N° 9408

SATISFACTION AND COMPARISON INCOME

Andrew E. Clark
(CEPREMAP, Paris, and
ESRC Research Centre on Micro-Social Change,
Essex University)

Andrew J. Oswald
(London School of Economics)

Revised : February 1994

For their helpful comments about the literature, we thank Michael Argyle, James Banks, Ian Baxter, Dan Hamermesh and Peter Warr. Barry McCormick also kindly discussed with us his early unpublished work on GHS data, which preceded our own. Christoph Schmidt made especially good points to us. This research is primarily supported by the ESRC and the EEC. We have benefited from participants' comments in seminars at Aberdeen, Bristol, Cambridge, CEPREMAP, CREST, Dartmouth, EMRU, Essex, Glasgow, London School of Economics, the LSE Conference on the Economics and Psychology of Happiness and Fairness, Munich, Newcastle, Oxford, St Andrews and UCL. Special thanks are due to Alan

Satisfaction and Comparison Income

This paper is an attempt to test the hypothesis that utility depends on income relative to a 'comparison' or reference level. Using data on 5,000 British workers, it provides two kinds of evidence. First, workers' reported satisfaction levels are shown to be inversely related to their comparison wage rates. Second, satisfaction levels are shown to be strongly declining in the level of education. College graduates, for example, have the lowest job satisfaction, ceteris paribus. Concern for relativities seems the natural explanation for this remarkable result. More generally, the paper tries to help begin the task of constructing an economics of job satisfaction.

Satisfaction dans le travail et Salaire de Référence

Le présent article tente de tester l'hypothèse selon laquelle le bien-être individuel serait dépendant du niveau de salaire rapporté à un "salaire de référence" (concept que nous définirons au cours de cet article). Nous utilisons des données recueillies auprès de cinq mille travailleurs britanniques et nous présentons deux types de résultats: tout d'abord, l'analyse empirique fait apparaître une relation inversée entre les niveaux de satisfactions individuels dans le travail (évalués par les travailleurs eux-même) et les niveaux de salaires de référence. En second lieu, nous montrons qu'il existe une relation forte et négative entre ces niveaux de satisfaction dans le travail et le niveau d'études des travailleurs. Par exemple, les diplômés font état des niveaux de satisfaction dans le travail les plus bas. Il semblerait que l'explication naturelle de ce résultat soit que les travailleurs sont sensibles à une comparaison entre les salaires. D'une manière plus générale, cet article tente de contribuer à l'analyse économique de la satisfaction dans le travail.

Mots clefs: Satisfaction dans le travail, salaires, éducation, attentes du travail.
Keywords: Job satisfaction, wages, education, work expectations.
JEL: J28, J30, D63.

SATISFACTION AND COMPARISON INCOME

1. Introduction

One of the most controversial ideas in social science is the notion that happiness depends upon relative income. Although the terminology varies across disciplines, a common theme in the psychology, sociology and administrative science literatures is the concept of a reference level of income against which an individual compares himself or herself. When that individual's earnings fall below the comparison level, he or she feels relatively deprived, and is unhappy.

Relative deprivation theory has not made substantial inroads into the economics literature. This is presumably because economists believe that utility depends on absolute income alone. The theory has, however, generated a small number of (largely theoretical) papers and books. Writers like Easterlin (1974), Boskin and Sheshinski (1978), Layard (1980), Frank (1985) and Akerlof and Yellen (1990) argue that many of the most conventional ideas about economic policy would be overturned in an economy where relative income matters.[1] Nevertheless, the lack of empirical evidence, except of what most economists view as of a circumstantial nature[2], has kept relative deprivation[3] theory on the periphery of research in economics.

The purpose of this paper is to provide a test of the theory that happiness depends upon a comparison level of income. It does so by using new data on a random sample of workers who are asked how content they feel with their jobs. The data set thus provides self-reported levels of satisfaction. Such data are rarely used by economists, but form the basis for a large empirical literature in social psychology.[4] The paper combines these satisfaction statistics with data on comparison incomes calculated using an earnings model that is conventional in economics but is apparently unknown in the psychology literature.

A more general aim of the paper is to explore the patterns in job satisfaction data. Relative to its importance, the economics literature on workers' well-being is small. The paper attempts to begin this analysis.

The first finding of the paper is that workers' reported levels of well-being are at best weakly correlated with absolute income. Its second, and central, finding is that measures of relative and comparison income are significantly negatively correlated with reported levels of happiness at work. Comparison incomes are initially derived from a standard earnings regression model, which means that the results have one unusual feature. This is that workers' levels of well-being are explained statistically by a variable - the comparison income - that those workers themselves do not observe directly. As a check, external measures of comparison income are also examined.

The paper describes another kind of evidence for the importance of comparison effects. It dispenses with explicit measures of comparison income and looks directly at the relationship between education and reported levels of well-being. Conventional economic theory would lead most economists to predict a strong positive relationship between educational achievements and reported utilities. The data, however, show the reverse: the higher the level of education, the lower the reported satisfaction level. This is consistent with the view that utility depends on the gap between outcomes and aspirations, and that education raises aspiration targets.

Section 2 discusses the main ideas of, and historical background to, relative deprivation theory. Sections 3 and 4 estimate satisfaction equations. Section 5 concludes.

