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By

IOANNIS THEODOSSIOU and GEORGIOS A. PANOS

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# Earnings Aspirations and Job Satisfaction: The Affective and Cognitive Impact of Earnings Comparisons<sup>‡</sup>

GEORGIOS A. PANOS

University of Macedonia & DECRG, The World Bank

IOANNIS THEODOSSIOU

University of Macedonia & CELMR, University of Aberdeen

## Abstract:

Theories of interdependent preferences predicts that the effect of peer earnings on individual well-being is either negative, the “relative deprivation”, or positive the “cognitive effect”. The evidence so far has attributed the dominance of each of the above effects on the country’s economic and political environment. This study claims that relative earnings can affect job satisfaction in two opposite ways, through the affective, “relative deprivation”, and the cognitive channel. The dominance of each effect depends on the individual-specific financial situation rather than the country’s environment. Utilising a longitudinal dataset for British employees, the results of this study show that the cognitive informational effect of “peer earnings” dominates social comparisons for those in financial distress. It further suggests job satisfaction is a relative concept.

Keywords: Earnings, Job Satisfaction, Financial Vulnerability, Reference Group.

JEL Classification Code: C23, C25, D64, D84, J28

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Correspondence to Professor Ioannis Theodossiou, Centre for European Labour Market Research, University of Aberdeen Business School, Edward Wright Building, Dunbar Street, AB24 3QY, United Kingdom. Telephone: +0044 1224 272183, Fax +44 1224 272181, e-mail: theod@abdn.ac.uk.

## 1. Introduction

In recent years there has been notable interest in well-being as a determinant of individual economic behaviour. A strand of this literature has focused on job satisfaction (Hamermesh, 1977; Freeman, 1978) and has considered it as one of the three major determinants of life satisfaction or happiness (Argyle, 1989). The importance of job quality and job satisfaction, or happiness at work, for the build up of good employee morale has been highlighted by the European Union in host of recent guidelines. These are critical elements which affect quits, layoffs and firm performance. Bewley (1995) reports that both employers and employees recognise the desirability and importance of happiness at work for good employment relations.

Evaluating the socioeconomic determinants of job satisfaction, studies have focused on unions (Borjas, 1979), gender (Clark, 1997; Sloane and Williams, 2000; Bender et al., 2005), race (Bartel, 1981), occupations (Watson et al., 1996; Ward and Sloane, 2000), industry or establishment characteristics (Cappelli and Sherer, 1988; Idson, 1990) as well as priority-setting behaviour (Drakopoulos and Theodossiou, 1997; Clark, 2001; Skalli, Vasileiou and Theodossiou, 2005). In contrast to the standard view, Akerlof, Rose and Yellen (1988) has shown that earnings and hours of work are not of sole or even primary importance in determining productivity and well being at work. Aspiration level theory postulates that the gap between earnings aspirations and earnings achievement is a fundamental determinant of well-being. This view is based on the idea that people tend to form expectations early in adulthood, which is configured by their education and upbringing. These expectations evolve during life, as a result of accumulated experience and social interactions. Hence, well-being is reference-dependent. This implies that wages exhibit both a direct and an indirect effect job satisfaction. The direct effect is the effect of the actual level of earnings, related to effort and financial needs. The indirect effect depends on the way employees evaluate the remuneration of their work relative to some norm or reference. This norm or reference is founded on intra-personal and inter-personal comparisons

which define the relative position of the individual in the earnings distribution (Frank, 1997; Hamermesh, 2001).

Though the subjective well-being approach offers evidence supporting the argument that utility is at least in part relative, it has not yet been made entirely clear how income comparisons affect it. For subjective well being and focusing on interpersonal comparisons, Runciman, 1966 has shown the importance of the “relative deprivation” theory for both satisfaction with work and satisfaction with life. Evidence shows that the income of the reference group creates a negative externality. However, this is not the only direction theories of social comparisons have pointed at. There have been studies suggesting a positive externality. This strand emphasizes the influential informational content that social comparisons can have, when the individual’s future is uncertain in an environment of economic uncertainty. Hirschman defined this as the “tunnel effect” (Hirschman, with Rothschild, 1973), that is a positive indirect influence of the income of “relative others” on individual welfare. It operates because upward mobility of others supplies information about a high probability of own advancement. A second framework justifying positive social comparison effects on individual well-being is provided in the context of “Social Capital” theories<sup>1</sup>. Ravallion and Lokshin, 2005 argue that the positive externality springs from an “increased security” effect reflecting the help that people can get from friends, relatives, neighbours and colleagues when in need.

The evidence supporting the dominance of one theory over the other is based on country-level studies. It is the country-specific economic and political environment that supports the creation of norms of comparison. Thus, while the pursuit for status has become the norm in developed western societies, individuals in underdeveloped or developing countries are thought to have different norm formation mechanisms. Hence, although in the West, after years of economic growth and development, the ownership of a luxury car or a designer-made suit gives rise to feelings of envy to those who are less fortunate

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<sup>1</sup> Woolcock, 2002; 2005.

against the privileged, in economically unstable societies less privileged individuals are supposed to be likely to consider the good fortune of their more fortunate fellow citizens in a more benevolent fashion, seeing shines of hope in the success of those who progress. However, such attitudes are likely to be short-lived if their own expectations are not fulfilled. Although the evidence justifies the positive cognitive impact of reference norms of earnings/income through its informational content, the view that this positive effect is only prevalent in underdeveloped/developing countries seems to suggest a rather ascetic lifestyle in the Stoic sense in these countries.

This study provides evidence that the individual-specific circumstances are responsible for determining the direction of the effect of social comparisons on individual evaluations of well being or job satisfaction rather than the country-specific environment. In this respect, this study shows the dual nature of social comparison effects. Utilizing a panel dataset of British employees it presents evidence supporting the influence of (a) an affective and (b) a cognitive - context effect of "*peer earnings*" on job satisfaction.

According to Veenhoven (1991), the affective component of well-being is the hedonic level, *i.e.* the "*degree to which the various affects a person experiences are pleasant*". The cognitive component is labeled contentment and is "*the degree to which an individual perceives his aspirations to be met*". Veenhoven (1991) argues that satisfaction with specific aspects of life, such as income satisfaction and job satisfaction is more likely to be relative, compared to satisfaction with life as a whole, which primarily depends on the hedonic level of affect. Weiss (2002) argues that job satisfaction is usually inappropriately defined as affect since this obscures differences among three separate constructs, overall evaluative judgments about jobs, affective experiences at work and beliefs about jobs. The extent to which an employee considers the remuneration of his or her work as satisfying compared to the aspired is of primary importance for the evaluation of his or her job, in an era where job prestige and the material level of living are valued highly.

This study sets off from the assumption that job satisfaction is a relative concept and the comparison earnings exhibit a permanent negative affective effect. However, it claims that transitory shifts in the norm of comparison exhibit a positive cognitive effect in the short-run. The magnitude of the latter effect differs significantly between the segment of the employed population living in financial distress and the segment living in financial comfort. Indeed, assuming that there is a permanent as well as a transitory effect of “relative earnings” on job satisfaction, the results reveal a negative permanent comparison effect of the “relative earnings” on job satisfaction. Its magnitude is similar for both financially vulnerable and financially sound employees. The transitory component - arising from changes in reference earnings compared to the individual-average - exhibits a significantly positive effect on job satisfaction, which is significantly higher for the financially vulnerable group. This implies that, among the financially distressed, the informational content of social comparisons dominates whereas the “relative deprivation” effect is important for the financially secure group. One should note that this effect is found for the relatively stable economic environment of Britain. Furthermore, robustness checks indicate that the positive cognitive effect is stronger for younger employees, for employees earning less than the reference group, and for those with uncertain income. Finally, it is more likely that the informational content of earnings comparisons drives this positive effect, rather than social capital considerations. To the knowledge of the authors, this is the first study that indicates a dual effect of peer earnings on job satisfaction within the same country-context and relates the two effects to the individual-specific financial circumstances.

The remaining of this paper is structured as follows: Section 2 presents a literature review on the aspiration level theory and the empirical evidence on reference dependent well-being. Section 3 describes the data, the hypothesis and the empirical strategy. The results and their implications are discussed in Section 4. Section 5 concludes.

