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## **Relative pay and job satisfaction: some new evidence**

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**Abstract:** This paper investigates the determinants of job satisfaction using data from the National Educational Longitudinal Study. The determinants of interest include actual pay, relative pay, hours of work, job autonomy and several personal characteristics. We also investigate the determinants of satisfaction with pay conditional on a worker's satisfaction with other domains of job satisfaction, such as satisfaction with job security. We find that relative pay is statistically significant but that its effect on satisfaction with pay is relatively small. Job autonomy has a powerful influence on satisfaction with pay. So too does being black.

JOB    SATISFACTION    WAGES    AUTONOMY    SECURITY

JEL: J28

## 1. Introduction

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 1997; McBride 2001; Van Praag *et al.* 2002; Frey and Stutzer 2002).<sup>1</sup> 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 blackbox 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.

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; Grund and Sliwka 2001). 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). Secondly, job satisfaction is one of the three most important predictors of overall well-being (Argyle 1989, Clark 1997, Sousa-Poza and Sousa-Poza 2001). 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).

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

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<sup>1</sup> 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.

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 the factors believed to influence job satisfaction, relative income has attracted considerable attention since it is widely asserted that individuals are not simply interested in the absolute wage they themselves receive, but their wage relative to some reference group. This derives from the long-established view that an individual's happiness does not depend only on a person's own income but also on some reference level. Several studies have tested the hypothesis that this 'reference' or 'relative' income is an important determinant of job satisfaction. Different studies, however, have used different measures of relative income and it is still unclear whether and to what extent relative income affects job satisfaction.

This paper presents new evidence of the relative income hypothesis. The primary purpose is to estimate the impact of relative income on that part of overall job satisfaction relating explicitly to pay. It also investigates whether and to what extent this impact differs between those who are satisfied and those who are dissatisfied with other aspects of their job, such as job security and promotion opportunities. These analyses are undertaken while controlling for a range of other factors relating to the job and the individual.

The empirical analysis is based on data from the fourth follow-up of the National Educational Longitudinal Study (NELS:2000). This provides detailed information for a representative sample of individuals eight years after the end high school. The statistical analysis is therefore undertaken on a single cohort of individuals in their mid-20s. 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 and section 6 concludes.

## **2. Previous studies of job satisfaction**

Most 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 1998, Sanz de Galdeano 2001, Blanchflower and Oswald 2001).<sup>2</sup> Clark (1996, 1997) and Sanz de 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, p. 342).

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 (e.g. Clark *et al.* 1996, Sloane and Ward 2001, Blanchflower and Oswald 2001).<sup>3</sup> 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 suggests that higher levels of education are associated with lower levels of job satisfaction (Clark 1995, 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.

Several previous studies have investigated the potential determinants of job satisfaction. These determinants include union membership, size of establishment, self-employment status, earnings, hours of work and job tenure (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 individual workers' job satisfaction,<sup>4</sup> 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

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<sup>2</sup> 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 female's labour market position improves.

<sup>3</sup> But Shields and Price (2002) find that job satisfaction increases progressively with age.

<sup>4</sup> A robust and general finding is that richer people on average report higher general subjective well-being (Frey and Stutzer 2002).

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.

Previous studies have gone beyond relating job satisfaction to a person's own income as a primary determinant of job satisfaction, as in much of the labour economics literature, by investigating the hypothesis that it is not *own income* but *relative income* that is the important factor. 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 (1998), Sloane and Ward (2001) and Shields and Price (2002). Most studies have found some effect of relative income on the levels of happiness at work, though different studies use different measures of relative income in their empirical tests. Hamermesh (1977, 2001), for example, defines 'relative income' as the difference between current income ( $y$ ) and expected income ( $y^*$ ), which is obtained from an estimated earnings equation. Relative income is treated as a surprise that makes individual workers relatively better or worse off. Clark and Oswald (1996), on the other hand, use predicted income itself as the measure of relative income.

### **3. Relative income and job satisfaction: an analytical framework**

In a recent study by Van Praag *et al.* (2002), an individual's general satisfaction is hypothesised to be made up of several domain satisfactions, which in turn depend on 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).<sup>5</sup> Job satisfaction, in turn, is also likely to be multi-dimensional. Overall job satisfaction ( $S$ ) is determined by several individual job satisfaction domains ( $S_k$ ), such as satisfaction with pay, job security, promotion prospects, fringe benefits and the importance attached to the job:  $S = g(S_k)$ . This paper focuses on the particular domain of job satisfaction relating to pay.

