discretion in your job are not that important.

[Insert table 5, around here]

In table 8, we report the estimates of the satisfaction equation (5). This strategy now is different. We estimate the effect of the different organizational structures on overall job satisfaction and satisfaction in the different job domains, but now we run different regressions for each of the factors, i.e. quality, participation, workplace and teams. Then, for the group of firms adopting the different structures, hereafter restricted sample, we run separate regressions but now including the structures that have been adopted at least two years ago. By comparing the estimated elasticities between the full sample and the restricted sample, we may

disentangle if the effect of the different structures on satisfaction is in the short-run or on the contrary is a medium-run effect.⁸

[Insert table 7, around here]

⁸ In table 8 we only report estimated coefficients for the factors referring the different organizational structures. However, full estimates are available from the authors upon request.

References

- Amemiya, Y., 1973. Regression analysis when the dependent variable is truncated normal. *Econometrica* 41, 997-1016.
- Clark, A., Oswald, A., 1996. Satisfaction and comparison income. *Journal of Public Economics* 61, 359–381.
- Groot, W. and H. M. van den Brink, 1999. Job Satisfaction and Preference Drift, *Economics Letters* 63, 363-367.
- Van Praag, B.M.S. and A. Ferrer-i-Carbonell (2004), *Happiness quantified; A satisfaction calculus approach*, Oxford: Oxford University Press.
- Van Praag, B.M.S. and A. Ferrer-i-Carbonell (2006), An Almost Integration-free Approach to Ordered Response Models, Tinbergen Institute Discussion Paper 2006-047/3.

Table 1

	N	Mean	sd
Age	3.391	36,637	10,974
Years in the current firm	3.493	8,710	8,332
Women	3.399	0,340	0,474
Primary education or lower	3.455	0,426	0,494
Secondary education	3.455	0,436	0,496
Higher education	3.455	0,138	0,345
<i><u>Self-reported over education</u></i>			
Highly overeducated	3.416	0,055	0,228
Overeducated	3.416	0,172	0,377
No mismatch	3.416	0,634	0,482
Undereducated	3.416	0,124	0,329
Highly undereducated	3.416	0,016	0,124
Weekly hours worked	3.385	40,510	8,587
<i><u>Net monthly salary</u></i>			
<700€	3.259	0,043	0,204
2700-1000€	3.259	0,337	0,473
31000-1300€	3.259	0,367	0,482
41300-1600€	3.259	0,156	0,363
51600-1900€	3.259	0,065	0,247
61900-2200€	3.259	0,019	0,137
2200-2500€	3.259	0,007	0,086
>2500€	3.259	0,005	0,070
<i><u>Satisfaction domains</u></i>			
Overall satisfaction	3.396	3,344	0,931
Sense of success	3.408	3,273	0,902
Own influence	3.353	3,095	1,014
Training	3.367	2,728	0,990
Earnings	3.363	3,003	1,042
Timetable	3.402	3,377	1,007
Relations with managers	3.404	3,466	0,915
Own initiative	3.312	3,386	0,975
Relation with general managers			
Relation with employees			
Relation with supervisors	3.379	3,428	0,941

Table 2

		Food					Other		N	Total answers
		agriculture	Electr.	Hostel.	Computers	Health	manufact.	Total		
Worker suggestion program	Yes	41,1	53,4	66,7	50,9	62,5	45,8	49,4	212	429
	> 2 years	73,9	90,3	77,8	89,3	80,0	88,0	85,4	181	
Information sharing system	Yes	63,2	74,6	85,2	76,8	84,8	72,4	73,8	321	435
	> 2 years	77,8	88,6	91,3	88,4	85,7	83,0	84,7	272	
Workplace turnover	Yes	52,6	46,6	23,1	35,7	48,5	54,1	48,3	210	435
	> 2 years	83,3	88,9	83,3	90,0	75,0	85,6	85,2	179	
Redesign of the workplace	Yes	29,6	51,7	63,0	42,9	39,4	36,6	40,5	174	430
	> 2 years	75,0	83,3	70,6	66,7	76,9	79,7	77,0	134	
Teams for problem solving	Yes	30,4	50,0	32,0	44,6	45,5	32,5	37,1	159	428
	> 2 years	88,2	79,3	75,0	100,0	86,7	80,0	84,3	134	
Semi-autonomous working groups	Yes	19,6	43,1	26,9	64,9	45,5	26,6	34,5	148	429
	> 2 years	100,0	88,0	100,0	97,3	80,0	77,4	87,2	129	
Quality circles	Yes	37,7	43,6	46,2	30,4	71,0	45,8	44,3	188	424
	> 2 years	75,0	83,3	83,3	76,5	81,8	80,6	80,3	151	
Total quality management	Yes	25,0	26,9	28,0	10,0	44,4	24,1	24,4	96	393
	> 2 years	76,9	71,4	57,1	20,0	100,0	80,0	76,0	73,0	