## 2. Aspiration Norms and the Labour Market: A Review

In modern societies, income is a direct indicator of socioeconomic status and achievement. Thus, not only income from work but also the perception about the extent to which income satisfies financial needs exerts a major influence on job satisfaction. Aspiration level theory provides a candidate explanation for several of the stylized facts in the job satisfaction literature, such as the Anglo-Saxon paradox (Frey and Stutzer, 2002), *i.e.* the opposite gender differences in earnings and job satisfaction (Clark, 1997; Bender, *et al.*, 2005), the non-linear U-shaped age profile of job satisfaction (Clark, Oswald and Warr, 1996; Levy-Garboua & Montmarquette, 1997), the British education paradox (Clark and Oswald, 1996; Bender and Heywood, 2005) and the higher job satisfaction among the low-paid (Leontaridi and Sloane, 2004). Individual and within-country group differences in job satisfaction levels and well being can, in part, be attributed first, to differences in earnings aspiration levels formed through education and upbringing (Stutzer, 2004), and second, to the way these evolve during the working life. In a non-visible form of social action, individuals compare their own earnings with a norm determined by some level of expectations (Layard, 2003). Social norms have been described as “*beliefs held by societal members*” (Akerlof, 1980), “*agreements to improve the efficiency of the economic system and alleviate market inadequacies*” (Arrow, 1971), “*invisible handshakes*” (Okun, 1980) and as “*the standard of achievement or comparison, shaped by personal experience and social comparisons*” (McBride, 2001). In the latter view, the aspiration norm is viewed as reference dependent and satisfaction is affected by changes in own income and the income of others. This is in line with Duesenberry’s (1949) view regarding the frame of reference which affects utility. McBride (2001) defines the process as an “*internal norm*”, arising from psychological theories of adaptation and habit formation. This is described as the “*external norm*”, flowing from sociological theories of “*Social Comparison*” and economic theories of “*Interdependent Preferences*” (Easterlin, 2001).

The notion of an internal norm suggests that aspirations are formed by own income levels in the recent past. Thus, changes in income affect subjective well-being more than the actual level of income and casual evidence indicates that workers prefer increasing wage profiles (Loewenstein and Sicherman, 1991; Frank and Hutchens, 1993). Paraphrasing Becker & Murphy (1988) the internal norm considers wages as “harmfully addictive”. This is a consequence of the fact that individuals adapt to new situations, by adjusting their expectations in accordance with social science theories of habituation - adaptation (Helson, 1964). In the psychological literature such phenomena are called “hedonic treadmills” (Brickman and Campbell, 1971). In the 1970’s pioneering work by the “Leyden School” on individual welfare functions describe this behavioural pattern as the “Preference Shift Parameter” (van Praag and Kapteyn, 1973). This term formalized the empirical observation of the tendency of individuals to adjust their welfare function by increasing their material wants proportionately to a rise in their income or earnings. About 60-80% of the welfare effect due to an increase of income is eliminated by the “Preference Shift”. Casual evidence shows that a rise in earnings initially increases job satisfaction, but as individuals become used to the new situation, their job satisfaction declines to its original level (Clark, 1999). This has also been labeled as “Preference Drift” (Groot and van den Brink, 1999; Grund and Sliwka, 2001).

According to the external norm of reference view, aspirations are formed by income comparisons with a group of reference *i.e.* individuals with similar characteristics to whom one relates the most. Contrary to the standard neoclassical view, the concept of relative utility is not new. Adam Smith suggests that “*people judge the utility or value associated with any job, by comparing it with the other jobs available, and the utility associated in them*”<sup>2</sup>. Karl Marx argued that “*a house may be small or large; as long as the surrounding houses are equally small it satisfies all social demands for a dwelling. But if a palace rises beside the little house, the little house shrinks into a hut*”<sup>3</sup>. In similar vein, Layard (2003) describes the “*rivalry*

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<sup>2</sup> Cited by Cappelli & Sherer, 1988.

<sup>3</sup> Cited by: Easterlin, 1974; Höllander, 2001.

*process*” as one where individuals compare what they have to what other people have and if others get more, then they also need more to feel as good as before. The review in Rees (1993) indicates that the wages earned by “others” are a powerful force in determining labour market outcomes. This mechanism works through “*the imperfection of labour markets, which generates a zone of indeterminacy, where, motivated by individual perceptions and social comparisons, individual and collective bargaining can take place*”. Empirical evidence showing that relative earnings affect job satisfaction negatively has been provided by several economists (Hamermesh, 1977; 2001; Cappelli and Sherer, 1988; Clark and Oswald, 1996; Clark, 1996; 1997; Watson *et al.*, 1996; Sloane and Williams, 1996). Peer group earnings exhibit an effect opposite in sign, but comparable in absolute magnitude to the effect of own earnings. Further studies have found supporting evidence for the importance of “relative deprivation” theory for individual welfare, in terms of satisfaction with life. Those include van de Stadt, Kapteyn & van de Geer (1985) for the Netherlands, Ferrer-i-Carbonell (2005) for Germany, McBride (2001), Blanchflower & Oswald (2004), and Luttmer (2005) for the United States. The above studies point out that subjective well-being and job satisfaction are partly relative concepts. Runciman, 1966 views the importance of “relative deprivation theory” in the context of theories of interdependent preferences, as the early works of Veblen (1899) and Duesenberry (1949) termed the potential of social comparisons in consumption and savings decisions (Frank, 1989).

In contrast, another strand of theories of social comparisons points out a totally different dimension namely that income comparison can give rise to a positive cognitive effect on individual well-being. A strand of this literature emphasizes the potentially influential informational content social comparisons can have when the individual’s future is dubious in an environment of economic uncertainty. In this view, individual welfare depends not only on own current income but also on expected future income. However, individual knowledge about the future income path is unknown or at best a rough estimate. Thus, if at some point some members of the reference group (relatives, neighbours or

colleagues) witness an improvement in their earnings, income or social status, then the individual's expectations about own future circumstances are positively influenced. Hirschman defined this as the "tunnel effect" (Hirschman, with Rothschild, 1973), which operates because upward mobility of others supplies information to the individual about a high probability of own advance. The gratification and optimism caused by this information suspends or even outweighs the individual's potential feelings of envy towards the advancement of others. Yet, this effect may be short-lived. If expectations are not realized after some time, then "relative deprivation" might dominate. Ravallion & Lokshin (2000) have made this concept operational. They show that preferences for redistribution in Russia are as important for the poor as for the rich who view the future with uncertainty. Senik (2004[a]) found a significantly positive effect of "comparison income" on life satisfaction in Russia, evidence in favour of the "tunnel effect" operating in a volatile and unstable economic and political environment. In a similar vein, Senik (2004[b]) finds that this positive "cognitive" effect holds for another 6 Eastern-European countries in economic transition, in contrast to the rest 14 Western-European countries where "relative deprivation" dominates social comparisons.

A second strand in which social comparisons can exert positive cognitive effects on well-being is the theory of "Social Capital" (Ravallion and Lokshin, 2005). Pioneering work in this field is again initiated by Hirschman (1958) and recently there has been an increased interest in examining social capital as a determinant of economic development (The World Bank, 1997; 2000). In this view, rises in peer income can exert a positive externality to individual well-being, in the form of an "*increased security effect*". Thus, a gain is derived from the help that people in need can receive from better off friends, relatives or neighbours. This requires a community whose members support each other so that friends and neighbours are viewed as part of an individual's "social capital". Ravallion and Lokshin (2005) describe such a society as a "Moral Economy". They make this concept operational by setting up a model of interdependent preferences with risk sharing, applicable to underdeveloped / developing countries. The empirical

evidence from Malawi reveals a positive effect of the income of friends and neighbours on individual well-being.

This paper examines if there is a potential conflict in the way people of different personal financial circumstances view their peers and provides empirical evidence and reveals the existence of a positive transitory comparison effect which dominates the permanent “relative deprivation” effect on job satisfaction of employees in financial strain.

### 3. Methodology

#### 3.1 The Data

This study uses the first 11 waves of the British Household Panel Survey<sup>4</sup> (1991-2001) to examine the effect of social comparisons on job satisfaction. It utilizes a nationally representative household survey which provides information on individual job satisfaction, earnings and various demographic and socioeconomic characteristics. The sample is an unbalanced panel of 11,913 individuals in paid employment, aged between 20 and 60 at the time of the interview<sup>5</sup>, aggregating to a total of 51,653 observations. The sample<sup>6</sup> has a balanced gender representation, with 49.69% men and 50.31% women. The individual average statistical life in the sample is 4.34 years.

The measure of individual job satisfaction is derived from the following question: “Overall, how satisfied are you with your job as a whole?” The answers range from 1 indicating complete dissatisfaction to 7 indicating complete satisfaction.

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<sup>4</sup> The data were made available through the ESRC Data Archive. The data was originally collected by the ESRC Research Centre on Micro-social Change, at the University of Essex. The original collectors of the data, the Data Archive and the affiliated institutions bear no responsibility for the analyses or interpretations presented here.

<sup>5</sup> A previous version of this paper utilized a sample of employees aged 16-65. A referee pointed out to us that for the groups closer to the school leaving age and close to retirement, backward looking comparisons and forward-looking expectations are of lesser importance, respectively.

<sup>6</sup> The descriptive statistics is given in [Table 1](#).