Previous studies argue that job satisfaction relating specifically to pay ( $S_p$ ) is directly dependent on factors such as income ( $y$ ), hours of work ( $h$ ), individual characteristics ( $i$ ) and job characteristics ( $j$ ):

$$S_p = f(y, h, i, j).$$

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<sup>5</sup> Van Praag *et al.* (2002) represents 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..

Typically an individual's job satisfaction is assumed to be increasing in income and decreasing in hours of work. This is the most basic and simplest model where workers in this case care only about their current earnings and do not make comparisons with, for example, other workers with similar characteristics to themselves.<sup>6</sup>

The level of utility may depend not only on a worker's actual income but also on comparative or 'relative' income<sup>7</sup>. Individual workers may compare their employment income to some expected income level or to the income of a comparison group.<sup>8</sup> According to Frey and Stutzer (2002), higher income does not simply translate into higher happiness. People compare themselves with others and it is not the absolute level of income that matters most but one's own income relative to other people. It has long been acknowledged that people with higher incomes are happier, but raising everybody's income does not increase the total level of happiness. This is because relative income does not change when all incomes increase in proportion (Easterlin 2001, Blanchflower and Oswald 2000).<sup>9</sup>

Relative income can easily be added to the model by making relative income an argument of the utility function,  $S_p = f(y, y^*, h, i, j)$ , where  $y^*$  is the earnings of a relevant reference group. It is then straightforward to estimate the effects of factors determining satisfaction with pay. Utility is expected to decrease with  $y^*$ .<sup>10</sup>

Although an interesting idea, the *relative income hypothesis* has proved to be difficult to test empirically. This is partly because of uncertainty about what  $y^*$  represents or how individuals form their expectations, and partly because of data unavailability.<sup>11</sup> The comparison level  $y^*$  may be determined from the income of other workers or may be based on other kinds of information such as family background.

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<sup>6</sup> The effect of *absolute* income may be additively separable (Blanchflower and Oswald 2001).

<sup>7</sup> Some other terms include 'reference', 'norm' or 'comparison' income.

<sup>8</sup> Relative income may capture the effect of relative deprivation, envy, jealousy or inequality (Clark and Oswald 1996). According to Frey and Stutzer (2002), the relationship between income and happiness is non-linear and there is diminishing marginal utility to absolute income. They point out further that differences in income only explain a small proportion of differences in happiness between persons.

<sup>9</sup> Blanchflower and Oswald (2001), for example, point out that since World War II, income per head in countries such as the US, UK and other European countries has increased sharply but average happiness has remained virtually the same over the same period.

<sup>10</sup> Hamermesh (2001) points out that it is not clear by which mechanism changes in earnings affect job satisfaction.

<sup>11</sup> Frey and Stutzer (2002) point out that though there is no doubt that people compare themselves to other people, 'it is crucial to know with *what* other people such a comparison is being made' (p. 15).



There are several ways in which a measure of relative income can be constructed. First, if workers have knowledge of the average current rate of return to investment in education and training, they may compare themselves to others who made the same investment at the same time, and differences in satisfaction will arise out of heterogeneity in the returns to those investments (Hamermesh 2001). In Clark and Oswald (1996), the reference group is workers with the same characteristics. They conclude that the higher the income of the reference group the less satisfied people are with their own income and hence their job.

Second, Neumark and Postlewaite (1998) argue that workers may not base their income expectations on the income earned by workers with similar characteristics since individual workers may form their income expectations based on some ‘internal norm’ rather than an external reference group. One possibility is the experience offered by parents and other relatives (McBride 2001). Neumark and Postlewaite show, for example, that the decision of females to work is positively correlated with the employment status and earnings of sisters and sisters-in-law.

Third, there is the ‘*disappointing returns hypothesis*’. Hamermesh (2001) argues that ‘a rational individual will base his/her job satisfaction on a comparison of outcomes to expectations that were formed at the time that the investment decisions that generated those returns were undertaken’ (p.5). In this case, the worker's job satisfaction is dependent on the earnings that the worker would have expected to earn at time  $t$  had labour market conditions remained as they were when the worker entered the labour market at time  $t_0$ .

