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Job autonomy and job satisfaction: new evidence

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Abstract: This paper investigates the impact of perceived job autonomy on job satisfaction. We use the fifth sweep of the National Educational Longitudinal Study (1988-2000), which contains personally reported job satisfaction data for a sample of individuals eight years after the end of compulsory education. After controlling for a wide range of personal and job-related variables, perceived job autonomy is found to be a highly significant determinant of five separate domains of job satisfaction (pay, fringe benefits, promotion prospects, job security and importance / challenge of work).

Job, autonomy, satisfaction, pay, gender, promotion

JEL classification: I31, J28

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1. Introduction

Traditionally, economists have shied away from investigating well-being because of its highly subjective nature and have considered 'personal judgements of satisfaction and other subjective opinions as a black box that should be opened only by psychologists and sociologists' (Levy-Garboua and Montmarquette 1997, p.1). The main concern has been that no two people will use the same scale to answer questions about their well-being.¹ Nevertheless, the analysis of subjective well-being has become a topic of increasing interest among economists and is now regarded as something worthy of empirical investigation (Clark and Oswald 1994; Blanchflower and Oswald 1999; McBride 2001; Frey and Stutzer 2002a, 2002b; van Praag *et al.* 2003).²

The driving force behind this increasing interest in personal well-being is the growth in the number of large-scale labour market surveys that include questions about how much workers are satisfied with their job. Several studies have consequently attempted to identify and measure the determinants of job satisfaction (Clark and Oswald 1996; Hamermesh 1977, 2001; Borjas 1979; Sousa-Poza and Sousa-Poza 2000). As Freeman (1978) has pointed out, 'the answers to questions about how people feel toward their job are not meaningless but rather convey useful information about economic life that should not be ignored' (p. 135).

There are several compelling reasons why economists should care about job satisfaction. First, job satisfaction has been found to be a strong predictor of a worker's behaviour and performance. For example, reported job satisfaction has been used to predict separations, quits and labour productivity (e.g. Hamermesh 1977; Freeman 1978; Akerlof *et al.* 1988; Clark *et al.* 1997; Clark 2001; Shields and Price 2002; Levy-Garboua *et al.* 2001; Tsang *et al.* 1991).³ Secondly, job satisfaction is an important predictor of overall well-being (Argyle 1989; Clark 1997; Sousa-Poza and Sousa-Poza 2001; van Praag *et al.* 2003). If the answers by individual workers to job satisfaction questions only contained white noise, it is unlikely that such correlations would have been found (Clark 1997).

¹ Layard (2003) reports evidence from research in neuro-science that feelings (e.g. happiness) can be measured accurately through brain activity and that happiness can be compared between people.

² See Frey and Stutzer (2002) for an extensive account of economic research on happiness and on why economists should and could use subjective data on human happiness in general and job satisfaction in particular.

³ It should be noted that some earlier studies have found only a low correlation between job satisfaction and worker performance (Iaffaldano and Muchinski 1985).

The determination of job satisfaction has therefore become a focus of numerous recent studies. Previous studies have explained job satisfaction as dependent on a number of factors such as gender (Clark 1997; Galdeano 2001), own wage or income, relative wages (Clark and Oswald 1996; Hamermesh 1977, 2001), union activity (Borjas 1977) and mismatches between education and skill (Allen and van der Velden 2001).

Among other factors believed to influence job satisfaction is job autonomy. More autonomy is expected to be associated with greater job satisfaction because workers have more freedom to determine their own effort and work schedule. Previous research in this area has been confined to the disciplines of psychology and sociology, and has been either qualitative in nature or relies on small, unrepresentative, samples of respondents (Anderson et al. 1992; Bhuiman et al. 1996; Birdseys and Hill, 1995; Landersweerd and Bousmans 1994; Schienman, 2002). Much of this research also ignores the issue of ‘how much’ job autonomy increases job satisfaction. Furthermore, very few of the studies that investigate the impact of job autonomy on job satisfaction fail to control for other determinants of job satisfaction, such as personal characteristics. The economics literature on job satisfaction has also ignored the multi-dimensional nature of job satisfaction, focusing instead on overall satisfaction with a job.

In this paper we intend to fill these gaps in previous research. We investigate the effect of different levels of job autonomy on several dimensions (i.e. domains) of job satisfaction using a large-scale survey of young adults in the US. Specifically, our data refer to the fourth follow-up of the National Educational Longitudinal Study conducted in 2000. Respondents to this survey are observed eight years after the end of high school, and those in employment at the time of the survey were asked not only whether they were satisfied with different aspects of their job but also how much freedom they had in deciding how their job should be done. Together with a wide range of other variables, this allows us to investigate the impact of job autonomy on job satisfaction.