Table 3

	Yes		No		\bar{X} (yes) = \bar{X} (no)	
	\bar{X}	S	\bar{X}	S	Diff	t-test
Worker suggestion program	3,409	0,907	3,289	0,951	0,121	3,551
Information sharing system	3,368	0,912	3,295	0,976	0,073	1,870
Job rotation	3,387	0,935	3,330	0,928	0,057	1,698
Redesign of the workplace	3,407	0,918	3,310	0,940	0,097	2,844
Teams for problem solving	3,385	0,922	3,329	0,938	0,056	1,583
Semi-autonomous working groups	3,429	0,870	3,313	0,958	0,117	3,251
Quality circles	3,400	0,926	3,298	0,933	0,103	3,003
Total quality management	3,426	0,921	3,323	0,935	0,103	2,652

Table 4

	Yes		No		\bar{X} (yes) = \bar{X} (no)	
	\bar{X}	S	\bar{X}	S	Diff	t-test
Worker suggestion program	3,412	0,919	3,419	0,844	-0,007	-0,112
Information sharing system	3,367	0,913	3,434	0,901	-0,067	-1,238
Job rotation	3,408	0,931	3,236	1,003	0,172	2,298
Redesign of the workplace	3,420	0,917	3,352	0,916	0,068	1,049
Teams for problem solving	3,447	0,907	3,158	0,929	0,289	3,616
Semi-autonomous working groups	3,468	0,865	3,237	0,877	0,231	2,233
Quality circles	3,401	0,930	3,487	0,846	-0,086	-1,208
Total quality management	3,434	0,909	3,485	0,917	-0,051	-0,532

Table 5

	Coefficient	t-stat
Constant	0,1542	3,49
Feeling of success	0,2669	15,84
Own influence	0,0247	1,61
Training	0,0645	4,52
Earnings	0,0394	3,19
Timetable	0,0720	5,20
Relation with managers	0,0927	5,13
Own initiative	0,0633	3,90
Relation with supervisors	0,3290	19,90
N	3079	
R ²	0,5396	