Subjective variables have been treated with suspicion by economists on the grounds that they are likely to measure what people say, rather than what they do or even feel (Bertrand and Mullainathan, 2004). Furthermore, since the job satisfaction variable is of an ordinal nature individuals may “anchor” their scale of response at different levels (Winkelmann and Winkelmann, 2002). This could render inter-individual comparisons of satisfaction responses meaningless. However, significant positive correlations have been found between satisfaction responses and emotional expressions as well as brain activity. Ferrer-i- Carbonell and Frijters (2004) review this evidence and point out that satisfaction responses are predictive of human behaviour, meaning that individuals will not continue doing an activity from which they obtain dissatisfaction. It seems likely that no one is better able to assess and evaluate one’s circumstances than the person herself. Regarding interpersonal ordinal comparability, evidence in van Praag (1991) indicated that members of the same language community translate verbal labels in a context-free framework into similar numerical values. Thus, the meanings of “good” and “bad” appear to be the same and most importantly, respondents judge the equivalence between these verbal labels and a numerical scale in a similar way. Furthermore, psychological evidence (Sandvik et al., 1993; Diener and Lucas, 1999) indicates individuals somehow accurately predict satisfaction levels of others – even from different cultural communities – from pictures and videos.

The motivation of this study is straightforward. Empirical findings suggest the dominance of positive cognitive effects in income comparisons when the general economic environment is uncertain, and the dominance of relative deprivation in western societies. This study examines whether it is the individual-specific financial circumstances, rather than the general environment that determine the direction of the comparison effect on satisfaction with work. Thus, two methodological issues are of primary importance for this study. The first is the identification of individual-specific financial circumstances and the second is the definition of the earnings of the reference group. Individual financial circumstances will determine the separation of the sample into

financially “rich” and “poor” segments. Several disaggregating criteria have been utilized in the poverty and low-pay literature, all having debatable validity arising from issues of precision and other methodological flaws. Of great importance are considerations about the regional and/or relative nature of poverty. Furthermore, any custom definition of low-pay<sup>7</sup> in the BHPS generated samples where more than 75% of the low-paid employees are women and more than 90% are part-time employees (Leontaridi and Sloane, 2003; Manning and Petrangolo, 2003; Diaz-Serrano and Vieira, 2005).

In order to refrain from the debates on definition, and the regional nature of low-pay employment, this study introduces the use of financial vulnerability indicators and defines two sub-groups of the employed population; the “*financially vulnerable*” and the “*financially sound*”. The financial vulnerability variable is derived from the question: “*Overall, how would you characterize your financial situation in the current year*”? Responses vary from 1 to 5, translating into the respective labels: “*Finding it very difficult*”, “*Finding it difficult*”, “*Just about getting by*”, “*Doing alright*” and “*Living comfortably*”. Thus, the financially vulnerable are defined as individuals who reply less than or equal to 3, *i.e.* less than “*just about getting by*”. Financially sound are considered to be those in the highest two categories. As Table 2 indicates this definition classifies about 30% of the observations as *financially vulnerable*. This percentage is very similar to that obtained by any typical definition of low-pay. The important difference is that the two sub-groups have very similar and balanced representation in terms of gender, age and part-time status, in contrast to any other typical definition (Table 1). Financial vulnerability indicators have previously been used by Ravallion & Lokshin (2000) in studying financial satisfaction and preferences for redistribution and Lydon & Chevalier (2002). Hamermesh (2001) warns against regressing subjective variables against each other. It is also likely that the assessment of the financial vulnerability is correlated with own earnings, giving

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<sup>7</sup> Typical definitions of low pay examined and not presented here are the two thirds of the median threshold, the mean of yearly or average lifetime earnings by region. Theodossiou (1998) defines the employed population under low pay as those belonging to the last three deciles of the earnings distribution.

rise to issues of multicollinearity in the satisfaction regression. However, Table 3 indicates that there is enough variation in the relationship between objective earnings centiles and subjective assessments of financial circumstances<sup>8</sup>. Furthermore, the pairwise correlation coefficient between the assessment of the financial situation and the earnings variable is 0.217 and 0.146 with the job satisfaction variable.

The use of the financial vulnerability variable has a number of advantages for this study. In line with the aspiration level theory, it is assumed that workers view the remuneration of their work as a measure of financial power, evaluating the extent to which their earnings satisfy their financial needs. In this perspective, earnings affect utility from work according to one's financial needs and to the extent that these are satisfied. This is in accordance with Weiss's (2002) definition of job satisfaction and the Levy-Garboua & Montmarquette's (1997) explanation of job satisfaction as posterior affirmation. Table 3 indicates that there is no paradox in job satisfaction between the financially vulnerable and the financially secure employees.

### 3.2 The hypothesis

As discussed above this study diverges from the view that "relative deprivation" dominates social comparisons in western societies, while positive cognitive effects are dominant in environments with economic uncertainty. It first proposes the decomposition of the effect of comparison earnings into a permanent affective and a positive cognitive effect. Second, it examines issues of dominance of the two effects on job satisfaction, springing from the individual financial circumstances. Attitudinal responses exhibit an affective and a cognitive component. With respect to job satisfaction, the affective component is related to the extent to which one finds his or her job enriching or rewarding. The cognitive component is related with the fulfillment of aspirations. In the context of this study it is assumed that earnings comparisons affect the formation of job

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<sup>8</sup> The distribution is similar when earnings centiles are defined by major geographical area.

satisfaction through both the affective and the cognitive channel. Reference earnings can be thought to influence the affective component depending on how, in general, one feels about his or her peers. Their effect through the cognitive component and its magnitude are determined by individual-specific circumstances at any point in time. In this context, job satisfaction is assumed to be a relative concept.

Formally, following Senik (2004[b]), the function for utility from work is defined as:

$$JS_{i,t} = f[W_{i,t}, E(W_{i,t+1}), \bar{W}_i] \quad (1)$$

where:  $JS_{it}$  indicates job satisfaction at time  $t$ ,  $W_{it}$  is the employee's current wage,  $E(W_{it})$  is the expectation of one's wage and  $\bar{W}_i$  is the earnings of the reference group. The key term is the individual's expectations. While it is expected that  $\frac{dJS}{dW} > 0$  and  $\frac{dJS}{dE(W)} > 0$ , it is the sign of  $\frac{dJS}{d\bar{W}}$  that is ambiguous. That is because the expectation of one's wage entails uncertainty part of which is assumed to be resolved by observing the evolution of reference group income *inter alia*. Thus:

$$E(W) = g(\bar{W}) \quad (2)$$

and the total effect of reference earnings is:

$$\frac{dJS}{d\bar{W}} = \frac{\partial f}{\partial \bar{W}} + \frac{\partial f}{\partial E(W)} \frac{\partial g}{\partial \bar{W}} \quad (3)$$

The sign of the first term in (3) is expected to be negative, based on the notion of the "quest for status" in western societies. The sign of the second term is ambiguous. It depends on how the individual feels about the members of her reference group in a particular point in time, on individual circumstances at that time and on how the individual interprets the evolution of the earnings of his or her peers when forming own expectations about own income path.

This study examines the signs and the relative magnitude of the effects of these two terms. It furthermore tests the hypothesis that ratio of the two effects is significantly different between groups of employees experiencing financial vulnerability and those living in financial comfort. The intuition regarding this hypothesis is that relative deprivation dominates interpersonal comparisons for financially sound employees, while the informational content of such comparisons increases job satisfaction of the financially distressed. This is a positive effect that dominates the effect of “relative deprivation” in the short-run for the latter group. The two effects are isolated by decomposing the overall reference group earnings estimates into the permanent and the transitory component.

### 3.3 Obtaining reference group earnings estimates

The measure used as a proxy for the earnings of the reference group consists of the predicted values from an earnings equation on the pooled sample with year fixed effects<sup>9</sup>. Thus, a standard human capital theory (Mincer, 1958; Becker, 1964) earnings equation of the following form is estimated:

$$\ln(W_{it}) = \sum_m \delta_m X_{m,it} + \sum_{t=1}^{11} D_t + v_{it} \quad (4)$$

where;  $W_{it}$  indicates usual gross monthly earnings. Responses by individuals about their usual monthly earnings are divided by the GDP deflator<sup>10</sup> and transformed into 1991 real earnings values in pounds.  $X_m$  indicates the individual and job related characteristics,  $D_t$  are year fixed effects and  $v$  is the error term.

Table 4 reports the specification and the estimation results for equation (4). Usual hours of work are not included in the specification to avoid multicollinearity in job satisfaction equations, but it also implies that individuals compare their earnings, but not their hours of work (Layard, 2003). The specification follows

<sup>9</sup> Predicted values from separate cross-sectional earnings equations were also obtained from cross-sectional earnings equations. Results and conclusions were not different from the ones presented here when this measure was used to reflect comparison group earnings in job satisfaction equations.

<sup>10</sup> [World Development Indicators \(2005\)](#)

closely Clark & Oswald (1996). It includes more explanatory variables than the satisfaction equation to avoid perfect multicollinearity when income and all of its statistical determinants are included. The use of predicted values from earnings equations to approximate for comparison income is common in the literature. These are sought to approximate the level of earnings an individual should expect to earn given his or her personal and human capital characteristics. Drakopoulos & Theodossiou (1997) refer to this approximation as an attempt to capture the “concept of a benchmarking” *i.e.* the individual “subjective target income”. However, Manski (1993) questions the prospect of individuals forecasting wage in the same manner econometricians do. This view is in line with Tobin (1980) and Okun (1981) and is also discussed in McAvinchey & Mavromaras (2004). Several alternatives have been utilized to approximate the earnings of reference, including comparisons to the standard of living of parents when they were at the current age of the respondent (McBride, 2001), average income defined by age, education and region cells (Ferrer-i-Carbonell, 2005). However, since the external norm of comparison is a subjective and individual-specific notion, usual data constraints force the researchers to seek the best available proxy. This is also the case in point here.