The remainder of the paper is structured as follows. Section 2 provides a review of the determinants of job satisfaction. A framework of analysis is set out in section 3. Section 4 describes the data and variables. The results of the empirical analysis are presented in section 5. Section 6 concludes.

2. Previous studies of job satisfaction

Previous studies have attempted to explain a worker's job satisfaction as a function of the individual's personal characteristics and the characteristics of the job itself. Variables such as age, gender, education, marital status, hours of work and earnings figure prominently in these previous studies.

One of the main findings is that women are more satisfied with their jobs than men, even after taking into account many observed characteristics and sample selectivity (Clark 1996, 1997; Groot and Brink 1999; Sanz de Galdeano 2001; Blanchflower and Oswald 2001).⁴ Clark (1996, 1997) and Galdeano (2001) explain the existence of a positive relationship between being a female and job satisfaction as reflecting women's lower expectations from their job, which arise from the poor position in the labour market that women have traditionally held (Clark 1997).

The observed relationship between job satisfaction and age suggests the existence of a U-shaped relationship, which is captured by a quadratic term in age in the regression equation (Clark *et al.* 1996; Sloane and Ward 2001; Blanchflower and Oswald 2001).⁵ Marital status is also believed to influence job satisfaction, married individuals being more likely to report a higher level of job satisfaction (Blanchflower and Oswald 2001; Clark 1997).

Previous research also suggests that higher levels of education are associated with lower levels of job satisfaction (Clark 1997; Clark and Oswald 1996; Sloane and William 1996). One explanation of this result is that job satisfaction depends on the gap between outcomes and aspirations and that aspirations increase with the level of education. Individuals with a higher level of education consequently tend to be less satisfied with their job because they have higher expectations than those with lower levels of education.

Other variables correlated with job satisfaction include earnings, hours of work, job tenure, union membership, size of establishment, and self-employment status (Freeman 1978; Borjas 1979; Clark and Oswald 1996; Clark 1997; Belfield and Harris 2002; Shields and Price 2002). An interesting result from these earlier studies relates to the estimated effect of a person's earnings on their job satisfaction. Although, theoretically, income is believed to influence

⁴ Ward and Sloane (1999) find for the UK academic profession that there were no significant differences between males and females regarding job satisfaction. Moguerou (2002) finds females are less satisfied with their job than males. Clark (1997) notes that this difference must diminish over time as the position of females in the labour market improves.

⁵ But Shields and Price (2002) find that job satisfaction increases progressively with age.

individual worker's job satisfaction,⁶ empirical evidence testing this hypothesis gives mixed results. Clark (1997) and Shields and Price (2002) report that income is important for worker's "satisfaction with pay" and for "overall job satisfaction". On the contrary, Clark and Oswald (1996) find that a worker's reported level of well-being is at best weakly correlated with their income. Similarly, Belfield and Harris (2002) find no evidence that job satisfaction depends on income among those working in higher education. Some studies argue that it is not *own income*, but *relative income*, that is important. The idea that job satisfaction is dependent on relative income has been suggested and tested by Hamermesh (1977, 2001), Clark and Oswald (1996), Neumark and Postlewaite (1995), Sloane and Ward (2001) and Shields and Price (2002). Most studies have found some effect of relative income on job satisfaction, though the effect is generally rather small.

3. Job satisfaction: an analytical framework

In a recent study by van Praag *et al.* (2003), an individual's general satisfaction is hypothesised to depend upon several individual domain satisfactions, which include work, home, wealth, leisure and the environment. Each of these domain satisfactions in turn depend upon a set of explanatory variables. The utility derived from having a job can be regarded as one of several sub-utility functions that together determine an individual's general utility (Clark and Oswald 1996).⁷ In a similar vein, we argue here that job satisfaction is also likely to be multi-dimensional. Overall job satisfaction (S) is determined by satisfaction in several job domains (S_k) such as pay, job security, promotion prospects, fringe benefits and the importance attached to the job: $S = g(S_k)$. Previous studies have focused almost exclusively on a single aggregate measure of job satisfaction and have therefore ignored its multi-dimensional nature.⁸ It is of interest to see how the impact of the determinants varies between the different job domain satisfactions.

We illustrate this idea in Figure 1. An individual's personal background and job characteristics affect overall job satisfaction through the various domain satisfactions. We assume here that all individual domain satisfactions are determined by the same set of explanatory variables: $S_k = f(i, j)$, where i refers to personal characteristics and j refers to the characteristics of the job itself. Personal characteristics include factors such as gender, age,

⁶ A robust and general finding is that richer people on average report higher general subjective well-being (Frey and Stutzer 2002).