A fourth alternative, again suggested by Hamermesh (2001), is to base the reference income level on the rational expectation of income with learning and heterogeneity. Hamermesh (2001) argues that ‘after some period of time the worker’s expectation of future returns may have adjusted to the likely reality’ (p.5). And ‘this implies that job satisfaction will be determined by the deviation of the returns to the worker’s skills over a continually adjusting forecast of those returns’. In other words, the forecast will be based on what the worker expected at time  $t_0$ , but modified by intervening experience and events.

#### **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 provides detailed information not only about their academic record but also their labour market activities eight years after the end of compulsory education, such as their employment status, earnings and job characteristics. The sample selected for the present study includes only those 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. We use job satisfaction data from the fourth follow-up of the NELS together with data from previous follow-ups in order to obtain our measures of relative income.

### *Modelling job satisfaction*

Five individual domains of job satisfaction are identified in the National Educational Longitudinal Study: satisfaction with pay, fringe benefits, promotion prospects, job security and importance 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 relative income on job satisfaction, it is necessary to control for the personal characteristics of each respondent and for those 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:

$$S^* = \mathbf{x}_i' \boldsymbol{\beta} + \varepsilon_i \quad (2)$$

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.<sup>12</sup> We therefore estimate a binomial logit model and report the marginal effects for ease of interpretation (Green 1997).

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<sup>12</sup> The respondents were asked to answer the question: "Overall, would you say you are satisfied or dissatisfied with your job as a whole?" and "Are you satisfied with your pay?"

### *Explanatory variables*

Three groups of explanatory variables are identified: (1) those relating to the personal characteristics of the respondent, such as age, gender, race, marital status, number of children; (2) those relating to the job itself, such as income earned and hours worked; (3) those relating to relative income. For hours worked, we use the average number of hours worked per week as stated by the respondent. Income is the reported current annual earnings from the respondent's main job. Annual earnings is used to reduce the problem of measurement error that is more likely to arise by using the earnings for the most recent week or month (Bound *et al.* 1999, Hamermesh 1999).

A further variable that may be expected to influence job satisfaction is the degree of perceived autonomy that a worker enjoys in the way they do their job. More autonomy is expected to be associated with greater job satisfaction. Four levels of job 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 complete autonomy. Zero autonomy is included in the base category so that the effect of the various degrees of autonomy on satisfaction with pay can be estimated. We expect satisfaction with pay to increase as job autonomy increases.

*Measure of relative income:* The main problem for the present analysis is how to construct a measure of relative income. There are several approaches in the literature that this paper attempts to follow. Our first strategy, is to run a simple OLS regression of income on a number of explanatory variables to obtain an estimate of relative income. This is simply a version of the Mincerian earnings equation. The earnings predicted from the earnings equation ( $y^*$ ) provides an estimate of the average income of similar people with the same age, education and other characteristics as the respondent. The predicted earnings from the earnings equation can be used as a proxy for  $y^*$  (Clark and Oswald 1996; Hamermesh 2001).

One of the unique features of the NELS:2000 data is its longitudinal nature. Since the NELS:2000 started in 1988 when respondents were still 8<sup>th</sup> graders, it contains detailed information about individual respondents before they enter the labour market, their early labour market experience and their family background. For example, in 1994, two years after the end of compulsory education, they were asked how much they expected to be earning when they were 30. This information gives us a direct 'proxy' for their expected income to

test the *regret* or *disappointing returns* hypothesis, also known as disappointment theory following Clark (1997). Once workers are in the labour market they will compare their realised income with their prior expected income. The higher the prior expected income, the more likely they are going to be dissatisfied with their pay. We expect to find a negative relationship between this measure of expected income and job satisfaction.

It has also been suggested that family background will influence an individual's expected income (McBride 2001). Individuals from higher income families may set for themselves a higher than average expected income and are more likely to be dissatisfied with their job for any given level of actual income.<sup>13</sup> Family income reported in 1992 (at the end of compulsory education) can be used as a measure of relative income. Since this variable turned out to be insignificant in all estimated equations, we do not report the results here.