### **3.4 The Specification and Estimation Procedure**

The microeconomic analysis of job satisfaction is initially based on two specifications aimed at depicting the effects of norms related to earnings. The specifications are based on the state of the knowledge in the current literature subject to the data limitations. The first specification is the simplest variant of the standard theory with own income, hours of work and a vector of personal and work related characteristics. In view of the concavity assumption of utility in income the earnings variable is included as a logarithm. The empirical evidence so far indicates a significantly positive effect of income on job satisfaction, but not of a large magnitude. The second specification introduces the earnings of the reference group and is of primary interest. So far job satisfaction studies which take into account some form of reference group earnings have indicated a

negative relationship between peer wages and individual job satisfaction. In cases where a non-significant or positive relationship appeared for sub-groups or the population as a whole, this is attributed to misspecification or to the inappropriateness of the measure used to capture the earnings of the reference group.

Job satisfaction is an ordered categorical variable. Hence, ordered probit models (Zavoiva and McKelvey, 1975) are estimated. In this framework, there is a latent probability of reporting a job satisfaction level (JS). This can be described as:

$$JS_{it}^* = \sum_1^{11} D_t + \sum_j a_j Z_{ij,t} + \varepsilon_{it} \quad (5)$$

where  $JS^*$  is the unobserved utility from work,  $Z_{it}$  is a vector of exogenous personal and work related characteristics,  $\delta_j$  is the vector of coefficients to be estimated, and  $\alpha_t$  indicates year fixed effects. Then the reported job satisfaction levels can be described as:

$$JS = \begin{cases} 1, & \text{if } JS^* \leq \mu_1 \\ 1, & \text{if } \mu_1 \leq JS^* \leq \mu_2 \\ \dots & \\ 7, & \text{if } \mu_6 \leq JS^* \end{cases}$$

where;  $\mu_1 \dots \mu_6$  are the cut-off points for the latent variable, unknown parameters to be estimated along with  $\delta^{11}$ . Furthermore, in the above model  $\varepsilon_{it} \sim \text{IN}(0, \sigma_\varepsilon^2)$ , independent of  $Z_{it}$  for all  $i, t$ .

In the specifications a decomposition for several continuous variables is utilised, by including both their average value per individual and their annual values. In the context of discrete choice models with random effects, this transformation is

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<sup>11</sup> [Greene](#) (2003), section 21.8, p.736

known as Mundlak's (1978) version of Chamberlain's (1980) assumption<sup>12</sup>. This is a variant of random effects models introducing fixed effects for continuous variables that are assumed to be correlated with the individual unobserved characteristics (van Praag, *et al.*, 2003; Ferrer-i-Carbonell & van Praag, 2003; Ferrer-i-Carbonell, 2005). Senik (2004[a]) also introduces this decomposition in the context of the pooled ordered probit model<sup>13</sup>. The justification in its use is that changes in some of the variables will not have an immediate full extent effect on job satisfaction. Thus, this specification offers an intuitive interpretation for the adaptation process taking place as a response to the change of variables like earnings, reference earnings and hours of work.

Hence, equation (5) is rewritten as:

$$JS_{it} = a_Y Y_{it} + \beta_Y \bar{Y}_i + a_G G_{it} + D_i + \varepsilon_{it} \quad (6)$$

where Y is a vector containing continuous variables in a logarithmic form, including own earnings, normal weekly hours of work, paid overtime hours, and number of children. In the second specification, reference earnings are also included in the Y vector. The second term in the right-hand side contains the average value per individual of the variables in Y, over the sample lifetime. Vector G includes personal and job characteristics in the form of dummy variables. Further manipulation of (6) leads into:

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<sup>12</sup> Wooldridge (2002), 11.5 and 13.8.2, p.328 and p.405

<sup>13</sup> Taking advantage of the panel structure of the dataset, the models could alternatively be estimated with the inclusion of individual random effects accounting for unobserved individual heterogeneity, constant across time and uncorrelated by structure with the rest of the explanatory variables. It is considered appropriate to utilise the pooled model and present bootstrapped standard errors for the specifications with reference group earnings, since this is derived from a first stage regression. Bootstrapping standard errors in the context of a random effects ordered probit model is yet computationally unfeasible in terms of the time needed. All specifications presented in the following section have also been estimated in models with random effects. None of the conclusions in this paper is affected when the latter model is used. Results are available upon request.

$$JS_{it} = a_Y(Y_{it} - \bar{Y}_i) + (a_Y + \beta_Y)\bar{Y}_i + a_G G_{it} + D_t + \varepsilon_{it} \quad (7)$$

Equation (7) splits the effect of the selected continuous variables into a permanent (between individuals) effect equal to (a+b) and a temporary (within individuals) effect, equal to a.

At the end of the next section the robustness of the findings and some extensions are examined by estimating the model of the second specification for separate groups of interest.

### 3. Empirical Results & Discussion

Table 5 presents the results for the estimated baseline job satisfaction probit model. The estimated coefficients<sup>14</sup> and standard errors corrected for heterogeneity are presented, clustered on the individual level to correct for fixed effects<sup>15</sup>. The full estimation results are presented only for the full specification. For the remaining specifications only the results on income variables are reported for space considerations. Three sets of results are presented, for the full sample of employees and then separately for the financially vulnerable and the financially sound (Columns 2 and 3, respectively). The null hypothesis that the financially vulnerable and the financially sound employees have the same job satisfaction equations is rejected. The likelihood ratio test using the column 1 (restricted model) and columns 2 and 3 (unrestricted models) gives a value of 388.8. The 5% level of significance for  $\chi^2(60)$  is 55.8. Hence, the financially vulnerable and the financially sound employees appear to have different job satisfaction equations.

In general, the results are consistent with the literature regarding the determinants of job satisfaction in Britain. Female employees are much more

<sup>14</sup> In the ordered probit model, the direction of the effect on the probabilities  $P(JS=7)$  and  $P(JS=1)$  is unambiguously determined by the sign of the coefficients. This sign does not always determine the direction of the effect for the intermediate outcomes (Wooldridge, 2002, p. 506).

<sup>15</sup> Wooldridge (2002), 11.5 and 13.8.2, p.328,

satisfied with their jobs compared to men, in accordance with the empirical observation of the so called Anglo-Saxon paradox. The effect is higher among the financially vulnerable employees. Job satisfaction is U-shaped in age with a minimum around the age of thirty-four. Part-time employees are more satisfied with their work, and the result is twice as large for the financially sound group as for the financially vulnerable. However, this may be an outcome of self-selection into part-time work since one could guess that compared to the financially vulnerable, financially sound individuals would be happier to take up part-time jobs as family income compensates for the loss in earnings entailed by the part-time status. In line with the education paradox (Clark and Oswald (1996)), it is found that less educated people derive higher satisfaction from their jobs compared to their more educated counterparts. Furthermore, unskilled workers appear to be more satisfied with their jobs, compared to the skilled-group. Both effects are larger for the financially vulnerable group. Overall, healthy people are much more satisfied with their job and whites appear to be more satisfied compared to other races. With respect to industry, regional and year fixed effects, workers in agriculture (reference group) are the most satisfied employees, workers in London are the least satisfied *ceteris paribus*, and a negative trend in job satisfaction is prevalent in all years after 1991.

Wages are generally considered to have a positive impact on job satisfaction<sup>16</sup>. However, several studies argue that relative wages matter most, while own earnings are of secondary importance or even exert insignificant effect on job satisfaction. In Table 5, the wage effect is split into a permanent and a transitory component. Interestingly, the results indicate that a higher transitory wage has a significantly positive effect on job satisfaction. However, the permanent wage over the sample lifetime exhibits a significantly negative effect, almost equal in magnitude to the opposite transitory wage effect. A significantly negative

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<sup>16</sup> Following most of the relevant literature in this area, this study does not consider issues of endogeneity in the job satisfaction-wage or job satisfaction-hours of work relationship. The literature abstracts from this issue, since taking into account the endogeneity of wages or hours of work in the job satisfaction equations raises a number of difficulties associated with the *ad hoc* choice of identifying restrictions upon which the results might be sensitive. Notable exceptions are Lydon and Chevalier (2002), Pouliakas and Theodossiou (2004) and McAvinchey and Mavromaras (2004).

permanent wage effect on job satisfaction has been also reported for Britain and Denmark, in a study using ECHP data (*EPICURUS* Project Conventional Report, 2004). This effect can be attributed to high marginal tax rates. However, these are relatively low in Britain (25%) compared to Denmark. A more appropriate justification for the nature of this between groups effect might be related to the well-documented relatively low job satisfaction of the high-paid employees in the United Kingdom. It appears that it is the “shock effect” of an increase in transitory earnings that raises job satisfaction, rather than the “level effect” of permanent earnings. The transitory “shock effect” raises expectations about the trend of future earnings more than the path of the actual earnings. Individuals soon adjust their lifestyle to the level of actual earnings which fall short of their exuberant expectations. Hence, low-paid workers report higher job satisfaction than their high paid counterparts as they form disproportionately less enthusiastic expectations than the high paid workers. The opposite picture emerges for the usual hours per week variable. An increase in the hours of work has a significantly negative effect on job satisfaction. This effect is opposite and similar in magnitude on average to that of increases in own earnings for the financially sound group. The effect is smaller in magnitude compared to that for the financially vulnerable. The between groups effect of work hours indicates that *ceteris paribus*, people who work more hours on average are more satisfied with their jobs. Interestingly, rises in paid overtime hours exhibit a positive influence on workers’ job satisfaction in all models.