⁷ Van Praag *et al.* (2002) represent the subjective well-being as a general utility function which includes satisfaction over a number of domains such as work, home, health, wealth, leisure and the environment.

ethnicity and educational attainment. Job characteristics include variables such as earnings, hours worked, skill level, occupation and the industry in which a person is employed.

A further variable that may be expected to influence job satisfaction, and its various domains, is the degree of perceived autonomy that workers enjoy in the way they do their job. It is expected that a higher degree of job autonomy will lead to greater satisfaction. Several studies that have investigated the influence of perceived job autonomy on job satisfaction are primarily qualitative in nature and fall within the field of business research (Bhuiyan *et al.* 1996; Birdseye and Hill 1995), sociology (Schienman 2002) and psychology (Anderson *et al.* 1992; Landersweerd and Bousmans 1994; Weaver 1977). Most of these studies are descriptive in content, employ small and unrepresentative samples and often do not control for other variables such as personal characteristics. For example, Bhuiyan *et al.* focus on the influence of job autonomy on the job satisfaction of ex-patriots in Saudi-Arabia while Landersweerd and Bousmans focus on the influence of job autonomy on the job satisfaction of nurses. This research in the field of organisational behaviour suggests a positive relationship between job autonomy and job satisfaction.

The next section describes the data and the variables included in the model and the statistical methodology used to estimate the impact of job autonomy on job satisfaction.

4. Data, variables and model

We use data from the National Educational Longitudinal Study (NELS:2000). The study began in 1988 with a cross-sectional survey of eighth graders, and continued with four follow-up interviews in 1990, 1992, 1994 and 2000. The first three follow-ups provide detailed information about a respondent's family background, academic record and their activities before, during and after high school. The 2000 follow-up survey provides detailed information about their labour market activities eight years after the end of compulsory education. The sample selected for the present study includes only those employees who were in a full-time job in 2000. Part-time workers are excluded since we wish to focus here on the attitudes to work only of those whose primary activity is working for pay. Self-employed persons are also excluded since our measure of job autonomy is relevant only for employees.

Modelling job satisfaction

⁸ An exception is Clark and Oswald (1996), who examine overall job satisfaction and satisfaction with pay.

Several individual domains of job satisfaction are identified in the National Educational Longitudinal Study. These include satisfaction with pay, fringe benefits, promotion prospects, job security and importance / challenge of work. The correlation matrix for these five job satisfaction domains (Table 1) indicates that although the individual domains are significantly positively correlated with each other, the correlation coefficients are low. The logit regression reported in Table 2, however, indicates that overall job satisfaction is highly significantly related to all five individual domains of job satisfaction. This result is consistent with the view that overall job satisfaction is a multi-dimensional construct.

In order to estimate the influence of perceived job autonomy on job satisfaction, it is necessary to control for the personal characteristics of each respondent as well as for the characteristics of the job itself that are likely to influence job satisfaction. Empirically, satisfaction with pay can be described by the following latent variable model:

$$S^* = \mathbf{x}_i' \boldsymbol{\beta} + \varepsilon_i$$

where S^* is a latent variable that is assumed to be linearly related to the vector of explanatory variables, \mathbf{x}_i , which influence an individual's utility from being in a job. In our data, job satisfaction is described as a binomial response variable, indicating whether individuals are satisfied ($S=1$) or dissatisfied ($S=0$) with their job.⁹ We therefore estimate a binomial logit model and report the marginal effects for ease of interpretation (Green 1997).

Explanatory variables

Two groups of explanatory variables are identified: (1) those relating to the personal characteristics of the respondent, such as age, gender, race, marital status and number of children; (2) those relating to the job itself, such as job autonomy, income earned and hours worked. Although all respondents were in 8th grade in the first sweep of the NELS in 1988, their year of birth varies from 1972 to 1975. Race distinguishes between white, black, Hispanic (non-black), Asian and American Indian.¹⁰

Our primary aim in this paper is to estimate the extent to which the degree of job autonomy influences various dimensions of job satisfaction. The variable of interest is the degree of perceived autonomy that workers enjoy in the way they do their job. Four levels of job

⁹ The respondents were asked to answer the question: "Overall, would you say you are satisfied or dissatisfied with your job as a whole?"