2. Relative Deprivation and Comparison Income

Define an individual's utility from working as either

$$u = u(y, h, z), \tag{1}$$

where y is income, h is hours of work, and z is a set of taste parameters, or as

$$u = u(y, y^*, h, z), \tag{2}$$

where y* is a comparison or reference income level against which the individual compares himself or herself. Equation (1) is the standard economists' model, found in every microeconomics textbook. Assume, as conventional, that utility is increasing in income, y, and decreasing in hours worked, h. Equation (2), which is closer to the theoretical models found in social psychology textbooks, assumes that utility is declining in the comparison pay level, y*. This captures an effect that can be described as relative deprivation, envy, jealousy or inequity.

Versions of equation (2) abound in social science literatures other than economics. Adams' (1963, 1965) equity theory is one prominent example; another is Runciman (1966); a third is Homans (1961).[5] Economists who have written down models like equation (2) include Akerlof and Yellen (1990), Baxter (1988), Boskin and Sheshinksi (1978), Duesenberry (1949), Gylfason and Lindbeck (1984), Hochman and Rogers (1969), Frank (1984a,b, 1985), Kapteyn and Van Herwaarden (1980), Lommerud (1989), Nickell and Andrews (1983), Oswald (1979, 1983), Pencavel (1991), Solow (1990), Scitovsky (1976), Trevithick (1976), Van de Stadt et al (1985), Veblen (1949), and Wood (1978).[6] These are greatly outweighed, however, by the conventional literature based on equation (1).

A closely related economics literature is concerned with "fairness". Survey evidence such as Kahneman, Knetsch and Thaler (1986) shows that people have strong views about fairness in economic exchange. Laboratory evidence on so-called ultimatum games (Guth *et al* 1982, Bolton 1991) suggests that individuals will throw away real income to obtain a fairer division of a smaller pie. It seems likely that decisions about fairness rest on some sort of comparative process, but the details are not well understood.

The form of test undertaken here is a simple and, in retrospect, natural one. The paper uses a microeconomic data set on individuals who report their levels of satisfaction, pay and hours of work. It calculates their 'comparison' income levels using a standard form of Mincer earnings equation. This equation provides a predicted or expected wage that is taken as a proxy for comparison income. One nested test, designed to discriminate between equations (1) and (2), is therefore to estimate directly a regression equation for equation (2). A t-test on variable y* is then the test of the null hypothesis that the conventional equation (1) is the correct specification of the utility function.

It might be argued that equation (2) would not revolutionize economics research because it merely makes explicit a variable implicit, or held constant, in equation (1). On this view, the results described later in the paper do not pose a threat to conventional economic theory, but rather add empirical detail to the structure of 'tastes'. There is something to this, but it misses the fact that a concern for relativities leads to different behavioural implications, and different policy prescriptions, than in conventional models.

A precursor to this paper is an original but comparatively little-known paper by Hamermesh (1977). The author takes a sample of American employees, covering the years 1969 and 1973, and estimates job satisfaction equations. This seems to be the earliest article of its kind in the economics literature. Although Hamermesh's focus is upon occupational choice and the effects of training, and he does not discuss - at least in any detail - ideas of relative deprivation, his regression equations include as a variable the residual from a wage equation.[7] That residual enters positively and significantly in a job satisfaction regression, which is akin to finding that y-y*, in the earlier notation, affects utility. Although designed for a different purpose, therefore, Hamermesh (1977) is the earliest study of the kind reported in this paper. A recent article by Meng (1990), using Canadian data, is related to

Hamermesh's work, although it uses a larger set of variables and focuses more on the impact of trade unions. Watson et al (1992) is in the same tradition.

Recent study of satisfaction has been done by Cappelli and Sherer (1988). They use data on approximately 600 employees working for a major US airline. Regression equations (using OLS) are estimated for two different forms of satisfaction, namely, satisfaction with pay and satisfaction with work. An outside "market wage", calculated by averaging pay for specific occupations in other airlines, is statistically significant and negative in one of the two equations reported for pay satisfaction. Moreover, it is fairly close to being of equal size but opposite in sign to the coefficient on a variable for the actual wage earned by the worker. Thus the specification is close to a pure relative wage effect. For the regression results on work satisfaction, market wages are insignificant, and change sign across different regressions. In a related paper, Cappelli and Chauvin (1991) show that relative wages help to predict actions as well as attitudes. Disciplinary layoffs in a large manufacturing company are negatively and significantly related to a plant's wage premium.

Borjas (1979) and Freeman (1978) are the other main economics papers to have used job satisfaction data. Borjas draws on a sample of men from the 1971 National Longitudinal Survey of Mature Men. He finds that satisfaction is an increasing function of wages and labour force experience, and a decreasing function of the number of children in the household and of a variable measuring poor health. Borjas's main conclusion, however, is that being a trade union member has a large and significant effect on reported job satisfaction. This effect is also found by Freeman (1978), who uses data from the US PSID and NLS. The appropriate interpretation of union variables has been the central concern of the small economics literature on job satisfaction.

3. Empirical Results on Satisfaction and Comparison Income

The data in this paper come from wave 1 of a random sample of approximately 10,000 individuals in approximately 5,500 British households. This data set, known as BHPS, has the unusual feature that it asks respondents how satisfied they are with their jobs. The data were collected in late 1991. Individuals were asked to rate their satisfaction levels with seven items: promotion prospects, total pay, relations with supervisors, job security, ability to work on their own initiative, the intrinsic nature of the work, and the hours of work. Each of these was to be given a number from one to seven, where one corresponded to "not satisfied at all", seven corresponded to "completely satisfied", and the integers from two to six represented intermediate levels of satisfaction. Individuals were then asked a final question, after they had rated their levels of contentment with the list of topics, worded as:

> "All things considered, how satisfied or dissatisfied are you with your present job overall using the same 1-7 scale?"