The expected job satisfaction of the representative financially vulnerable and financially sound individual is equal to  $-1.372$  and  $-0.399$  respectively. Both of these fall between the cut off points 5 and 6, corresponding to the category 6 on the original scale from 1 to 7. In terms of the composition of expected job satisfaction, the two income terms are the strongest predictors of job satisfaction among all included variables (with the exception of the age variable). Their respective effects on job satisfaction are almost equal in opposite directions. This implies that the two effects cancel out in the long run. Thus, while a rise in earnings increases job satisfaction in the short run, it also increases expectations

about future earnings more than proportionately. As people adapt to the new level of higher earnings actual perceptions about the level of earnings fall short of the formed expectations and hence job satisfaction declines.

Table 6 introduces the second specification, including the estimated earnings of the reference group. In this specification the standard errors are bootstrapped, since reference earnings are the outcome of an initial regression. The effect of the earnings of the reference group is split into a permanent (level) and a transitory (shock) component. The motivation for this decomposition is that observation of “peer” earnings has two effects on job satisfaction. The first - a “permanent effect” - depends on how one feels about his or her peers earnings *ceteris paribus*. The second - a “transitory effect” - depends on the environment, the timing and the particular situation of the individual. The former approximates the general “level” of reference norm- a status effect - and it is an average in the sample lifespan, while the second indicates short-run effects arising from the evolution of reference earnings of people with the exact same characteristics. Results in Table 6 reveal two opposite effects. The level of comparison earnings over the sample life span exhibits a significantly negative effect, in line with the theory of “relative deprivation”. Its coefficient is -0.296 for the whole sample and the t-statistic  $\frac{a_1 - a_2}{\sqrt{\sigma_{a_1}^2 - \sigma_{a_2}^2}}$  indicates that the difference in the coefficients between the

financially vulnerable and the financially sound sub-groups is not statistically significant. However, the transitory effect of reference earnings on job satisfaction is significantly positive. For the whole sample of the employed individuals in column 1 this effect is smaller in magnitude compared to the negative permanent effect.

Separate estimations for the sub-samples of financially vulnerable and financially sound individuals reveal an interesting pattern concerning the decomposition of the effect of reference earnings. For the financially vulnerable sub-sample, the “shock” effect of reference earnings is 1.62 times higher than the negative permanent between-groups effect. For individuals in a financially vulnerable

situation, this may be interpreted as the dominance of the informational content of reference earnings at a point in time over general feelings of envy drawn from earnings comparisons among peers. This interpretation is supported by the results in column 3 for the financially sound sub-sample. For this group the transitory effect of the reference earnings on job satisfaction is again positive but 0.53 times the permanent negative effect. The difference in the two transitory reference wage coefficients between the two groups is statistically significant at the 5% level. Thus, the positive cognitive effect of reference earnings is relatively more important for the financially vulnerable group. This comparison effect is about four times higher than that of the own income effect for the financially vulnerable but only 1.37 for the financially sound. Thus, while relative deprivation is the dominant state in social comparisons for the latter group, the positive cognitive effect is dominant for the former.

An increase in the earnings of the reference group appears to two effects. The “shock” effect provides information to the individual about his or her prospects in the near future. The “level” effect determines the permanent level of reference. While individuals obtain satisfaction from the former effect in the short-run, if their formed high expectations are not met the permanent rise in their reference earnings norm reduces their job satisfaction in the long-run, as they adapt to their new circumstances. The shock effect is higher for the financially vulnerable. For this specification, the financially vulnerable representative individual has an expected job satisfaction of -0.721 and the financially sound -0.752. The effects of variables that are likely to be correlated with the reference earnings, such as gender, education, age and occupation are virtually the same in Tables 5 and 6. The coefficients of own earnings and hours of work are somewhat changed in magnitude, which indicates as expected that these two terms are correlated with the reference earnings variable<sup>17</sup>.

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<sup>17</sup> The correlation between the three variables affects the magnitude, but not the nature of the results and conclusions in this study. Several alternative specifications have been tried but the results did not alter the nature of the above findings. These specifications excluded earnings and hours of work from the job satisfaction equations with reference income, included hours of

One could argue that the measure used to capture the reference earnings is an alternative expression of own income, which will exhibit a positive coefficient if observed earnings are contaminated with measurement error. As a robustness check for the informational content of this measure, a number of models are estimated in order to examine if the effect of the measure used to capture the reference earnings is consistent with intuition in a number of sample disaggregations. All specifications have the same independent variables with the specification reported in Table 6. The results of this exercise are reported in Table 7. Panel A of Table 7 reports the results of a regression for two working population sub-groups, one with earnings tied to an incremental scale<sup>18</sup> and one without. Results indicate that the cognitive impact of reference income vanishes for those whose pay is set via an incremental scale. Importantly, the negative permanent impact of the earnings of the reference group remains. These effects hold for both the financially vulnerable and financially sound. The positive transitory effect of reference earnings is again higher for the financially vulnerable whose pay does not tie to an incremental scale. This supports the proposition that individuals utilise the information provided by the evolution of the earnings of their reference group to form expectations about their own future. This information effect vanishes when there is certainty about the evolution of one's earnings path.

Furthermore, Senik (2004[a]) argues that the information effect should be stronger for the young, as they have more time to seize job opportunities and the most to gain from information. Panel B examines this argument by estimating the regressions separately for people younger than 35 years of age and for the older. Indeed the cognitive effect is higher in magnitude for the young compared to the old for the sample overall. The ratio of the within to the between effect is greater than one for the young group and less than one for the older group. Results vary

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work in the earnings equation etc. Finally, regressions without the decomposition, using the levels of the variables only, render a significantly positive comparison effect for the financially vulnerable and a significantly negative comparison effect of smaller magnitude for the financially sound. The effect is statistically insignificant for the whole sample.

<sup>18</sup> The correlation coefficient between type of pay (incremental scale) and financial vulnerability is -0.098.

with respect to the financially vulnerable and the financially sound group. In general the pattern is that cognition has a higher impact in the former whereas the affection effect influences more the latter.

Another argument of interest is that the effect of “relative deprivation” is asymmetric and upward-looking (Duesenberry (1949), Höllander (2001)). Ferreri-Carbonell (2005) presents evidence from subjective well-being equations in Germany in support of this argument. In contrast, McBride (2001) indicates “relative deprivation” effects are stronger for people with high income. Easterlin (1974) shows that the effects of internal and external income norms are present in all groups and at all income levels. Theodossiou and Drakopoulos (1997) claim that people earning above their reference group have different priority-setting mechanisms compared to those earning below. In Panel C of Table 7, the model is also estimated for employees who earn more and for those who earn less than or equal to their reference group. It is found that the ratios of within-to-between group effects of reference earnings are greater than unity only for the groups earning less than their reference group, overall and in both financial situations. The negative permanent comparison effect is much higher in magnitude for people earning more than their reference group. These results support McBride’s (2001) finding using U.S. data that the negative income comparison effect on well-being is stronger for the high-income earners compared to the remainder. This could indicate a different priority-setting behaviour for those earning below their norm of reference compared to those having achieved or surpassed the earnings of the “relative others”. In terms of the terminology in Akerlof and Kranton (2000), a status - seeking pattern emerges for those earnings more than their “peers”, while a rather more “conformist” pattern prevails for those who have not surpassed their “norm of reference”.

Panel D further examines the effects for individuals who are not highly satisfied with their job security and for those who are. Results indicate that the cognitive positive transitory impact of reference earnings is higher for the groups with low

job security. For the financially sound group the cognitive impact of reference earnings is insignificant, regardless of whether the job provides job security.

Finally, Panels (E) and (F) in Table 7 examine some more specific “social capital” considerations regarding the earnings of the reference group namely, whether there are potential uncertainty reducing effects arising from peer earnings comparisons. It should be noted that it is rather unlikely that “decreased uncertainty” effects can arise from the expectation of help from colleagues in times of own hardship. It is more likely that in such times people will seek for help from friends or relatives. Two questions available in the BHPS are used. The first, available from Wave 6 requires individuals to respond to the question: *“Is there someone out of the household you can borrow money from”*? The second question is: *“Do you have anyone who can help in a time of crisis”*?<sup>19</sup> The results do not accord well and in some cases oppose the expected relationships from social capital considerations. This similarity of the effects of reference earnings on the job satisfaction for the two groups is interpreted as evidence in support of the argument that the evolution of the earnings of the reference group has a transitory informational impact which is higher and dominant in times of uncertainty.