¹⁰ It should be noted that the sample size of American Indians is small (1.2% of the respondents).

autonomy are identified in the NELS data: zero autonomy, limited autonomy (a worker is told what to do but has some control over how to do it), some freedom in deciding what to do, and virtually complete autonomy (i.e. basically one's own boss). Zero autonomy is included in the base category so that the effect of the various degrees of autonomy on overall satisfaction and its domains can be estimated. More autonomy is expected to be associated with greater satisfaction simply because workers have freedom to determine their own effort and work schedule. Table 3 provides some *prima facie* evidence that a worker's satisfaction with various aspects of their job increases as perceived job autonomy increases.¹¹ The greatest increase in job satisfaction, however, occurs at the low end of the job autonomy scale. Increasing job autonomy from 'no freedom in job' to 'limited freedom in the way a job is done' is associated with by far the biggest increase in job satisfaction between the various categories. We investigate this further in the empirical analysis below.

Two other job-related variables that are included in our analysis of job satisfaction are earnings and hours worked. We follow previous studies by using annual earnings (from the respondent's main job) rather than the earnings for the most recent week or month in order to reduce the problem of measurement error (Bound *et al.* 1999; Hamermesh 1999). For hours worked, we use the average number of hours worked per week as stated by the respondent. Other job-related variables included in the regression model are occupational status and the industry in which the respondent works. Occupational status distinguishes between professional, managerial, skilled non-manual, skilled manual and unskilled / semi-skilled workers. The latter is used as a characteristic of the base group. The industry variable is divided into ten main industry groups.

5. Empirical results

This section presents two sets of results. The first set investigates the determinants of job satisfaction as a whole and provides the results for females and males separately as well as for the total sample. The second set provides the results for each of the five domains of job satisfaction referred to above. Although the primary focus of the empirical investigation is to estimate the impact of perceived job autonomy on job satisfaction, the influence of other job-

¹¹ We recognise that there may be a two-way relationship between job satisfaction and job autonomy in so far as workers who are happy in their job are more likely to perform well and consequently get promoted to jobs with greater autonomy. Since the NELS database does not contain sufficiently detailed information about a person's job history, we cannot attempt to control for the potential endogeneity of job autonomy here.

related factors and personal factors on job satisfaction is also discussed. The estimated regression equations include several controls that are in general statistically insignificant and these results are not reported (see note to Tables).

From the results presented in Table 4, it is clear that the degree of job autonomy is highly statistically related to overall job satisfaction. As job autonomy increases from 'no freedom' to 'limited freedom', for example, the probability of a worker being satisfied with his or her job increases by 0.13 for females and 0.11 for males. And as the degree of freedom increases from 'no freedom' to 'basically one's own boss', the probability of being satisfied with one's job increases by 0.24 for females and 0.17 for males. It is also interesting to note that the differential between the different threshold measures of job autonomy increases almost linearly for females but the rate of increase begins to fall for males at higher levels of autonomy. In sum, even when a wide range of other job-related and personal factors are taken into account, the degree of autonomy that workers have in their job has a substantial impact on their overall job satisfaction, and there are differences between males and females.

Two other job-related variables are significantly related to job satisfaction. As expected, current income has a positive effect on overall job satisfaction, with the estimated impact of income being nearly twice as great for males as for females. Being employed in a professional occupation also increases the probability of being satisfied with one's job (by 0.11 for females and 0.05 for males compared to the base group of unskilled and semi-skilled workers). Rather surprisingly, the number of hours worked is not correlated with overall job satisfaction.

Job satisfaction does not appear to be related to personal factors in most cases. There are, however, two exceptions. Black workers have a lower probability of being satisfied with their job as a whole than white workers (whereas other ethnic groups are not significantly different to white workers); and there is some evidence that single workers are less satisfied with their job as a whole than married workers. Taken together, being black and single therefore has a substantial negative impact on overall job satisfaction.

Although there is clear evidence that the degree of job autonomy has a substantial and highly significant influence on job satisfaction, further analysis reveals that the magnitude of this impact varies between different aspects of a worker's job. Table 5 shows the regression results for satisfaction with pay, fringe benefits, promotion prospects, job security and importance /

challenge of job. The main result is that the degree of job autonomy is highly significantly related (positively) to all five aspects of job satisfaction.

The estimated impact of job autonomy on job satisfaction varies considerably, however, between these five aspects of job satisfaction. The estimated impact is much greater for pay, promotion prospects and importance / challenge of job than for fringe benefits and job security. The most striking result is that the probability of being satisfied with one's promotion prospects increases by 0.24 as job autonomy changes from 'no freedom in job' to 'basically one's own boss.' The regressions estimated separately for females and males (Tables 6 and 7) indicate that the estimated impact of job autonomy is similar for the two groups, though there is some indication that the estimated impact of job autonomy on job satisfaction is slightly greater for females than for males, especially with respect to importance / challenge of work.