These answers form the basis for most of the later empirical work in the paper. The data on satisfaction with pay are used as a check on a particular hypothesis, but the main empirical analysis concerns the determinants of overall satisfaction. *The way the question was asked suggests that individuals' replies weigh up many attributes of the job package.*[8] Hence the data may approximate total well-being from work rather better than can a narrow question about job satisfaction.

This paper treats people's reported satisfaction levels as proxy utility data. Because there is almost no economic literature using such an approach, some economists are likely to worry about the credibility and robustness of an analysis that draws upon reported numbers on satisfaction. Perhaps the best defence against concern of this sort is to point to the very different attitude taken by researchers in the psychology literature. Psychologists, no less than

economists, are interested in data that contain reliable information about human behaviour. The huge literature on job satisfaction in psychology journals - though different in emphasis from the empirical results given later in the paper - is a testament to the seriousness with which research psychologists treat survey responses on feelings of well-being at work. As psychologists are likely to be more skilled than economists at judging the quality of such data, this might be thought sufficient grounds for economists to use statistics on satisfaction in their own work. More explicitly, however, the justification for studying subjective assessments of satisfaction is that they are correlated with observable events and actions. For example, there are strong correlations, in the expected direction, with the following:

(i)	Poor mental health	Warr, Clegg and Jackson, 1978 Journal of Occupational Psychology.
(ii)	Length of life	Palmore, 1969 The Gerontologist.
(iii)	Coronary heart disease	Sales and House 1971 Journal of Chronic Diseases.
(iv)	Labour turnover	McEvoy and Cascio 1985 Journal of Applied Psychology.
(v)	Absenteeism	Clegg 1983 Journal of Applied Psychology.
(vi)	Sabotage and stealing at work	Mangione and Quinn 1975 Journal of Applied Psychology.

Thus satisfaction data are not merely random numbers (though they will be measured with error).

To encourage intuition, consider an individual enjoying 'total' utility v. Write this utility function, which psychologists might term a 'life satisfaction' function, as

$$v = v(u(y, h, i, j), \mu).$$

Let u be utility from work and μ be utility from other sources and spheres of life. Therefore u(.) is a kind of sub-utility function capturing the level of well-being that the person receives from all aspects of his or her job. Define y as the income earned from the job, h as the

number of hours worked, i as a vector of person-specific characteristics, and j as a vector of job-specific characteristics. The other component of utility, μ, may be determined quite differently, and can be expected to depend on factors such as the quality of family life, friendships, the individual's health, and many personal variables outside the realm of the economist. Assuming that life utility, v, is increasing in both its arguments, economists would ideally like data on u, the utility associated with work. The job satisfaction data used in this paper, which come as summary measures after the series of questions asking individuals to consider many particular attributes of the work, may be thought of as statistics on u(y, h, i, j). These data, like most data studied by economists, are highly imperfect representations of the underlying theoretical ideal. They are grouped into several bands, are qualitative orderings rather than quantitative, and can be thought of (because individuals presumably use the numbers differently) as being measured with potentially large amounts of error.

Table 1 describes the distribution of reported satisfaction levels for the sample of 5195 British employees in the BHPS data set. The sample excludes those who are self-employed, those who are retired, and those who are younger than 16. It includes part-time workers, and covers both the public and private sectors.

Almost a third of the sample give 7 as their answer to the question asking for their overall satisfaction with the job. This is the highest possible satisfaction category, so it appears that a significant proportion of employees are very happy with their work. For reported satisfaction levels 6 to 2, the frequency of response falls monotonically. Table 1 shows that 27% of people, for example, give 6 as their answer; 19% say 5; and so on down to 2% giving their satisfaction rating as 2. The lowest category of contentment with work, 1, reveals an upturn in the frequency distribution to 3.4% of the sample.

To provide information about the correlations in the raw data, Table 2 lists a set of mean satisfaction levels for different groups in the sample. The data demonstrate that men report themselves as noticeably less satisfied than women: the mean score for men is 5.3 while for women it is 5.7. Clark (1993) explores this difference. The gender difference is significant at the 1 per cent level. People with promotion opportunities are more satisfied than those without, as are the relatively healthy. There is a strong effect from age, with some evidence of a mild U-shape, and a positive effect overall. Clark, Oswald and Warr (1993) investigate the possible causes of this age relationship. Individuals who work in small firms are 'happier' than those in big firms; union members are less happy than those who are non-union.[9] Interestingly, and perhaps unexpectedly, the highly educated (with college degrees) are no more satisfied than those with medium qualifications (A, O and nursing), who are in turn less satisfied than those with no or few qualifications (other). The paper returns to this issue at a later stage.

A primary aim of the paper is to explore the idea that it is relative income, rather than absolute income, which gives utility. Table 3 provides cross-tabulations that begin to shed light on this issue. It reveals that absolute income, y, shows no sign of being positively correlated with job satisfaction. Contrary to what a microeconomics textbook would predict, employees earning in the lowest quintile of income report mean satisfaction of 5.78, while those with income in the highest quintile report average satisfaction at 5.43. These are averages across a heterogeneous group, of course, and the presence of part-timers is particularly likely to confound the difficulty of drawing inferences. The lower half of the Table 3 moves to the male sub-sample, which should be more homogenous, and here the happiest individuals are, indeed, those in the highest income quintile. However, there is a U-

shape in income, so again the results do not fit especially well with standard theoretical preconceptions.[10]

The remainder of Table 3 examines the influence of y*. This is 'comparison income', which can be thought of as a reference level of income.[11] The variable y* is calculated by estimating a conventional earnings equation on the whole cross-section of employees, and then using this regression equation to predict an earnings level, y*, for each person. These y* levels correspond to the income of 'typical' employees of given characteristics. Someone denoted k, for example, with a college degree, working in metal manufacturing, living in London, of age 45, and in a particular occupation (and with a set of other particular characteristics), is assumed to have a predicted income, y^*_k, which he or she knows is the going rate of pay for someone like him or her. One hypothesis is that utility of person k depends on income y_k. An alternative hypothesis, though not conventional in economics, is that utility depends on the gap between y_k and y^*_k.