## 5. Conclusions

This paper presented empirical evidence in support of the hypothesis that the reference group earnings exhibit a dual impact on job satisfaction. The empirical analysis utilized the sub-sample of employed individuals from the first 11 waves of a large British micro-paned household survey dataset (BHPS). The approach used to explore the nature of relative earnings originates from the standard approach (Clark & Oswald, 1996). It distinguishes between financially vulnerable and financially sound employed individuals. The two sub-groups are defined according to the way individuals themselves evaluate their current financial situation in a given year. Furthermore, following Senik (2004[a]; 2004[b]) the

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<sup>19</sup> This question is transformed into a binary variable, coded 1 if people respond they have more than one such person.

impact of the earnings of the reference group is separated into a “level” and a “shock” component in the nature of earnings comparisons. The former has an impact on the “affective” component of job satisfaction, while the latter affects the “cognitive” component. The contribution of this study at the subjective well-being literature is a twofold. It adheres to the empirical literature on the role of interdependent preferences on individual well being at work. It reviews the literature on the nature and the direction of the effect of reference earnings on job satisfaction and subjective well-being and proposes the dual nature of earnings comparisons. So far, the prevalence of the tunnel effect has been documented in countries where the majority of the population lives in poverty and/or in an unstable economic environment. Although this is justified as an information effect it induces interpretations of an ascetic lifestyle on average in certain countries, in the Stoic sense. This study suggests that “tunnel effects” can exist among the working population in countries where the economic environment is stable. It is the individual financial circumstances that entail distress and uncertainty about the future. To the knowledge of the authors this is the first study that proposes the presence of two opposite effects of significant magnitude from earnings comparisons to job satisfaction within a western society.

The results indicate that the cognitive impact on job satisfaction from social comparisons is higher for the financially vulnerable. The nature of this informational effect is supported by the finding that the cognitive effect is insignificant for employees whose wage path is set on an annual incremental scale. Further specification tests support the view that the effect of relative deprivation is higher among the group earning more than their norm of reference. This reinforces the argument that affective comparisons are more of a status-seeking phenomenon, rather than upward looking.

A significant positive cognitive impact in social comparisons among the financially distressed can give rise to policy arguments related to group psychology. Although the evidence presented in this paper is tentative, it can give rise to discussion about the treatment of poverty – financial strain as a group

phenomenon, rather than as an individual-specific case. It further suggests job satisfaction is a relative concept.

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Appendix:**Table 1: Sample Descriptive Statistics**

	All Employed	Financially Vulnerable	Financially Sound
Number of individuals	11,913	6,536	9,711
Number of observations	51,653	16,125	35,528
Average Job Satisfaction	5.34 (1.35)	5.08 (1.49)	5.45 (1.26)
Average Real Gross Earnings (1991)	1,098.8 (787.5)	898.6 (536.6)	1,189.7 (862.8)
% Above Reference Earnings	51.80%	44.82%	54.97%
% Below Reference Earnings	48.20%	55.18%	45.03%
<i>Job Characteristics</i>			
% Full-time	85.41%	82.89%	86.55%
% Part-time	14.59%	17.11%	13.55%
% Skilled non-manual	35.34%	28.75%	38.33%
% Skilled manual	11.76%	10.12%	12.50%
% Unskilled non-manual	36.16%	39.36%	34.70%
% Unskilled manual	16.74%	21.77%	14.46%
% Permanent Contract	94.69%	92.83%	95.54%
% Temporary Contract	5.31%	7.17%	4.46%
<i>Individual Characteristics</i>			
% Male	49.69%	48.29%	49.56%
% Female	50.31%	51.71%	50.44%
Average Age	37.7 (10.59)	37.5 (10.42)	37.7 (10.67)
% Age 20-29	27.20%	26.56%	27.49%
% Age 30-39	30.27%	31.26%	29.82%
% Age 40-49	25.66%	26.72%	25.18%
% Age 50-59	16.87%	15.46%	17.52%
% Education: "Graduate degree"	2.81%	1.56%	3.38%
% Education: "College degree"	12.72%	9.79%	14.05%
% Education: "Teaching, A-level, O-level"	58.30%	55.65%	59.51%
% Education: "CSE"	6.03%	6.87%	5.65%
% Education: "None of the above"	20.14%	26.14%	17.42%

**Table 2: Sample Separation, Descriptive Statistics**

Wave	No. of Individuals	% of the sample		Average Real Earnings		Average Job Satisfaction	
		Financially Sound	Financially Vulnerable	Financially Sound	Financially Vulnerable	Financially Sound	Financially Vulnerable
1	4,157	62.62%	37.38%	1,148.0 <sup>[a]</sup>	871.1	5.56 <sup>[a]</sup>	5.22
2	3,872	63.20%	36.80%	1,183.4 <sup>[a]</sup>	881.8	5.53 <sup>[a]</sup>	5.29
3	3,715	64.66%	35.34%	1,179.6 <sup>[a]</sup>	878.0	5.48 <sup>[a]</sup>	5.13
4	3,815	66.40%	33.60%	1,186.1 <sup>[a]</sup>	898.5	5.42 <sup>[a]</sup>	5.05
5	3,795	66.48%	33.52%	1,187.0 <sup>[a]</sup>	917.8	5.42 <sup>[a]</sup>	5.06
6	3,975	70.69%	29.31%	1,187.1 <sup>[a]</sup>	903.7	5.44 <sup>[a]</sup>	5.07
7	4,537	71.81%	28.19%	1,172.1 <sup>[a]</sup>	881.5	5.50 <sup>[a]</sup>	5.09
8	4,536	72.66%	27.34%	1,181.6 <sup>[a]</sup>	891.8	5.41 <sup>[a]</sup>	5.03
9	6,376	69.84%	30.16%	1,176.6 <sup>[a]</sup>	903.9	5.38 <sup>[a]</sup>	4.99
10	6,460	69.54%	30.46%	1,217.6 <sup>[a]</sup>	915.0	5.42 <sup>[a]</sup>	5.02
11	6,415	73.44%	26.56%	1,229.8 <sup>[a]</sup>	928.7	5.47 <sup>[a]</sup>	5.01
Total	51,653	68.78%	31.22%	1,189.7 <sup>[a]</sup>	898.6	5.45 <sup>[a]</sup>	5.08

[a]: Significant differences between financially vulnerable and financially sound at the 1% level, from a two-sample t-test for earnings and a Wilcoxon Mann-Whitney rank sum non-parametric test for job satisfaction

**Table 3: The relationship between self-assessments of current financial circumstances with objective earnings centiles and job satisfaction**

	- 1 - Finding it Very Difficult	- 2 - Finding it Quite Difficult	- 3 - Just About Getting By	- 4 - Doing Alright	- 5 - Living Comfortably	Total
<i>Panel A: Real Earnings Distribution</i>						
<b>1-Low</b>	38.0%	31.6%	24.8%	18.8%	14.8%	20.04%
<b>2</b>	27.1%	24.5%	24.2%	20.1%	14.9%	19.95%
<b>3</b>	18.9%	19.6%	22.5%	20.9%	16.8%	20.02%
<b>4</b>	11.6%	14.8%	17.3%	21.8%	21.1%	19.99%
<b>5-High</b>	4.5%	9.6%	11.2%	18.3%	32.4%	20.00%
<b>Total</b>	1.51%	4.95%	24.79%	39.59%	29.17%	100.00%
<i>Panel B: Average Earnings and Job Satisfaction</i>						
<b>Average Earnings (st. dev)</b>	740.3 (432.5)	853.0 (583.7)	917.4 (530.3)	1,072.9 (784.6)	1,348.9 (936.4)	1,099.0 (787.5)
<b>Average Job Satisfaction (st. dev.)</b>	4.67 (1.87)	4.90 (1.59)	5.14 (1.44)	5.38 (1.28)	5.55 (1.23)	5.34 (1.34)
<b>% Very Satisfied</b>	44.54%	46.08%	50.88%	58.86%	65.62%	58.01%

**Table 4: Earnings Regression - OLS - Pooled Sample**

Dependent Variable: Logarithm of Real (1991) Usual Gross Monthly Earnings

	<i>Coef.</i>	<i>St. Error</i>
Age Group: 30-39	0.120	[0.007]***
Age Group: 40-49	0.136	[0.008]***
Age Group: 50-60	0.118	[0.010]***
Married/Cohabiting	0.041	[0.006]***
Male	0.196	[0.008]***
Ln(no. of kids+1)	0.004	[0.006]
Working daytime	0.013	[0.001]***
Permanent Job	0.091	[0.011]***
Pay includes bonuses	0.059	[0.005]***
Pay includes annual increments	0.014	[0.005]***
Full-time Job	0.600	[0.009]***
Trade Union at work	0.029	[0.007]***
Manager	0.146	[0.005]***
Pension member	0.139	[0.007]***
Education dummies (7)		Yes
Health dummies (5)		Yes
Establishment Size dummies (5)		Yes
Occupation dummies (78)		Yes
Industry dummies (73)		Yes
Region dummies (18)		Yes
Year fixed effects (11)		Yes
Number of Observations		49,792
Number of Individuals		11,533
R-squared		0.71