Two other results relating to the characteristics of the job are of interest. First, current income is significantly positively related to four aspects of job satisfaction, with the greatest impact being on satisfaction with pay as would be expected. Current income is not statistically related, however, to importance / challenge of work. Hours worked is also significantly related (negatively) to satisfaction with pay and the estimated coefficient (a semi-elasticity) is about the same magnitude (0.20) as the estimated coefficient on earnings (but with the opposite sign). Very similar results are obtained for females and males with respect to these two variables. This suggests that an equal proportionate change in earnings and hours at the mean value of these two variables would leave workers at the same level of satisfaction.

Black workers are consistently less satisfied with all aspects of their job than white workers, though their dissatisfaction over pay is much greater than their dissatisfaction over other aspects of their job. This is consistent with the view that black workers perceive that they are discriminated against in the labour market, especially with respect to pay. The probability of being satisfied with their pay, for example, is 0.13 less for black workers than for white workers. Evidence that other ethnic minorities are less satisfied with various aspects of their job than white workers is generally rather weak. Very similar results are obtained for ethnic minority groups when the regressions are run for males and females separately.

Finally, single persons are invariably less satisfied with all aspects of their job than married workers. Similar results are obtained for females and males separately. There is also some

evidence that divorcees are less satisfied with certain aspects of their job (particularly for pay and fringe benefits) than married workers, though the results are statistically much stronger for females than for males.

6. Conclusion

Job satisfaction is a topic of considerable interest to employers since it is likely to influence a worker's, and hence the firm's, performance. Previous studies suggest that firms are likely to benefit through lower job turnover and higher productivity if their workers have a high level of job satisfaction. It is also important for workers to be happy in their work, given the amount of time they have to devote to it throughout their working lives.

In view of the potential importance of job satisfaction to both the employer and the employee, this paper has investigated the determinants of several domain satisfactions using data from the National Educational Longitudinal Study. This survey, which traces the school-to-work transition of a representative sample of youths from eighth grade through the following twelve years, provides an opportunity to investigate aspects of job satisfaction not previously possible. Specifically, it allows us to investigate the potential impact of a range of job-related and personal factors on five different domains of job satisfaction for a large and nationally representative sample of workers.

The focus of the present paper, however, has been on a hitherto under-researched aspect of job satisfaction, namely the impact of job autonomy on several different domains of job satisfaction. Since a key characteristic of job satisfaction is its multi-dimensional nature, we have investigated the extent to which job autonomy is related to satisfaction with pay, fringe benefits, promotion prospects, job security and importance / challenge of job. The main finding is that the degree of job autonomy is significantly related to all five aspects of job satisfaction. As a worker's control over how a job is done increases, the level of job satisfaction also increases. The increase in job satisfaction between 'no freedom in job' and a 'small amount of freedom in job' is particularly striking. This is especially the case for satisfaction with pay, promotion prospects and importance / challenge of job.

A further result of interest is that there is some evidence that job autonomy has a greater impact on all domains of job satisfaction for females than for males. This is especially the case for the impact of job autonomy on the importance / challenge of job. Female workers

with a high level of job autonomy have a significantly higher level of satisfaction with respect to the importance / challenge of the job than is the case for males.

Finally, we find that most personal characteristics have little effect on the various domains of job satisfaction. Two notable exceptions are that black workers and single workers are substantially and significantly more dissatisfied with various aspects of their job compared to the base group. Black and single workers, for example, are substantially more dissatisfied with their pay than white workers.

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Table 1. Correlation matrix

	Satisfaction with job as a whole	Satisfaction with pay	Satisfaction with fringe benefit	Satisfaction with promotion	Satisfaction with job security
Satisfaction with pay (yes=73%)	0.374				
Satisfaction with fringe benefit (yes=81%)	0.347	0.277			
Satisfaction with promotion (yes=74%)	0.457	0.308	0.281		
Satisfaction with job security (yes=91%)	0.322	0.171	0.277	0.260	
Satisfaction with importance of job (yes=86%)	0.507	0.230	0.222	0.364	0.210

Note: Respondents were asked to indicate whether they are/were satisfied with their current/most recent job with respect to several aspects of the job, including pay, fringe benefits, importance and challenge of work, opportunities for promotion and job security. They were then asked: “Overall, would you say you are satisfied or dissatisfied with your job as a whole?” 88% answered 'yes' to this question.

Source: National Educational Longitudinal Study (NELS), 1988/2000.

Table 2. Logit estimates of overall job satisfaction

Explanatory variables	Dependent variable = overall job satisfaction	
	Marginal effects	Standard error
Constant	-0.114	0.007
Satisfaction with pay	0.060***	0.004
Satisfaction with fringe benefit	0.041***	0.004
Satisfaction with promotion opportunity	0.067***	0.004
Satisfaction with job security	0.042***	0.005
Satisfaction with work importance and challenge	0.085***	0.005
Log-likelihood	-1828	
Chi-squared	495	
Number of observations	9045	

Note: () = standard error; * = significant at 0.05; ** = significant at 0.01; *** = significant at 0.001.