Counter to the spirit of the normal economics textbook, satisfaction is, according to Table 3, more strongly correlated with relative income than absolute income. Here the relative income variable is y/y*. The denominator, y*, which might be denoted 'comparison income', is the income that a typical person of given characteristics would receive. For men, for example, Table 3 reveals that average satisfaction in the lowest quintile of relative income is 5.24, whereas in the highest quintile of relative income it is 5.43. Moreover, there is a monotonic relationship. Moving through the relative income quintiles, mean satisfaction scores for men are respectively: 5.24, 5.25, 5.28, 5.35, and 5.43. Higher relative income seems to bring 'happiness'.[12]

A more systematic analysis of satisfaction data begins in Table 4. Here, and throughout the remainder of the section, the method of estimation is by ordered probit (see

Zavoina and McElvey, 1975). This allows the most efficient use of ordered qualitative data such as satisfaction scores. Broadly similar substantive findings can be produced by following the method adopted in most of the psychology literature, that is, by averaging the 1-7 satisfaction numbers and estimating OLS equations. That method, however, leads to biased and inconsistent estimates.

Column 1 of Table 4 estimates the simplest form of textbook worker utility function. It assumes that well-being depends on the level of income and the number of hours worked. The central prediction of conventional microeconomic theory is rejected: income enters with a negative rather than positive sign. Hours of work, however, do enter in the theoretically expected negative way. Psychology textbooks appear to omit this influence from discussions of job satisfaction, so this empirical result may not be known in that literature.

In the remaining columns of Table 4, extra control variables are gradually included. Five age-dummies (where the omitted category is under-20) have a monotonically rising relation with satisfaction. Men are less satisfied, ceteris paribus, than women. Finally, in column 4 of Table 4, the probit equation includes 18 regional dummies, 10 industry dummies, 3 health dummies, and 3 race dummies. The results on the other variables are robust to the addition of these thirty four dummy variables. Most significantly, income is uncorrelated with satisfaction, and hours continue to be negative and statistically significant.

Table 5 reports the earnings equation used to calculate comparison income, y*, for each individual. It has a conventional structure, so is given in compressed form. The equation has many more explanatory variables than the satisfaction equation. There are two reasons for this. First, the control variables in the satisfaction equation were chosen to be as close to exogenous as possible. They are age, gender, regional and industry dummies, and health and race dummies. Second, the long list of additional variables entering the earnings

equation might be thought of as 'identifying' the satisfaction equation. As is common in applied microeconomics, this identifying assumption - which, more strictly, is in this case a way to avoid the perfect multi-collinearity that would result from including on the right hand side of the satisfaction equation both income and all the statistical determinants of income - is open to objections. To guard against this, Section 4 of the paper employs a test for comparison and relativity effects which does not rely on using constructed y* values. It obtains the same type of conclusions. A more pragmatic counter-argument is that the results in Tables such as 6 and 7 can be shown to be robust to wide variations in the choice of variables omitted from the satisfaction equations.

Table 6 provides a statistical test of the hypothesis that worker satisfaction depends on relative rather than absolute income. As before, consecutive columns build up to a full specification, while allowing the robustness of intermediate results to be checked. Comparison income enters negatively and significantly in all specifications. Its coefficient varies from -0.22 (with a standard error of 0.044) in column 1, to -0.18 (with a standard error of 0.050) in column 4. The inclusion of forty one control variables thus lowers the estimated coefficient by less than one fifth. Income, by contrast, is not well-defined in Table 6's ordered probits. Although always positive, and approximately significant at the 5 per cent level in column 1, income does not have a convincingly robust influence on workers' reported satisfaction levels.[13] Hours of work is negative, and statistically significant until the final column where its coefficient becomes -0.07 with a standard error of 0.05. Age dummies continue to show that the old are more content; the male dummy is negative and significant.

An objection to the formulation used so far is that y*, the comparison level of pay, is derived within the data set. The difference between y and y* is a residual from an earnings regression equation, so the significance of this residual in a satisfaction equation might simply

reflect misspecification. On this view, a table like Table 6 might be seen as a form of Hausman test with no implications for the theory that relative deprivation matters. To check this, an alternative version of Table 6 was estimated. Table 7 uses as its measure of y* a set of income levels drawn from an external data source. The 1991 New Earning Survey provides data on the earnings of workers of different kinds. Employers' length of usual working week was divided into 28 categories both for males and for females. Each individual in the BHPS was then assigned the y* level corresponding to his or her usual weekly hours of work. This method produced 56 data points for comparison income. Each is an income cell-mean by gender and weekly hours.

Table 7 uses these y* data. The results are similar to those in Table 6. In column 1 of Table 7 the coefficient on comparison income is -0.4 with a t-statistic in excess of 6. Adding a set of controls reduces this, in column 4, to -0.24 with a t-statistic of approximately 3.4. By comparison, column 4 of Table 6, based on the previous method for calculating y*, had a well-defined coefficient of -0.18. The similarity between Table 6 and 7 indicates that the role played by y* is not the result of a misspecification (in the Hausman-test style).[14] The remaining tables continue with the previous method.