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Robust standard errors in brackets, clustering on individuals to correct for serial correlation

**Table 5: Job Satisfaction Regressions - Ordered Probit Models**

Dependent Variable: Overall Job Satisfaction (Ordinal variable, scaled 1-7)

	All Employed	Financially Vulnerable	Financially Sound	t-statistic (Vulnerable-Sound)
<i>Intra-individual Effects</i>				
Ln(Usual Monthly Earnings)	0.170 [0.024]***	0.147 [0.044]***	0.179 [0.030]***	-0.598
Ln(Normal Weekly Hours)	-0.184 [0.046]***	-0.218 [0.081]***	-0.163 [0.057]***	-0.556
Ln(Paid Overtime Hours)	0.033 [0.008]***	0.039 [0.014]***	0.028 [0.010]***	0.635
Ln(No. children+1)	0.08 [0.022]***	0.074 [0.040]*	0.078 [0.028]***	-0.082
<i>Inter-individual Effects</i>				
Mean[Ln(Usual Monthly Earnings)]	-0.188 [0.032]***	-0.173 [0.054]***	-0.202 [0.039]***	0.428
Mean[Ln(Normal Weekly Hours)]	0.182 [0.061]***	-0.024 [0.098]	0.285 [0.073]***	-2.525***
Mean[Ln(Paid Overtime Hours)]	-0.005 [0.015]	0.005 [0.022]	-0.007 [0.018]	0.413
Mean[Ln(No. children+1)]	0.076 [0.028]***	0.045 [0.047]	0.100 [0.034]***	-0.944
Financially Vulnerable	-0.298 [0.014]***	-	-	-
Male	-0.182 [0.020]***	-0.226 [0.030]***	-0.161 [0.023]***	-1.684*
Full-time job	-0.222 [0.034]***	-0.123 [0.050]**	-0.258 [0.042]***	2.048**
Age	-0.034 [0.006]***	-0.026 [0.009]***	-0.038 [0.007]***	1.121
Age squared/1000	0.493 [0.076]***	0.377 [0.118]***	0.558 [0.089]***	-1.224
<i>Job Satisfaction reaches a minimum at the age of:</i>				
Education: "Graduate degree"	0.052 [0.048]	0.176 [0.078]**	0.013 [0.054]	1.723*
Education: "Teaching, A-level, O-level"	0.153 [0.024]***	0.230 [0.038]***	0.123 [0.027]***	2.309***
Education: "CSE"	0.267 [0.042]***	0.333 [0.058]***	0.235 [0.050]***	1.274
Education: "None of the above"	0.355 [0.034]***	0.398 [0.050]***	0.339 [0.041]***	0.914
White	0.083 [0.043]*	0.116 [0.057]**	0.062 [0.052]	0.700
Excellent Health	0.239 [0.014]***	0.215 [0.025]***	0.249 [0.017]***	-1.183
Married/Cohabiting	0.022 [0.018]	0.054 [0.027]**	0.013 [0.021]	1.222
New job - new position	0.169 [0.016]***	0.14 [0.025]***	0.187 [0.020]***	-1.496
Same job - new position	0.159 [0.015]***	0.146 [0.026]***	0.165 [0.017]***	-0.624
Occupation: "Skilled Non-Manual"	0.006 [0.023]	-0.059 [0.038]	0.029 [0.026]	-1.929*
Occupation: "Unskilled Non-manual"	-0.068 [0.024]***	-0.120 [0.039]***	-0.048 [0.028]*	-1.498
Occupation: "Unskilled Manual"	-0.180 [0.030]***	-0.212 [0.046]***	-0.174 [0.034]***	-0.652
Energy & Water Supplies	-0.417 [0.096]***	-0.565 [0.141]***	-0.356 [0.108]***	-1.181
Extraction & Manufacture of Metals, Minerals & Chemicals	-0.235 [0.092]**	-0.341 [0.128]***	-0.176 [0.105]*	-0.994
Metal Goods, Engineering & Vehicles Industries	-0.374 [0.086]***	-0.485 [0.120]***	-0.314 [0.098]***	-1.109

Table 5 continued:

	Employed	Vulnerable	Sound	t-statistic
Other Manufacturing Industries	-0.356 [0.086]***	-0.433 [0.120]***	-0.309 [0.099]***	-0.800
Construction	-0.208 [0.090]**	-0.329 [0.128]**	-0.142 [0.103]	-1.135
Distribution, Hotels & Catering (Repairs)	-0.254 [0.084]***	-0.348 [0.116]***	-0.200 [0.097]**	-0.984
Transport & Communication	-0.364 [0.088]***	-0.472 [0.123]***	-0.295 [0.101]***	-1.113
Banking, Finance, Insurance & Business	-0.351 [0.085]***	-0.463 [0.119]***	-0.292 [0.097]***	-1.113
Other Services	-0.202 [0.084]**	-0.236 [0.117]**	-0.175 [0.096]*	-0.403
R. of South East	0.063 [0.035]*	0.122 [0.048]**	0.032 [0.041]	1.419
East Anglia	0.153 [0.058]***	0.178 [0.073]**	0.136 [0.074]*	0.407
South West	0.133 [0.040]***	0.155 [0.058]***	0.118 [0.047]**	0.499
West Midlands	0.062 [0.042]	0.057 [0.058]	0.066 [0.049]	-0.121
East Midlands	0.116 [0.041]***	0.073 [0.060]	0.133 [0.048]***	-0.779
Yorkshire & Humbershire	0.115 [0.043]***	0.165 [0.060]***	0.087 [0.050]*	0.989
North West	0.035 [0.040]	0.032 [0.057]	0.03 [0.047]	0.019
North	0.061 [0.049]	0.053 [0.067]	0.06 [0.056]	-0.074
Wales	0.167 [0.039]***	0.275 [0.054]***	0.104 [0.046]**	2.394**
Scotland	0.031 [0.035]	0.007 [0.051]	0.041 [0.042]	-0.509
Wave 2 - 1992	-0.049 [0.022]**	-0.002 [0.039]	-0.077 [0.029]***	1.567
Wave 3 - 1993	-0.131 [0.023]***	-0.134 [0.041]***	-0.128 [0.030]***	-0.129
Wave 4 - 1994	-0.184 [0.024]***	-0.176 [0.043]***	-0.187 [0.031]***	0.208
Wave 5 - 1995	-0.193 [0.024]***	-0.190 [0.042]***	-0.192 [0.031]***	0.047
Wave 6 - 1996	-0.184 [0.024]***	-0.185 [0.043]***	-0.182 [0.031]***	-0.069
Wave 7 - 1997	-0.163 [0.024]***	-0.190 [0.044]***	-0.149 [0.031]***	-0.753
Wave 8 - 1998	-0.241 [0.024]***	-0.238 [0.043]***	-0.244 [0.030]***	0.127
Wave 9 - 1999	-0.243 [0.024]***	-0.257 [0.042]***	-0.237 [0.030]***	-0.393
Wave 10 - 2000	-0.26 [0.024]***	-0.282 [0.041]***	-0.249 [0.030]***	-0.654
Wave 11 - 2001	-0.249 [0.024]***	-0.286 [0.042]***	-0.232 [0.030]***	-1.031
Cut-off point 1	-3.149 [0.226]***	-3.566 [0.333]***	-2.841 [0.269]***	-1.694*
Cut-off point 2	-2.730 [0.226]***	-3.132 [0.333]***	-2.431 [0.269]***	-1.636
Cut-off point 3	-2.232 [0.226]***	-2.643 [0.333]***	-1.921 [0.268]***	-1.688*
Cut-off point 4	-1.873 [0.226]***	-2.261 [0.333]***	-1.574 [0.268]***	-1.605
Cut-off point 5	-1.208 [0.226]***	-1.619 [0.333]***	-0.892 [0.268]***	-1.699*
Cut-off point 6	-0.129 [0.226]	-0.417 [0.334]	0.503 [0.268]*	-2.149**
Number of Observations	50,639	15,742	34,897	
Number of Individuals	11,713	6,411	9,552	
Log Pseudo-likelihood	-76,048.2	-25,557.5	-50,296.3	
Log Pseudo-likelihood at 1st iteration	-78,088.0	-26,297.6	-51,338.7	
Wald x2	2,082.5***	900.8***	1127.1***	

Bootstrapped standard errors in brackets – based on 1,000 replications - clustering on individuals

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 6: Job Satisfaction Regressions with Reference Earnings - Ordered Probit Models**

Dependent Variable: Overall Job Satisfaction (Ordinal variable, scaled 1-7)