Source: National Educational Longitudinal Study (NELS), 1988/2000.

Table 3. Job satisfaction and job autonomy: % satisfied with particular aspects of their job

Aspect of job	Job autonomy			
	No freedom in job	Small amount of freedom	Some freedom	Much freedom
Pay	55.0	70.0	73.7	80.8
Fringe benefits	65.3	76.6	81.0	78.4
Promotion opportunity	49.9	69.6	75.8	81.2
Job security	77.2	88.3	91.8	91.9
Importance and challenge of work	63.3	80.4	87.4	92.2
Job as a whole	60.0	84.5	90.3	94.2

Notes:

Respondents employed at any time between January 1994 and the survey date in 2000 were asked to answer the following questions:

1. *Considering your current/most recent job, would you say that you are/were satisfied or dissatisfied with:*

- a. your pay?
- b. fringe benefits?
- c. opportunities for promotion and advancement?
- d. importance and challenge of your work?
- e. job security?
- f. your job as a whole?

2. *Which one of the following four statements best describes your job?:*

- a. someone else decides what you do and how you do it
- b. someone else decides what you do, but you decide how to do it
- c. you have some freedom in deciding what you do and how to do it
- d. you are basically your own boss.

Source: National Educational Longitudinal Study (NELS), 1988/2000.

Table 4. Overall job satisfaction: estimated marginal effects for full-time workers

Explanatory variables	Satisfied with job as a whole		
	Females	Males	Total
<i>Job characteristics</i>			
Job autonomy: small freedom	0.128*** (0.017)	0.112*** (0.016)	0.120*** (0.012)
Job autonomy: some freedom	0.180*** (0.016)	0.146*** (0.0145)	0.165*** (0.011)
Job autonomy: basically own boss	0.244*** (0.024)	0.170*** (0.020)	0.207*** (0.015)
Current income (log)	0.036*** (0.011)	0.067*** (0.012)	0.049*** (0.008)
Hours worked (log)	-0.025 (0.019)	-0.031 (0.020)	-0.027 (0.014)
Occupation: professional	0.106*** (0.024)	0.048** (0.019)	0.076*** (0.015)
Occupation: managerial	0.050* (0.023)	0.007 (0.019)	0.025 (0.014)
Occupation: non-manual	0.051** (0.019)	0.013 (0.016)	0.031** (0.012)
Occupation: skilled manual	0.048 (0.029)	-0.002 (0.015)	0.013 (0.014)
<i>Personal characteristics</i>			
Male			0.012 (0.008)
Black	-0.076*** (0.017)	-0.058*** (0.016)	-0.070*** (0.012)
Asian	-0.032 (0.022)	-0.015 (0.021)	-0.024 (0.015)
Hispanic	-0.018 (0.017)	-0.007 (0.015)	-0.013 (0.012)
American Indian	-0.073 (0.044)	0.012 (0.043)	-0.035 (0.031)
Single	-0.018 (0.012)	-0.026* (0.013)	-0.024** (0.009)
Divorced or widowed	-0.027 (0.022)	-0.009 (0.023)	-0.020 (0.016)
Constant	-0.335 (0.090)	-0.526 (0.101)	-0.329 (0.058)
Log-likelihood	-1270	-1211	-2507
Chi-squared	326	296	580
Number of observations	3494	3576	7070

Note: The base group includes persons with the following characteristics: no freedom in job, unskilled or semi-skilled, white, born in 1974, married, no children. Dummy variables were also included for year of birth, number of children, highest level of educational attainment, industry worked in and region of residence (results not reported here). () = robust standard error; * = significant at 0.05; ** = significant at 0.01; *** = significant at 0.001.