Finally, Table 8 sets out a much more general specification. This estimates two ordered probit equations. Column 1 includes in the satisfaction equation both the earlier variables and also 10 occupation dummies, dummies for a second job and union membership, dummies for being a renter and having a temporary contract, dummies for being a supervisor and working in an establishment with incentive payments, establishment size dummies, and a job tenure variable. For completeness, Table 8 also leaves in the Mu terms denoting the estimated threshold or 'change-up' points from one satisfaction level to another. Two interesting findings are that the negative union effect studied in Freeman (1978), Borjas

(1979) and Meng (1990) is now statistically insignificant, and that there is (weak) evidence of a continuing effect from establishment size. Column 2 is a parsimonious form after deleting variables on F-tests. The main conclusion is that, even in this very general specification, comparison income has a negative and significant effect upon workers' levels of satisfaction.[15]

Comparison wage effects are quantitatively important as well as statistically significant. The mean of y* is 6.5 and its standard deviation is 0.8. A move from one standard deviation below the mean to one standard deviation above is therefore a change from 5.7 to 7.3. Taking a conservative central estimate of y*'s coefficient to be -0.2, therefore, the implied change in satisfaction is approximately -0.3 points. Given the distribution of satisfaction, this is a large effect. It is greater than the consequences of switching gender; it is equal to the difference between an average 25 year-old and an average 55 year-old; it greatly exceeds the dissatisfaction from not having a supervisory job.

A further result from the BHPS dataset supporting comparison income theory is presented in Clark (1994). It is shown that the employee's wage one year ago is negatively correlated with current job satisfaction. The coefficients on current wage and wage one year ago have nearly equal and opposite signs, suggesting that overall job satisfaction is a function of the change in income, rather than its level.[16]

These results, when taken together, appear to offer statistical credence to the hypothesis that feelings of well-being depend on a reference or comparison level of income. By contrast, they offer little support for the view, presented in every microeconomics textbook, that a worker's level of well-being is a function of absolute income.

4. Aspirations and Comparisons: A Second Form of Test

At the heart of the paper's analysis lies the idea that different people have different

aspirations, and that these varying aspirations lead to varying amounts of contentment from the same absolute level of rewards. A direct test would be to estimate reduced-form satisfaction probit equations in which the explanatory variables include factors that mould aspirations directly and cannot plausibly be interpreted in other ways.

One natural variable to choose is the level of education. Commonsense and conventional microeconomics are in agreement in predicting that this will unambiguously raise the level of utility as proxied by reported satisfaction data. A model with comparison effects, however, offers a different possibility. Highly educated individuals may have higher reference standards than others. Someone with an outstanding college degree might, according to this theoretical viewpoint, be unhappy on an income level that would make a poorly educated person - with correspondingly low aspirations - feel extremely contented.

Tables 9 and 10 perform this test. The results are consistent with comparison theory, and appear to contradict standard economic models.

Table 9 contains four ordered probits, in each of which three dummies for educational attainment are included as well as a control for income. The dummies are for a college degree, advanced high school (A level approximately), and intermediate high school (O level approximately). The omitted category is for no or low qualifications. These four categories are for achieved paper certificates and not merely for years of schooling. Column 4 is representative; the education dummies enter a job satisfaction equation with the following pattern:

The Effect of Education on Overall Job Satisfaction

Degree	-0.53
A-level	-0.31
O-level	-0.17
No or low qualifications	0

Exactly counter to what neoclassical economic theory might lead one to expect, highly educated people are less happy. The effect is monotonic and well-defined. This result does not come from controlling for income: a specification of Table 9 without the income variables yielded almost exactly the same results.[17] It might be argued that education raises awareness of the value of time not spent at work, which makes work less satisfying while increasing the enjoyment of non-work activities and resulting in higher overall life utility. However, the analyses reported in Clark, Oswald and Warr (1993) and Clark and Oswald (1994) show that education is negatively correlated with a measure of overall 'health'. Thus it seems that education may be undertaken in the belief that it will raise later utility, but it also changes comparison levels or values in such a way the realised well-being, both total and work-related, is lower, ceteris paribus.

As a check on the causal mechanism, Table 10 estimates an ordered probit using not overall satisfaction but rather the answers from the pay satisfaction question in the BHPS. Again education enters strongly negatively and monotonically. This is consistent with the view that a comparison income level, working through an aspiration effect, influences (reported) levels of well-being.

A further check was done. If the education result is robust, it should have been noted before by researchers in the psychology literature. A search of the literature, and discussions with Michael Argyle and Peter Warr, suggested that, although not part of orthodox thinking, there is some supporting statistical evidence. Klein and Maher (1966), for example, show that education is significant and negative after controlling for occupational level. In Warr (1992), education enters negatively and significantly both with and without a large set of control variables. Watson et al. (1992) find, for a small sample of managers, that educational qualifications are negative, with a t-statistic of approximately unity, in a job satisfaction

equation. They also find a significant effect from wage relative to comparison wage, which may absorb some of their education coefficient. Borjas (1979) obtains no significant education effects, but his satisfaction question may have been interpreted by respondents as referring narrowly to job content. Results in Blanchflower and Oswald (1992), using the National Child Development Study, suggest that those with college degrees are the least satisfied with their work.