In previous studies, relative income is treated as a uni-dimensional covariate and is assumed to be homogeneous across individuals. Clark (1997) argues that it may be more appropriate to include a vector of relative incomes based on several reference groups. As is obvious from the above discussion, alternative versions of the relative income hypothesis are not mutually exclusive. It is not clear how individual workers would adjust their job satisfaction when, for example, they are better off by one relative income (e.g. prior expected earning) but worse off by another (e.g. earnings of workers with similar characteristics). This suggests that an individual worker may compare their income from work to several reference income groups simultaneously. We test for this possibility in the next section

Finally, it is possible that satisfaction with one domain of job satisfaction is conditional on satisfaction with other domains. We test for this by splitting the sample into two parts. The relationship between satisfaction with pay and the specified explanatory variables is first estimated conditional on the respondents being satisfied with their job security; and the equation is then estimated conditional on the respondents not being satisfied with their job security. A similar analysis is undertaken for two further domains of job satisfaction: satisfaction with promotion opportunities and satisfaction with fringe benefits.

## **5. Empirical results**

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<sup>13</sup> McBride (2001) argues that an individual subjective well-being may depend on a consumption norm that is related to one's parents' living standards. This is because the individual may compare his standard of living with his parents' standard of living. McBride (2001) therefore, suggests to use a measure of parents' consumption or income to capture this consumption norm, which he considers 'an objective measure that is potentially equivalent to the subjective measure' (p. 260).

The empirical analysis of job satisfaction focuses exclusively on satisfaction with pay for those in full-time employment eight years after high school. The probability of being satisfied with pay for this specific group of individuals is 0.73.

The estimated equations for satisfaction with pay are given Table 3. Equation 1 includes two measures of relative income. The first is predicted from the earnings equation following Clark (1997) and Clark and Oswald (1996)<sup>14</sup>; and the second is the respondent's own subjective estimate of what his or her income is expected to be at age 30 (obtained from the NELS:2000).<sup>15</sup> We use this latter measure as the subjective estimate of a respondent's income eight years after high school. Equations 2 and 3 are estimates for females and males separately.

Current income and hours of work affect satisfaction with pay in opposite directions, as expected. The estimated coefficients imply that a proportionate increase in income of 0.1 (10%), for example, increases the probability of satisfaction with pay by 0.023. The hours of work variable has a much smaller impact on satisfaction with pay.<sup>16</sup> Holding all other variables constant, an increase in hours worked by 10% is associated with a reduction in the probability of satisfaction with pay by 0.009, which is small compared to the effect of the same proportionate change in current income.

The results in Table 3 offer some support for both versions of the relative income hypothesis. The estimated marginal effects are statistically significant for both measures of expected income in equation 1. Both coefficients are small, however, compared to the estimated effect of current income. This is especially so for prior expected income. The support for the relative income hypothesis is therefore somewhat muted by the relatively small magnitude of the coefficients. It is also noted that including the two relative income variables separately has little effect on the results (not reported here).

Another variable of interest is the autonomy that workers have in the way they do their job. We find that the degree of autonomy has substantial effects on satisfaction with pay. In all of the equations reported in Table 3, the estimated probability of being satisfied with one's pay increases steadily as job autonomy increases. In equation 1, for example, an increase in job

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<sup>14</sup> Estimates of the earning equation are reported in Appendix 1.

<sup>15</sup> The correlation between these two variables is 0.12.

autonomy from 'no freedom' to 'some freedom' is associated with an increase in the probability of satisfaction with pay by 0.077. And an increase in job autonomy from 'no freedom' to 'basically own boss' raises the probability of satisfaction with pay by 0.142. This result indicates that the extent of a worker's own control over the job they do has a substantial impact on their satisfaction with pay. Very similar results are obtained in all equations, though there is some indication that the effects of job autonomy on satisfaction with pay are somewhat stronger for males than for females.

As far as personal characteristics are concerned, only three factors are found to be of significance. First, males have a higher probability of being satisfied with their pay than females (by 0.04). This may indicate the presence of pay discrimination against females. Second, there is an ethnic dimension to satisfaction with pay: black and Asian workers are less satisfied with their pay than white workers. The result obtained for black workers is particularly strong. All equations indicate that black workers have a considerably lower probability (-0.13) of being satisfied with their pay than white workers. This result is highly statistically significant and suggests the existence of a great deal of dissatisfaction over pay among black workers compared to other ethnic groups, particularly whites. This is evidence of 'perceived racial discrimination' with respect to pay. Third, there is evidence that single and divorced females are less satisfied with their pay than those who are married. Being single or divorced has no effect on satisfaction with pay for males.