	<i>All Employed</i>	<i>Financially Vulnerable</i>	<i>Financially Sound</i>	t-statistic (Vulnerable Sound)
<i>Intra-individual Effects</i>				
Ln(Usual Monthly Earnings)	0.118 [0.025]***	0.091 [0.043]**	0.127 [0.030]***	-0.678
Ln(Reference Group Earnings)	0.232 [0.038]***	0.349 [0.067]***	0.174 [0.046]***	2.150**
Ln(Normal Weekly Hours)	-0.273 [0.046]***	-0.303 [0.080]***	-0.254 [0.056]***	-0.504
Ln(Paid Overtime Hours)	0.029 [0.008]***	0.034 [0.018]*	0.022 [0.014]	0.705
Ln(No. children+1)	0.072 [0.022]***	0.063 [0.038]*	0.070 [0.028]**	-0.151
<i>Inter-individual Effects</i>				
Mean[Ln(Usual Monthly Earnings)]	-0.093 [0.031]***	-0.142 [0.054]***	-0.076 [0.038]**	-1.001
Mean[Ln(Reference Earnings)]	-0.296 [0.041]***	-0.216 [0.071]***	-0.331 [0.050]***	1.315
Mean[Ln(Normal Weekly Hours)]	0.318 [0.053]***	0.110 [0.093]	0.419 [0.064]***	-2.739***
Mean[Ln(Paid Overtime Hours)]	0.0001 [0.015]	0.017 [0.014]	-0.003 [0.010]	0.889
Mean[Ln(No. children+1)]	0.011 [0.025]***	0.052 [0.042]	0.107 [0.031]***	-1.041
Financially Vulnerable	-0.298 [0.011]***	-	-	-
Male	-0.169 [0.014]***	-0.256 [0.025]***	-0.128 [0.017]***	-4.308***
Full-time job	-0.258 [0.030]***	-0.257 [0.052]***	-0.245 [0.037]***	-0.185
Age	-0.035 [0.004]***	-0.032 [0.007]***	-0.037 [0.005]***	0.602
Age squared/1000	0.504 [0.050]***	0.441 [0.088]***	0.539 [0.060]***	-0.918
<i>Job Satisfaction reaches a minimum at the age of:</i>	34.722	36.281	34.323	
Education: "Graduate degree"	0.055 [0.031]*	0.160 [0.072]**	0.024 [0.035]	1.717*
Education: "Teaching, A-level, O-level"	0.144 [0.017]***	0.245 [0.032]***	0.104 [0.019]***	3.749***
Education: "CSE"	0.257 [0.026]***	0.350 [0.046]***	0.213 [0.032]***	2.442**
Education: "None of the above"	0.332 [0.023]***	0.428 [0.041]***	0.291 [0.028]***	2.761***
Cut-off point 1	-3.189 [0.191] ***	-2.883 [0.336]***	-3.224 [0.233]***	0.835
Cut-off point 2	-2.772 [0.191] ***	-2.451 [0.336]***	-2.817 [0.232]***	0.896
Cut-off point 3	-2.275 [0.190] ***	-1.964 [0.336]***	-2.307 [0.232]***	0.840
Cut-off point 4	-1.914 [0.190] ***	-1.579 [0.439]***	-1.958 [0.354]***	0.928
Cut-off point 5	-1.247 [0.190] ***	-0.934 [0.439]***	-1.275 [0.354]***	0.834
Cut-off point 6	0.093 [0.190]	0.271 [0.336]	0.123 [0.232]	0.362
Number of Observations	49,755	15,421	34,334	
Number of Clusters	11,526	6,290	9,418	
Log Pseudo-likelihood	-74,651.3	-25,011.4	-49,438.6	
Log Pseudo-likelihood at 1st iteration	-76,675.7	-25,755.0	-50,473.6	
Wald x2	2,077.8***	909.9***	1,127.1***	

Bootstrapped standard errors in brackets – based on 1,000 replications - clustering on individuals

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

**Table 7: Examination of the cognitive impact of transitory changes in reference earnings**

	All Employed		Financially Vulnerable		Financially Sound	
(A)	<i>Pay includes annual increments?</i>					
	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>
Log(Reference group earnings)	0.295 [0.052]***	0.003 [0.057]	0.406 [0.088]***	0.051 [0.108]	0.240 [0.064]***	-0.019 [0.068]
Mean[Log(Reference group earnings)]	-0.321 [0.055]***	-0.254 [0.062]***	-0.281 [0.092]***	-0.134 [0.114]	-0.349 [0.068]***	-0.305 [0.074]***
Observations	26,598	23,157	9,022	6,399	17,576	16,758
Log Pseudo-likelihood	-41,057.20	-33,330.40	-14,948.50	-9,936.40	-25,982.20	-23,291.80
Log Pseudo-likelihood at 1st iteration	-42,318.10	-34,207.90	-15,421.60	-10,266.90	-26,614.00	-23,798.40
(B)	<i>Older than 35 years of age?</i>					
	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>
Log(Reference group earnings)	0.231 [0.055]***	0.170 [0.054]***	0.291 [0.097]***	0.356 [0.095]***	0.202 [0.066]***	0.068 [0.066]
Mean[Log(Reference group earnings)]	-0.187 [0.059]***	-0.319 [0.057]***	-0.057 [0.103]	-0.291 [0.103]***	-0.248 [0.073]***	-0.318 [0.069]***
Observations	22,619	27,136	6,919	8,502	15,700	18,634
Log Pseudo-likelihood	-34,117.6	-40,442.3	-11,307.8	-13,661.0	-22,699.1	-26,660.9
Log Pseudo-likelihood at 1st iteration	-35,056.2	-41,570.1	-11,643.8	-14,082.6	-23,179.2	-27,264.4
(C)	<i>Own earnings greater than reference group earnings?</i>					
	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>
Log(Reference group earnings)	0.262 [0.058]***	0.217 [0.060]***	0.264 [0.095]***	0.445 [0.118]***	0.260 [0.074]***	0.145 [0.070]**
Mean[Log(Reference group earnings)]	-0.133 [0.058]**	-0.434 [0.058]***	-0.032 [0.095]	-0.450 [0.110]***	-0.190 [0.073]***	-0.427 [0.069]***
Observations	24,882	24,873	8,884	6,537	15,998	18,336
Log Pseudo-likelihood	-37,699.4	-36,847.0	-14,458.5	-10,511.4	-23,112.2	-26,230.5
Log Pseudo-likelihood at 1st iteration	-38,884.1	-37,767.1	-14,920.7	-10,828.7	-23,740.6	-26,721.4
(D)	<i>Highly satisfied with job security?</i>					
	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>
Log(Reference group earnings)	0.125 [0.072]*	0.078 [0.045]*	0.353 [0.116]***	0.049 [0.084]	-0.025 [0.093]	0.094 [0.054]*
Mean[Log(Reference group earnings)]	-0.248 [0.079]***	-0.224 [0.048]***	-0.253 [0.124]**	-0.010 [0.088]	-0.227 [0.103]**	-0.318 [0.057]***
Observations	12,672	37,083	4,804	10,617	7,868	26,466
Log Pseudo-likelihood	-21,743.8	-49,947.6	-85,36.2	-15,475.4	-13,146.2	-34,332.2
Log Pseudo-likelihood at 1st iteration	-22,295.0	-51,378.4	-87,48.4	-16,008.8	-13,439.0	-35,161.7
(E)	<i>Is there someone out of the household you can borrow money from?</i>					
	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>
Log(Reference group earnings)	0.237 [0.096]**	0.247 [0.057]***	0.397 [0.169]**	0.197 [0.109]*	0.173 [0.117]	0.270 [0.067]***
Mean[Log(Reference group earnings)]	-0.350 [0.101]***	-0.269 [0.061]***	-0.376 [0.179]**	-0.142 [0.116]	-0.370 [0.123]***	-0.327 [0.072]***
Observations	8,296	22,745	2,763	6,047	5,533	16,698
Log Pseudo-likelihood	-12,549.9	-32,702.8	-4,487.0	-9,445.5	-8,019.7	-23,176.5
Log Pseudo-likelihood at 1st iteration	-12,915.8	-33,547.1	-4,618.7	-9,725.1	-8,189.6	-23,629.1
(F)	<i>Do you have anyone who can help in a time of crisis (more than one person)?</i>					
	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>	<i>No</i>	<i>Yes</i>
Log(Reference group earnings)	0.189 [0.061]***	0.256 [0.049]***	0.332 [0.108]***	0.355 [0.087]***	0.116 [0.075]	0.210 [0.059]***
Mean[Log(Reference group earnings)]	-0.415 [0.067]***	-0.235 [0.052]***	-0.248 [0.116]**	-0.214 [0.092]**	-0.493 [0.082]***	-0.244 [0.063]***
Observations	18,785	30,970	5,776	9,645	13,009	21,325
Log Pseudo-likelihood	-28,297.9	-46,211.1	-9,316.48	-15,630.6	-18,876.6	-30,451.2
Log Pseudo-likelihood at 1st iteration	-29,188.0	-47,394.1	-9,674.83	-16,045.8	-19,370.9	-31,037.1

**Notes:**

\*: significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Bootstrapped standard errors in brackets - based on 1,000 replications - clustering on individuals

The rest of the specification is similar to that in Table 6.

Responses in panel (E) are given after wave 6