5. Conclusion

This paper is a contribution to the literature on the economics of job satisfaction. The need to understand well-being at work seems self-evident. More specifically, the paper is an attempt to test the hypothesis that happiness depends on income relative to a 'comparison' or reference level. It provides two kinds of evidence. First, workers' reported satisfaction levels are shown to be negatively related, in ordered probits, to their comparison earnings levels. Second, it is established that satisfaction is strongly declining in the level of education. College graduates, for example, have the lowest overall job satisfaction, ceteris paribus. More generally, the paper indicates the potential - still untapped by economists - of reported satisfaction statistics as proxy utility data.

As always, it is as well to bear in mind other possible interpretations of the patterns found in the data. Some of the empirical work described here rests upon the assumption that y*, the comparison level of income, can be calculated as the predicted value from an earnings regression equation. Earnings might, however, depend upon variables that are omitted from the data set, and those missing variables might, in turn, shape individuals'

utilities. To put this differently, the analysis could in parts be interpreted merely as a form of Hausman test. Hence it could be that, in using a variable close to the residual from a wage equation, the paper is in danger of drawing false inferences.

There are reasons to doubt this interpretation. One is captured in Table 7. It shows that a simple external measure of the comparison wage performs well statistically. A second counter-argument is contained in Tables 9 and 10, which reveal, without any reliance on constructed y* variables, that higher levels of educational achievement are associated with lower levels of overall satisfaction. The natural interpretation of this finding seems to be that education raises people's aspirations and so makes them more difficult to satisfy.[18] It is the simplest, and so possibly the most convincing, piece of evidence for the paper's theoretical ideas.

Despite what economics textbooks say, comparisons in the utility function seem to matter. This has a number of implications. In a world with comparisons, the case for growth as a way of increasing happiness is no longer so clear (see Easterlin (1974) and Layard (1980)). Optimal tax policies are profoundly affected, because there are negative externalities from high earners (see Oswald 1983). In an analogous way, the wages offered by firms may have low variance if there are intra-firm comparison effects, and will rise over time if workers compare their current wage to their own previous wages (see Frank and Hutchens 1993). Moreover, because preferences are intrinsically interdependent, the standard optimality results of the free market fail to hold.

Footnotes

1. The case for economic growth, for example, less clear, and the case for progressive taxation much stronger (Boskin and Sheshinski, 1978, and Oswald, 1983). Akerlof and Yellen (1990) argue that involuntary unemployment and other macroeconomic phenomena can also be explained this way.

2. For example, over long periods of time there is little upward movement in the mean reported level of happiness in sample surveys (Argyle 1989), and many writers argue on anecdotal grounds that our generation is no more content than earlier ones (Scitovsky 1976, Layard 1980).

3. The term originates from Stouffer et al. (1949).

4. It might be argued, in extreme, that these are random numbers merely made up by survey respondents. Psychologists, who are at least as aware of this possibility as economists, have long since abandoned such a view. See, for example, Chapter 9 of Argyle (1989).

5. The large literature includes Bernstein and Crosby (1980), Crosby (1976), Crosby and Gonzales-Intal (1984), Davis (1959), Festinger (1954), Lawler (1971), Maslow (1970), Pollis (1968), Pritchard (1969), Veenhoven (1991), Walster, Walster and Berscheid (1973), and Weik (1966).

6. Tests like Van de Stadt (1985) and Kosicki (1987) conclude in favour of the relative income hypothesis. However, the indirect nature of the testing (studying consumption decisions) leaves it open many alternative interpretations. Brown and Sisson (1975) is consistent with relative deprivation theory, but also with the competitive model.

7. Hamermesh (1977) does not explain why he takes satisfaction to depend on the residual from an earnings equation rather than on earnings itself. He may believe that people use the word 'satisfaction' in an inherently relativistic way. His equations include only two other independent variables.

8. Factor analysis confirms this statement. When the first principal component of the seven individual job satisfaction questions is used as the only explanatory variable in a regression with overall job satisfaction as the dependent variable, the t-statistic on this factor is around 60, with a χ^2 statistic of over 3000. In addition, when a job satisfaction regression is run with this first principal component as the dependent variable, the results turn out to be very similar to those using overall job satisfaction reported later in the paper.

9. These results are known in the psychology literature. Weaver (1980 is a useful reference paper.

10. Calculating these means for full-time workers only did not substantially change the results.

11. The most famous problem with Adam's (1963, 1965) equity theory is that of knowing how to calculate comparison income (and comparison 'inputs' such as effort and education). This paper uses an economic model to do so.

12. This cannot be interpreted as the individual simply suffering from having a bad 'match' in a job at worse pay than elsewhere. In conventional economic theory, individuals do not suffer from regret. Their utility depends on their achieved wage.

13. It is a common feature of the regression results reported in this paper that own income has only a small effect on job satisfaction. In particular, most regressions have the counter-intuitive implication that a ten percent rise in both y and y* would leave an individual worse off. There are three potential explanations of this weak effect. First, there could be an omitted variable, say 'effort', which is positively correlated with income and negatively correlated with job satisfaction, leading to a downward bias on the income estimate. However, such a bias should also apply to the coefficient on y*, unless it is assumed that individuals compare income only and not effort. Second, if there is measurement error in income then y*, because it is always a kind of average, will be less subject to error than y. Last, some recent work on utility functions (Frank and Hutchens 1993 and Kahneman 1993) has suggested that it may not be the level of variables which is important but rather their rate of change, implying that the change in y should predict utility better than the level of y. Clark (1994) finds evidence of this effect.