*Conditioning on other domains of job satisfaction:* Table 4 gives the results for the equations estimated for two separate groups of respondents, namely, those 'satisfied' with other domains of their job and those 'not satisfied' with other domains of their job. Two other job satisfaction domains are considered here: satisfaction with job security and satisfaction with promotion opportunities.

One of the most interesting findings is that the estimated impact of actual income on satisfaction with pay is twice as large for those who are dissatisfied with their job security compared to those who are satisfied with their job security. This suggests that workers are much more sensitive to pay and hours of work in determining their job satisfaction if they perceive their job security to be low. This result is consistent with the proposition that workers are willing to accept lower job security if they are compensated by a higher rate of

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<sup>16</sup> The inclusion of variables such as occupation and industry most recently worked in has little effect on the results and are excluded since they are themselves determinants of earnings.

pay. A further finding is that hours worked has a larger negative impact on satisfaction with pay for those who are dissatisfied with their promotion opportunities. Workers appear to be less concerned about the hours they work (in deciding whether they are satisfied with their pay) if they have good promotion opportunities.

Relative income also becomes irrelevant in determining satisfaction with pay if job security is low. This is indicated by the insignificant coefficients on the two measures of relative income in the equation estimated for those workers dissatisfied with their job security. A more striking result is obtained for predicted income when conditioning on promotion opportunities. A highly significant negative effect (-0.137) is estimated on predicted income for those who are satisfied with their promotion opportunities. This indicates that those who are satisfied with their promotion opportunities are less likely to be satisfied with their pay, the higher their predicted income. No effect is discernible for predicted income, however, for those dissatisfied with their promotion opportunities.

There are some conflicting results regarding black workers. On the one hand, for the group of workers who are satisfied with their job security, we find that black workers are more likely to be dissatisfied with their pay compared to corresponding white workers. But for the group of workers who are not satisfied with their job security, we find no significant difference between black and white workers in their satisfaction with pay.

Very few other variables are found to have statistically significant coefficients. Males who are satisfied with other aspects of their job (job security and promotion opportunities) are more likely to be satisfied with their pay than are females. Conditioning on other domains of job satisfaction does not produce any further insights into the impact of job autonomy on satisfaction with pay.

## **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. Productivity and profitability are likely to be higher if workers have a high level of job satisfaction. Job turnover is also likely to be higher in firms that have a low level of job satisfaction, thereby resulting in higher training costs. 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. Job satisfaction is obviously a topic deserving attention from economists.

The vast majority of studies of job satisfaction, however, are based on specific groups of employees, such as those in particular firms or in particular jobs. The National Educational Longitudinal Study, 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 job satisfaction on a larger scale. It allows us to investigate the potential impact of a range of job-related and personal factors on job satisfaction for a wide (and representative) cross-section of workers.

Job satisfaction is multi-dimensional. It includes several distinct domains such as satisfaction with pay, promotion opportunities, fringe benefits, job security and the importance/challenge of the job. This paper has focused specifically on one aspect of job satisfaction, namely, satisfaction with pay. Our main aim has been to estimate the extent to which a worker's job satisfaction is determined by comparisons with other reference groups as well as by variables such as actual pay and hours worked. We have also investigated the impact of factors relating to the job itself, particularly the degree of freedom enjoyed by a worker in doing the job, and by personal factors such as ethnicity and marital status.

The main findings of this paper are as follows. First, we find evidence that both of the variables used to measure relative income (income predicted from a wage equation and a worker's prior expected income) have the expected negative effect on satisfaction with pay. The estimated coefficients indicate, however, that the impact of relative income on satisfaction with pay is small compared to the estimated impact of actual income.

The second main finding is that the results of previous studies are confirmed by the results obtained here. Current income and hours worked have the expected effect on satisfaction with pay. More interestingly, we find that the major influence on satisfaction with pay is the degree of freedom that workers have over how they do their job. As job freedom increases, so too does satisfaction with pay.

Third, there is some evidence that workers who are dissatisfied with their job security are more sensitive to their current income and hours of work in deciding on whether they are satisfied with their pay. In other words, they need compensating for their perceived low job security in order to be satisfied with their pay.