Table 6

	Overall		Feeling of success		Own influence		Training		Earnings	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Constant	-0,4551	-0,5640	-0,9505	-0,7692	0,4229	0,2476	-0,1452	0,1156	-1,4227	-1,1645
	<i>-0,88</i>	<i>-0,99</i>	<i>-1,88</i>	<i>-1,38</i>	<i>0,74</i>	<i>0,39</i>	<i>-0,26</i>	<i>0,19</i>	<i>-2,40</i>	<i>-1,79</i>
Age	-0,0047	-0,0054	-0,0027	0,0028	0,0014	-0,0067	-0,0051	-0,0127	0,0070	-0,0025
	<i>-0,48</i>	<i>-0,48</i>	<i>-0,28</i>	<i>0,26</i>	<i>0,12</i>	<i>-0,53</i>	<i>-0,49</i>	<i>-1,06</i>	<i>0,64</i>	<i>-0,20</i>
Age squared	0,0001	0,0001	0,0000	0,0000	0,0000	0,0001	0,0001	0,0002	-0,0001	0,0001
	<i>0,40</i>	<i>0,49</i>	<i>0,35</i>	<i>-0,19</i>	<i>-0,13</i>	<i>0,75</i>	<i>0,41</i>	<i>1,07</i>	<i>-0,48</i>	<i>0,34</i>
Female	0,1099	0,0949	0,0547	0,0474	0,2005	0,2108	0,2061	0,1866	-0,1214	-0,1529
	<i>2,88</i>	<i>2,22</i>	<i>1,47</i>	<i>1,13</i>	<i>4,74</i>	<i>4,41</i>	<i>4,98</i>	<i>4,01</i>	<i>-2,78</i>	<i>-3,13</i>
Schooling	0,0022	0,0102	-0,0094	-0,0044	0,0119	0,0178	-0,0148	-0,0070	-0,0326	-0,0292
	<i>0,42</i>	<i>1,74</i>	<i>-1,81</i>	<i>-0,76</i>	<i>2,03</i>	<i>2,70</i>	<i>-2,57</i>	<i>-1,10</i>	<i>-5,37</i>	<i>-4,33</i>
Tenure	-0,0281	-0,0303	-0,0259	-0,0274	-0,0423	-0,0434	-0,0417	-0,0412	-0,0118	-0,0204
	<i>-4,92</i>	<i>-4,80</i>	<i>-4,65</i>	<i>-4,44</i>	<i>-6,66</i>	<i>-6,12</i>	<i>-6,77</i>	<i>-6,07</i>	<i>-1,81</i>	<i>-2,84</i>
Tenure squared	0,0006	0,0007	0,0007	0,0008	0,0009	0,0009	0,0008	0,0008	-0,0001	0,0002
	<i>3,66</i>	<i>3,71</i>	<i>3,99</i>	<i>4,21</i>	<i>4,56</i>	<i>4,14</i>	<i>4,26</i>	<i>3,78</i>	<i>-0,33</i>	<i>0,76</i>
Undereduc.	-0,0768	-0,0425	-0,1042	-0,0641	-0,0863	-0,0285	0,0198	0,0259	0,0010	0,0298
	<i>-1,62</i>	<i>-0,82</i>	<i>-2,26</i>	<i>-1,25</i>	<i>-1,65</i>	<i>-0,49</i>	<i>0,39</i>	<i>0,46</i>	<i>0,02</i>	<i>0,50</i>
Overeduc.	-0,1814	-0,2186	-0,2749	-0,2542	-0,1406	-0,1319	-0,1709	-0,1729	-0,1308	-0,1434
	<i>-4,52</i>	<i>-4,83</i>	<i>-6,99</i>	<i>-5,69</i>	<i>-3,16</i>	<i>-2,60</i>	<i>-3,92</i>	<i>-3,51</i>	<i>-2,84</i>	<i>-2,77</i>
Relative wage	0,5462	0,5790	0,5858	0,5409	0,3236	0,3674	0,4608	0,4596	0,6786	0,6556
	<i>7,31</i>	<i>7,06</i>	<i>8,02</i>	<i>6,70</i>	<i>3,91</i>	<i>4,00</i>	<i>5,68</i>	<i>5,15</i>	<i>7,94</i>	<i>7,01</i>
Log(hours)	-0,1279	-0,1804	-0,0717	-0,0803	-0,0598	-0,0847	-0,1497	-0,2048	-0,1769	-0,1457
	<i>-2,27</i>	<i>-2,84</i>	<i>-1,32</i>	<i>-1,29</i>	<i>-0,96</i>	<i>-1,19</i>	<i>-2,44</i>	<i>-2,95</i>	<i>-2,66</i>	<i>-1,92</i>
Quality		0,0438		0,0220		-0,0047		0,0905		0,0606
		<i>2,60</i>		<i>1,33</i>		<i>-0,25</i>		<i>4,96</i>		<i>3,17</i>
Participation		0,0252		0,0206		0,0436		0,0317		-0,0483
		<i>1,36</i>		<i>1,13</i>		<i>2,10</i>		<i>1,58</i>		<i>-2,29</i>
Workplace		0,0139		0,0031		0,0023		0,0122		0,0053
		<i>0,76</i>		<i>0,17</i>		<i>0,11</i>		<i>0,62</i>		<i>0,26</i>
Teams		0,0028		0,0082		-0,0118		0,0062		-0,0379
		<i>0,15</i>		<i>0,46</i>		<i>-0,58</i>		<i>0,31</i>		<i>-1,82</i>
N	2774	2172	2780	2173	2743	2149	2755	2157	2747	2147
R ²	0,0336	0,0465	0,0482	0,0425	0,0401	0,0451	0,0412	0,0526	0,0538	0,0624