14. Comparison income may also be predicted from within the BHPS dataset using only the sex and hours information used to match in the averages from the NES. If the regression results using the numbers from the NES and from the internal 'NES type' predicted income are similar then this provides some evidence against the Hausman interpretation of the previous regressions. Using the same regressors as in Column 4 of Table 6, the estimate on the 'NES type' predicted income is -0.31 with a standard error of 0.08. This is similar to the estimate of -0.24 for the NES numbers themselves reported in Table 7.

15. Further analysis yielded some evidence of a spline at y=y*. When job satisfaction regressions were run with y/y* as the explanatory income variable, the estiamte for slope coefficient on this variable was greater when $y<y^*$ than when $y>y^*$. However, these estimates were not significant at conventional levels. Also, when regressions with y,y* and a dummy variable indicating that income was less than its comparison

level were run, this dummy variable attracted a negative coefficient, bordering on significance at the 5% level.

16. This argument has been made recently by Frank and Hutchens (1993).

17. Neither is it the case that because workers with higher education have more specific human capital they are less able to change jobs and are therefore less satisfied. Mann (19xx) shows that the precentage of workers citing 'moving around' as opposed to 'staying with the same employer' as the route to a better job rises linearly with the level of the highest educational qualification.

18. A US interview study by Bewley and Brainard (1993) finds that firms are reluctant to take on workers who are over-qualified educationally. His finding and ours could be mirror images of one another. Firms may be reluctant to hire potential malcontents.

TABLE 1

DISTRIBUTION OF REPORTED JOB SATISFACTION LEVELS

SATISFACTION LEVEL	NUMBER OF INDIVIDUALS	PERCENTAGE
7	1645	31.7
6	1396	26.9
5	995	19.2
4	53	12.6
3	237	4.6
2	90	1.7
1	178	3.4
	5195	100.0

Note: These numbers are based on weighted data. The results using unweighted data are almost identical.

TABLE 2

MEAN REPORTED JOB SATISFACTION LEVELS

	MEAN SATISFACTION	T-TEST ON DIFFERENCE
Men	5.3 (0.031)	9.67
Women	5.7 (0.029)	
Union	5.4 (0.036)	4.45
Non-Union	5.6 (0.026)	
Promotion Opps	5.6 (0.027)	3.63
No Promotion Opps	5.4 (0.033)	
Degree or Other Higher Education Qualifications	5.4 (0.039)	
A, O or Nursing	5.5 (0.033)	
Other	5.7 (0.038)	
16-19	5.5 (0.072)	
20-29	5.4 (0.044)	
30-39	5.4 (0.043)	
40-49	5.5 (0.042)	
50-59	5.7 (0.056)	
60+	6.1 (0.087)	
Health Excellent	5.7 (0.035)	
Health Good	5.5 (0.030)	
Health Fair to Poor	5.2 (0.055)	
Establishment size 1-24	5.7 (0.034)	
Establishment size 25-199	5.4 (0.037)	
Establishment size 200+	5.3 (0.039)	

Note: These numbers are based on weighted data.

(Standard errors in parenthesis.)

TABLE 3

CROSS-TABULATION OF SATISFACTION BY VARIOUS INCOME MEASURES

MEAN SATISFACTION LEVELS

Income Variable	Q1 (lowest) income quintile	Q2	Q3	Q4	Q5 (highest) income quintile	Number of Observations
Men and Women						
y	5.78 (0.038)	5.50 (0.052)	5.33 (0.054)	5.34 (0.047)	5.43 (0.046)	4647
y*	5.89 (0.041)	5.61 (0.052)	5.33 (0.050)	5.29 (0.049)	5.37 (0.043)	5144
y/y*	5.49 (0.040)	5.42 (0.053)	5.43 (0.055)	5.56 (0.047)	5.59 (0.046)	4618
Men						
y	5.36 (0.058)	5.08 (0.081)	5.25 (0.071)	5.25 (0.070)	5.52 (0.061)	2385
y*	5.53 (0.067)	5.09 (0.075)	5.14 (0.072)	5.34 (0.065)	5.38 (0.059)	2665
y/y*	5.24 (0.059)	5.25 (0.068)	5.28 (0.076)	5.35 (0.068)	5.43 (0.072)	2368

Note: For each income variable the sample was divided into quintiles. Thus 5.90 in the top left corner implies that those with incomes in the lowest one fifth of the sample record a mean satisfaction level of 5.90.

TABLE 4

JOB SATISFACTION EQUATIONS-ORDERED PROBIT

	1	2	3	4
Log income (y)	-0.08 (0.028)	-0.10 (0.030)	-0.04 (0.032)	-0.06 (0.034)
Log hours (h)	-0.20 (0.048)	-0.16 (0.049)	-0.14 (0.049)	-0.11 (0.051)
Age 20-29		0.06 (0.068)	- 0.03 (0.070)	-0.04 (0.070)
Age 30-39		0.12 (0.70)	0.02 (0.071)	0.01 (0.072)
Age 40-49		0.20 (0.070)	0.10 (0.072)	0.08 (0.072)
Age 50-59		0.35 (0.076)	0.27 (0.077)	0.29 (0.078)
Age 60+		0.65 (0.104)	0.62 (0.104)	0.60 (0.105)
Male			-0.25 (0.036)	-0.22 (0.038)
Regional dummies (18)				✓
Industry dummies (10)				✓
Health dummies (3)				✓
Race dummies (3)				✓
Number of observations	4519			
Log-likelihood	-7280.0	-7244.1	-7219.2	-7149.2
Log-likelihood at zero	-7333.1			