Finally, we find that personal characteristics have little effect on satisfaction with pay. The only notable exceptions are that black workers (both male and female) and single females are substantially and significantly dissatisfied with their pay compared to the base group.

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Table 1. Correlation matrix

	Overall job satisfaction	Satisfaction with pay	Satisfaction with fringe benefit	Satisfaction with promotion	Satisfaction with job security
Satisfaction with pay (yes = 73%)	0.373				
Satisfaction with fringe benefit (yes = 81%)	0.339	0.268			
Satisfaction with promotion (yes = 74%)	0.458	0.312	0.277		
Satisfaction with job security (yes = 91%)	0.318	0.176	0.272	0.255	
Satisfaction with work importance (yes = 86%)	0.507	0.228	0.218	0.366	0.204

*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, 1988/2000.

Table 2. Logit estimates of overall job satisfaction

Explanatory variables	Dependent variable = overall job satisfaction	
	Marginal effects	Standard error
Constant	-0.115	0.018
Satisfaction with pay	0.057***	0.007
Satisfaction with fringe benefit	0.040***	0.008
Satisfaction with promotion opportunity	0.065***	0.007
Satisfaction with job security	0.041***	0.012
Satisfaction with work importance and challenge	0.081***	0.010
Log-likelihood	-1679	
Chi-squared	112	
Number of observations	8659	

*Note:* ( ) = standard error; \* = significant at 0.05; \*\* = significant at 0.01; \*\*\* = significant at 0.001. *Source:* National Educational Longitudinal Study.

Table 3. Satisfaction with pay: estimated marginal effects for full-time workers

Explanatory variables	(1) Total	(2) Males	(3) Females
<i>Job characteristics</i>			
Current income (Log)	0.233*** (0.016)	0.236*** (0.022)	0.234*** (0.024)
Hours worked (Log)	-0.091*** (0.034)	-0.103* (0.044)	-0.073 (0.053)
Predicted income (Log)	-0.090** (0.041)	-0.086 (0.051)	-0.104 (0.064)
Prior expected income (Log)	-0.038*** (0.009)	-0.039*** (0.012)	-0.034* (0.015)
Job autonomy: some freedom	0.077*** (0.022)	0.114*** (0.030)	0.034 (0.033)
Job autonomy: considerable freedom	0.110*** (0.021)	0.128*** (0.028)	0.085** (0.032)
Job autonomy: basically own boss	0.142*** (0.025)	0.157*** (0.033)	0.125*** (0.038)
<i>Personal characteristics</i>			
Male	0.043*** (0.013)		
Black	-0.127*** (0.019)	-0.118*** (0.026)	-0.132*** (0.028)
Asian	-0.044 (0.024)	-0.058 (0.031)	-0.026 (0.036)
Hispanic	-0.035** (0.017)	-0.035 (0.022)	-0.033 (0.026)
American Indian	-0.095 (0.050)	0.015 (0.069)	-0.177* (0.076)
Born in 1972	-0.008 (0.030)	-0.029 (0.033)	0.033 (0.060)
Born in 1973	0.008 (0.013)	0.002 (0.016)	0.016 (0.020)
Born in 1975	-0.018 (0.052)	-0.082 (0.070)	0.070 (0.080)
Single	-0.047*** (0.013)	-0.026 (0.018)	-0.068*** (0.019)
Divorced or widowed	-0.034 (0.025)	0.007 (0.036)	-0.072* (0.035)
Number of kids = 1	-0.005 (0.016)	-0.012 (0.021)	0.006 (0.024)
Number of kids =2	0.020 (0.020)	0.031 (0.027)	0.009 (0.030)
Number of kids = 3 or more	0.001 (0.033)	0.018 (0.048)	-0.017 (0.048)
Constant	-0.613 (0.389)	-0.628 (0.497)	-0.534 (0.622)
Log-likelihood	-3555	-1740	-1805
Chi-squared	434	237	188
Number of observations	6544	3402	3142

*Note:* The base group includes persons with the following characteristics: white, born in 1974, female, married, no children, told what to do in job (no autonomy). ( ) = robust standard error; \* = significant at 0.05; \*\* = significant at 0.01; \*\*\* = significant at 0.001.