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Table 6 (continuation)

	Timesat		Relation with managers		Own initiative		Relation with supervisors	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Constant	2,5224	2,1148	1,6535	1,9837	-0,6558	-0,6065	0,2780	0,2894
	<i>4,38</i>	<i>3,32</i>	<i>3,18</i>	<i>3,48</i>	<i>-1,17</i>	<i>-0,99</i>	<i>0,52</i>	<i>0,50</i>
Age	0,0117	0,0121	-0,0174	-0,0207	0,0110	0,0027	0,0063	0,0135
	<i>1,10</i>	<i>0,98</i>	<i>-1,76</i>	<i>-1,83</i>	<i>1,04</i>	<i>0,22</i>	<i>0,64</i>	<i>1,21</i>
Age squared	-0,0001	-0,0001	0,0003	0,0004	-0,0001	0,0000	-0,0001	-0,0002
	<i>-0,65</i>	<i>-0,58</i>	<i>2,51</i>	<i>2,56</i>	<i>-0,85</i>	<i>0,09</i>	<i>-0,70</i>	<i>-1,21</i>
Female	0,0823	0,1024	0,0895	0,0649	-0,0040	0,0072	0,1849	0,1629
	<i>1,93</i>	<i>2,13</i>	<i>2,33</i>	<i>1,51</i>	<i>-0,10</i>	<i>0,16</i>	<i>4,71</i>	<i>3,72</i>
Schooling	0,0024	0,0071	0,0010	0,0081	0,0051	0,0081	0,0151	0,0209
	<i>0,40</i>	<i>1,08</i>	<i>0,18</i>	<i>1,37</i>	<i>0,89</i>	<i>1,27</i>	<i>2,77</i>	<i>3,47</i>
Tenure	-0,0151	-0,0200	-0,0323	-0,0318	-0,0329	-0,0358	-0,0253	-0,0288
	<i>-2,39</i>	<i>-2,85</i>	<i>-5,64</i>	<i>-5,04</i>	<i>-5,32</i>	<i>-5,31</i>	<i>-4,33</i>	<i>-4,50</i>
Tenure squared	0,0002	0,0003	0,0005	0,0005	0,0007	0,0008	0,0005	0,0007
	<i>0,80</i>	<i>1,61</i>	<i>3,17</i>	<i>2,77</i>	<i>3,77</i>	<i>3,90</i>	<i>3,05</i>	<i>3,58</i>
Undereduc.	0,0751	0,1414	-0,0153	0,0332	0,0256	0,0509	-0,0460	0,0009
	<i>1,42</i>	<i>2,42</i>	<i>-0,32</i>	<i>0,64</i>	<i>0,50</i>	<i>0,91</i>	<i>-0,95</i>	<i>0,02</i>
Overeduc.	-0,0731	-0,0913	-0,1226	-0,1243	-0,1226	-0,0997	-0,1134	-0,0998
	<i>-1,63</i>	<i>-1,80</i>	<i>-3,03</i>	<i>-2,73</i>	<i>-2,80</i>	<i>-2,04</i>	<i>-2,75</i>	<i>-2,16</i>
Relative wage	0,0878	0,1521	0,2908	0,2620	0,5234	0,5434	0,3868	0,3839
	<i>1,05</i>	<i>1,65</i>	<i>3,87</i>	<i>3,19</i>	<i>6,43</i>	<i>6,16</i>	<i>5,03</i>	<i>4,57</i>
Log(hours)	-0,1856	-0,2119	-0,1524	-0,1845	-0,1125	-0,1339	-0,1104	-0,1564
	<i>-2,98</i>	<i>-2,99</i>	<i>-2,70</i>	<i>-2,89</i>	<i>-1,86</i>	<i>-1,97</i>	<i>-1,93</i>	<i>-2,43</i>
Quality		-0,0053		-0,0266		0,0089		0,0247
		<i>-0,28</i>		<i>-1,58</i>		<i>0,49</i>		<i>1,44</i>
Participation		0,0300		0,0274		0,0139		0,0426
		<i>1,44</i>		<i>1,48</i>		<i>0,70</i>		<i>2,25</i>
Workplace		0,0337		0,0008		0,0288		-0,0017
		<i>1,65</i>		<i>0,04</i>		<i>1,48</i>		<i>-0,09</i>
Teams		-0,0302		0,0259		0,0153		0,0172
		<i>-1,47</i>		<i>1,42</i>		<i>0,77</i>		<i>0,92</i>
N	2769	2169	2777	2174	2714	2117	2763	2161
R ²	0,0102	0,0165	0,0282	0,0331	0,0303	0,0335	0,0298	0,0391