Table 5. Job satisfaction: estimated marginal effects for full-time workers

Explanatory variables	Domains of job satisfaction				
	Pay	Fringe benefits	Promotion prospects	Job security	Importance / challenge of work
<i>Job characteristics</i>					
Job autonomy: small freedom	0.110*** (0.020)	0.073*** (0.018)	0.150*** (0.020)	0.050*** (0.010)	0.098*** (0.014)
Job autonomy: some freedom	0.135*** (0.019)	0.095*** (0.017)	0.196*** (0.019)	0.072*** (0.010)	0.155*** (0.013)
Job autonomy: basically own boss	0.171*** (0.023)	0.109*** (0.021)	0.239*** (0.024)	0.082*** (0.013)	0.216*** (0.018)
Current income (log)	0.211*** (0.014)	0.098*** (0.011)	0.071*** (0.011)	0.023*** (0.007)	0.014 (0.008)
Hours worked (log)	-0.200*** (0.022)	0.037 (0.020)	0.018 (0.021)	0.023* (0.011)	0.046*** (0.013)
Occupation: professional	-0.041 (0.022)	0.021 (0.019)	0.086*** (0.022)	0.018 (0.013)	0.125*** (0.017)
Occupation: managerial	-0.008 (0.022)	0.039* (0.019)	0.093*** (0.022)	0.040** (0.013)	0.037* (0.016)
Occupation: non-manual	-0.011 (0.020)	0.046** (0.016)	0.070*** (0.019)	0.010 (0.010)	0.016 (0.013)
Occupation: skilled manual	-0.041 (0.022)	0.016 (0.018)	0.046 (0.021)	0.004 (0.012)	0.034* (0.016)
<i>Personal characteristics</i>					
Male	0.015 (0.012)	-0.015 (0.011)	0.017 (0.012)	0.001 (0.007)	-0.005 (0.009)
Black	-0.131*** (0.019)	-0.075*** (0.017)	-0.074*** (0.019)	-0.056*** (0.010)	-0.041** (0.014)
Asian	-0.038 (0.023)	-0.017 (0.022)	0.012 (0.024)	-0.002 (0.014)	-0.040* (0.016)
Hispanic	-0.033 (0.017)	-0.040** (0.015)	0.017 (0.017)	-0.036*** (0.009)	-0.013 (0.013)
American Indian	-0.100* (0.043)	-0.056 (0.040)	-0.018 (0.047)	-0.049* (0.023)	0.018 (0.042)
Single	-0.049*** (0.012)	-0.033** (0.012)	-0.027* (0.012)	-0.017* (0.008)	-0.047*** (0.010)
Divorced or widowed	-0.039 (0.023)	-0.053** (0.020)	-0.028 (0.023)	-0.013 (0.014)	-0.016 (0.018)
Constant	-1.271 (0.109)	-1.093 (0.096)	-0.834 (0.101)	-0.213 (0.053)	-0.223 (0.070)
Log-likelihood	-3786	-3305	-3853	-2080	-2851
Chi-squared	575	554	404	319	607
Number of observations	7072	6953	6962	7055	7046

Note: The base group includes persons with the following characteristics: no freedom in job, unskilled or semi-skilled, female, white, born in 1974, married, no children. Dummy variables were also included for year of birth, number of children, highest level of educational attainment, industry worked in and region of residence (results not reported here). () = robust standard error; * = significant at 0.05; ** = significant at 0.01; *** = significant at 0.001.

Table 6. Job satisfaction: estimated marginal effects for full-time female workers

Explanatory variables	Domains of job satisfaction				
	Pay	Fringe benefits	Promotion prospects	Job security	Importance / challenge of work
<i>Job characteristics</i>					
Job autonomy: small freedom	0.113*** (0.030)	0.069** (0.026)	0.147*** (0.030)	0.053*** (0.015)	0.107*** (0.019)
Job autonomy: some freedom	0.142*** (0.028)	0.094*** (0.025)	0.222*** (0.028)	0.065*** (0.014)	0.167*** (0.018)
Job autonomy: basically own boss	0.183*** (0.035)	0.119*** (0.031)	0.251*** (0.035)	0.086*** (0.018)	0.263*** (0.026)
Current income (log)	0.215*** (0.020)	0.101*** (0.015)	0.077*** (0.016)	0.016 (0.009)	0.018 (0.011)
Hours worked (log)	-0.211*** (0.032)	0.047 (0.026)	-0.009 (0.028)	0.029* (0.014)	0.022 (0.018)
Occupation: professional	-0.036 (0.038)	0.020 (0.029)	0.082* (0.035)	0.042 (0.020)	0.141*** (0.027)
Occupation: managerial	-0.013 (0.037)	0.027 (0.029)	0.116*** (0.035)	0.053** (0.020)	0.046 (0.024)
Occupation: non-manual	0.001 (0.033)	0.048 (0.025)	0.085** (0.030)	0.024 (0.016)	0.017 (0.020)
Occupation: skilled manual	0.035 (0.049)	0.082* (0.040)	0.071 (0.046)	0.027 (0.025)	0.041 (0.032)
<i>Personal characteristics</i>					
Black	-0.131*** (0.029)	-0.086*** (0.024)	-0.109*** (0.027)	-0.049*** (0.014)	-0.048* (0.019)
Asian	-0.036 (0.034)	-0.009 (0.033)	-0.009 (0.034)	0.026 (0.024)	-0.030 (0.024)
Hispanic	-0.059* (0.026)	-0.048* (0.023)	-0.006 (0.026)	-0.040** (0.014)	-0.021 (0.018)
American Indian	-0.167* (0.065)	-0.072 (0.054)	-0.030 (0.069)	-0.068 (0.031)	-0.039 (0.055)
Single	-0.052*** (0.018)	-0.018 (0.016)	-0.019 (0.018)	-0.015 (0.010)	-0.048*** (0.013)
Divorced or widowed	-0.061* (0.032)	-0.053* (0.026)	-0.071* (0.030)	-0.012 (0.018)	-0.044* (0.023)
Constant	-1.279 (0.160)	-1.040 (0.135)	-0.796 (0.144)	-0.192 (0.074)	-0.144 (0.093)
Log-likelihood	-2094	-1629	-1965	-1049	-1402
Chi-squared	231	331	196	158	366
Number of observations	3721	3408	3436	3492	3481