Table 4. Satisfaction with pay conditional on other domains of job satisfaction: estimated marginal effects for full-time workers

Explanatory variables	Job security		Promotion opportunities	
	Satisfied	Dissatisfied	Satisfied	Dissatisfied
<i>Job characteristics</i>				
Current income (Log)	0.215*** (0.017)	0.395*** (0.059)	0.202*** (0.016)	0.206*** (0.034)
Hours worked (Log)	-0.085* (0.036)	-0.142 (0.112)	-0.072* (0.035)	-0.223** (0.079)
Predicted income (Log)	-0.100* (0.041)	-0.020 (0.177)	-0.137*** (0.040)	0.040 (0.091)
Prior expected income (Log)	-0.040*** (0.010)	-0.004 (0.043)	-0.028** (0.009)	-0.043* (0.019)
Job autonomy: some freedom	0.069** (0.024)	0.038 (0.077)	0.015 (0.027)	0.056 (0.043)
Job autonomy: considerable freedom	0.092*** (0.023)	0.162* (0.072)	0.033 (0.026)	0.082* (0.041)
Job autonomy: basically own boss	0.131*** (0.027)	0.018 (0.097)	0.058* (0.029)	0.089 (0.053)
<i>Personal characteristics</i>				
Male	0.050*** (0.013)	-0.021 (0.055)	0.040** (0.013)	0.026 (0.030)
Black	-0.129*** (0.020)	-0.059 (0.073)	-0.089*** (0.019)	-0.154*** (0.043)
Asian	-0.043 (0.024)	-0.002 (0.115)	-0.041 (0.022)	-0.065 (0.062)
Hispanic	-0.032 (0.017)	0.007 (0.077)	-0.045** (0.016)	-0.036 (0.042)
American Indian	-0.114* (0.050)	0.193 (0.201)	-0.112* (0.046)	-0.062 (0.130)
Born in 1972	0.033 (0.033)	-0.311* (0.125)	0.010 (0.031)	-0.052 (0.066)
Born in 1973	0.008 (0.013)	0.029 (0.056)	0.010 (0.013)	-0.001 (0.029)
Born in 1975	-0.020 (0.051)	-0.053 (0.225)	-0.026 (0.046)	-0.134 (0.150)
Single	-0.041*** (0.013)	-0.050 (0.057)	-0.023 (0.013)	-0.074* (0.029)
Divorced or widowed	-0.022 (0.025)	-0.188 (0.115)	0.007 (0.026)	-0.147* (0.058)
Number of kids = 1	-0.017 (0.016)	0.189** (0.070)	-0.002 (0.016)	-0.011 (0.036)
Number of kids =2	0.024 (0.021)	0.001 (0.101)	0.021 (0.020)	0.037 (0.048)
Number of kids = 3 or more	-0.011 (0.034)	0.165 (0.139)	-0.029 (0.031)	0.087 (0.076)
Constant	-0.299 (0.393)	-3.297 (1.849)	0.092 (0.389)	-1.210 (0.916)
Log-likelihood	-3161	-319	-2183	-1092
Chi-squared	363	67	281	88
Number of observations	5979	527	4780	1652

Note: See note to Table 3.



### Appendix 1 Earnings regression

	Coefficient	Standard error
Black	0.027	0.023
Asian	0.096***	0.025
Hispanic	0.040*	0.019
Born in 72	0.040	0.036
Born in 73	-0.001	0.013
Born in 75	0.111*	0.050
Male	0.213***	0.013
Ged qualification	0.048	0.048
High school diploma	0.148***	0.038
Associate degree or diploma	0.217***	0.040
Bachelor degree	0.363***	0.039
Master/PhD	0.543***	0.045
Professional	0.241***	0.027
Manager	0.237***	0.027
Skilled non-manual	0.208***	0.024
Skilled manual	0.139***	0.026
Single	-0.015	0.012
Divorced	0.024	0.028
Current job experience	0.061***	0.010
Current job experience squared	-0.005***	0.001
Full time job	0.971***	0.027
Public sector	-0.124***	0.017
Non-profit private sector	-0.170***	0.021
North east	0.084***	0.017
North central	0.063***	0.015
West	0.063***	0.018
Constant	8.679	0.052
R-squared	0.34	
Number of observation	8401	

*Note:* The base group includes persons with the following characteristics: white, born in 1974, female, no qualifications, unskilled or semi-skilled, married, part-time job, working in private sector, living in south. \* = significant at 0.05; \*\* = significant at 0.01; \*\*\* = significant at 0.001.