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Table 7

	Quality factor		Participation factor		Workplace factor		Team factor	
	< 2 years	> 2 years	< 2 years	> 2 years	< 2 years	> 2 years	< 2 years	> 2 years
Overall	0,0428	0,0129	0,0253	0,0075	0,0174	0,0695	0,0026	0,1687
	<i>2,54</i>	<i>0,35</i>	<i>1,38</i>	<i>0,22</i>	<i>0,96</i>	<i>2,17</i>	<i>0,14</i>	<i>2,27</i>
Feeling of success	0,0211	0,0369	0,0202	0,0272	0,0062	0,0204	0,0080	0,1262
	<i>1,28</i>	<i>1,06</i>	<i>1,12</i>	<i>0,83</i>	<i>0,35</i>	<i>0,66</i>	<i>0,45</i>	<i>1,69</i>
Own influence	-0,0062	0,0545	0,0441	0,0592	0,0084	0,0133	-0,0115	0,1111
	<i>-0,33</i>	<i>1,34</i>	<i>2,16</i>	<i>1,60</i>	<i>0,41</i>	<i>0,38</i>	<i>-0,56</i>	<i>1,32</i>
Training	0,0892	-0,0058	0,0294	0,0279	0,0165	0,0956	0,0054	-0,1640
	<i>4,89</i>	<i>-0,15</i>	<i>1,48</i>	<i>0,76</i>	<i>0,84</i>	<i>2,87</i>	<i>0,27</i>	<i>-1,85</i>
Earnings	0,0629	0,1090	-0,0502	0,0647	-0,0029	0,0877	-0,0387	0,0697
	<i>3,28</i>	<i>2,62</i>	<i>-2,40</i>	<i>1,64</i>	<i>-0,14</i>	<i>2,35</i>	<i>-1,85</i>	<i>0,80</i>
Timetable	-0,0062	0,0489	0,0350	-0,1240	0,0371	-0,0369	-0,0290	-0,1713
	<i>-0,33</i>	<i>1,19</i>	<i>1,70</i>	<i>-3,24</i>	<i>1,83</i>	<i>-1,04</i>	<i>-1,41</i>	<i>-2,09</i>
Relation with managers	-0,0280	0,0969	0,0288	0,0662	0,0055	-0,0442	0,0264	0,1729
	<i>-1,66</i>	<i>2,81</i>	<i>1,57</i>	<i>1,97</i>	<i>0,30</i>	<i>-1,42</i>	<i>1,44</i>	<i>2,23</i>
Own initiative	0,0086	0,0427	0,0175	0,0037	0,0311	0,0261	0,0161	-0,0490
	<i>0,47</i>	<i>1,10</i>	<i>0,89</i>	<i>0,10</i>	<i>1,62</i>	<i>0,78</i>	<i>0,80</i>	<i>-0,60</i>
Relation with supervisors	0,0228	0,0281	0,0414	0,0533	0,0048	0,0571	0,0170	0,3300
	<i>1,33</i>	<i>0,78</i>	<i>2,21</i>	<i>1,59</i>	<i>0,26</i>	<i>1,74</i>	<i>0,91</i>	<i>4,49</i>

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