Note: The base group includes persons with the following characteristics: no freedom in job, unskilled or semi-skilled, white, born in 1974, married, no children. Dummy variables were also included for year of birth, number of children, highest level of educational attainment, industry worked in and region of residence (results not reported here). () = robust standard error; * = significant at 0.05; ** = significant at 0.01; *** = significant at 0.001.

Table 7. Job satisfaction: estimated marginal effects for full-time male workers

Explanatory variables	Domains of job satisfaction				
	Pay	Fringe benefits	Promotion prospects	Job security	Importance / challenge of work
<i>Job characteristics</i>					
Job autonomy: small freedom	0.117*** (0.027)	0.084*** (0.025)	0.160*** (0.028)	0.048*** (0.014)	0.091*** (0.020)
Job autonomy: some freedom	0.134*** (0.026)	0.104*** (0.023)	0.178*** (0.027)	0.076*** (0.013)	0.141*** (0.019)
Job autonomy: basically own boss	0.165*** (0.031)	0.107*** (0.028)	0.233*** (0.032)	0.077*** (0.017)	0.175*** (0.024)
Current income (log)	0.211*** (0.019)	0.098*** (0.016)	0.070*** (0.016)	0.033*** (0.010)	0.012 (0.012)
Hours worked (log)	-0.190*** (0.032)	0.021 (0.031)	0.057 (0.032)	0.017 (0.017)	0.072*** (0.022)
Occupation: professional	-0.051 (0.028)	0.023 (0.025)	0.083** (0.028)	-0.000 (0.016)	0.112*** (0.022)
Occupation: managerial	-0.004 (0.029)	0.048* (0.026)	0.078** (0.028)	0.031 (0.018)	0.037 (0.021)
Occupation: non-manual	-0.032 (0.025)	0.040* (0.023)	0.057* (0.025)	-0.001 (0.014)	0.021 (0.018)
Occupation: skilled manual	-0.010 (0.024)	-0.006 (0.021)	0.041 (0.033)	-0.005 (0.014)	-0.031 (0.018)
<i>Personal characteristics</i>					
Black	-0.126*** (0.026)	-0.063* (0.025)	-0.032 (0.028)	-0.057*** (0.014)	-0.028* (0.021)
Asian	-0.039 (0.029)	-0.025 (0.030)	0.032 (0.035)	-0.018 (0.017)	-0.053 (0.022)
Hispanic	-0.010 (0.022)	-0.035 (0.020)	0.044 (0.024)	-0.033** (0.012)	-0.005 (0.018)
American Indian	0.009 (0.060)	-0.037 (0.059)	-0.001 (0.064)	-0.026 (0.035)	0.093 (0.066)
Single	-0.046** (0.018)	-0.051** (0.017)	-0.031 (0.019)	-0.019 (0.011)	-0.036* (0.014)
Divorced or widowed	-0.016 (0.035)	-0.053 (0.030)	0.031 (0.036)	-0.011 (0.020)	0.034 (0.033)
Constant	-1.281 (0.160)	-0.997 (0.149)	-0.954 (0.155)	-0.264 (0.077)	-0.341 (0.112)
Log-likelihood	-1791	-1661	-1857	-1008	-1425
Chi-squared	309	250	247	207	272
Number of observations	3574	3545	3526	3563	3565

Note: The base group includes persons with the following characteristics: no freedom in job, unskilled or semi-skilled, white, born in 1974, married, no children. Dummy variables were also included for year of birth, number of children, highest level of educational attainment, industry worked in and region of residence (results not reported here). () = robust standard error; * = significant at 0.05; ** = significant at 0.01; *** = significant at 0.001.

Figure 1. Two-tier model of job satisfaction