(Standard errors in parentheses)

TABLE 5

GROSS MONTHLY INCOME EQUATION

Age 20-29	0.49
	(16.62)
Age 30-39	0.56
	(16.76)
Age 40-49	0.56
	(15.80)
Age 50-59	0.53
	(13.91)
Age 60+	0.37
	(7.71)
Male	0.18
	(8.82)
Health dummies (5)	✓
Regional dummies (18)	✓
Occupation dummies (77)	✓
Industry dummies (61)	✓
Education dummies (12)	✓
Accident dummies (3)	✓
When work dummies (9)	✓
Establishment size dummies (11)	✓
Sex mix at work dummies (5)	✓
Organization type dummies(7)	✓
Marriage dummies (5)	✓
Temporary contract	-0.23
	(9.00)
Pay includes incentives	0.07
	(4.50)
Part-time	-0.74
	(33.3)
Union member	0.07
	(3.46)
Trade Union recognised	0.04
	(2.04)
Supervisor	0.16
	(9.57)
Pension member	0.13
	(7.10)
Job tenure	-4.2E-06
	(0.56)
Job tenure squared	3.2E-10
	(0.44)
Constant	5.61
	(48.16)
Number of observations	4582
Adjusted R^2	0.77

(t-statistics in parentheses)

TABLE 6

JOB SATISFACTION EQUATIONS - ORDERED PROBIT

	1	2	3	4
Log income (y)	0.07	0.05	0.05	0.04
	(0.042)	(0.042)	(0.042)	(0.043)
Log comparison income (y*)	-0.22	-0.24	-0.16	-0.18
	(0.044)	(0.046)	(0.048)	(0.050)
Log hours (h)	-0.16	-0.10	-0.11	-0.07
	(0.048)	(0.050)	(0.050)	(0.052)
Age 20-29		0.14	0.03	0.04
		(0.070)	(0.072)	(0.073)
Age 30-39		0.20	0.09	0.09
		(0.071)	(0.074)	(0.075)
Age 40-49		0.28	0.17	0.16
		(0.072)	(0.075)	(0.076)
Age 50-59		0.43	0.33	0.36
		(0.077)	(0.79)	(0.080)
Age 60+		0.69	0.64	0.63
		(0.105)	(0.105)	(0.106)
Male			-0.21	-0.17
			(0.037)	(0.040)
Regional dummies				✓
Industry dummies				✓
Health dummies				✓
Race dummies				✓
Number of observations	4514			
Log-likelihood	-7257.5	-7220.1	-7203.9	-7132.6
Log-likelihood at zero	-7322.3			

(Standard errors in parentheses)

TABLE 7

JOB SATISFACTION EQUATIONS USING
EXTERNAL COMPARISON INCOME - ORDERED PROBIT

	1	2	3	4
Log income (y)	-0.02	-0.04	-0.02	-0.03
	(0.03)	(0.03)	(0.03)	(0.03)
Log NES comparison income (y*)	-0.40	-0.38	-0.22	-0.24
	(0.06)	(0.06)	(0.07)	(0.07)
Log hours (h)	0.19	0.20	0.07	0.12
	(0.08)	(0.08)	(0.08)	(0.09)
Age 20-29		0.01	-0.04	-0.05
		(0.07)	(0.07)	(0.07)
Age 30-39		0.05	0.01	0.00
		(0.07)	(0.07)	(0.07)
Age 40-49		0.13	0.08	0.06
		(0.07)	(0.07)	(0.07)
Age 50-59		0.29	0.26	0.27
		(0.08)	(0.08)	(0.08)
Age 60+		0.59	0.59	0.56
		(0.10)	(0.10)	(0.11)
Male			-0.19	-0.15
			(0.04)	(0.04)
Regional dummies (18)				✓
Industry dummies (10)				✓
Health dummies (5)				✓
Race dummies (2)				✓
Number of observations	4519			
Log-likelihood	-7258.7	-7225.8	-7214.3	-7143.6
Log-likelihood at zero	-7333.1			
(Standard errors in parentheses)				

Note: NES comparison income y* is drawn from the 1991 New Earnings Survey. The y* levels are income cell-means by gender and by 28 categories for usual weekly hours of work. Thus there are 56 data points for y*.

TABLE 8

JOB SATISFACTION EQUATIONS - ORDERED PROBIT (Broad Specification)

	1	2
Log income (y)	0.05	0.04
	(0.044)	(0.044)
Log comparison income (y*)	-0.25	-0.30
	(0.065)	(0.059)
Male	-0.16	-0.14
	(0.045)	(0.044)
Age dummies	✓	✓
Region dummies	✓	✓
Log hours	-0.08	-0.05
	(0.059)	(0.057)
Health dummies	✓	✓
Race dummies	✓	
Industry dummies	✓	✓
Occupation dummies	✓	✓
Has second job	-0.13	-0.13
	(0.053)	(0.053)
Union member	-0.05	
	(0.041)	
Temporary contract	-0.20	-0.22
	(0.064)	(0.063)
Renter	0.16	0.16
	(0.042)	(0.041)
Supervisor	0.12	0.13
	(0.042)	(0.042)
Establishment size small	0.08	
	(0.047)	
Establishment size medium	0.034	
	(0.041)	
Incentive payments	0.056	
	(0.039)	
Job tenure	-5.0E-06	
	(8.4E-06)	
Constant	0.80	1.04
	(0.261)	(0.227)
Mu(2)	0.74	0.74
	(0.019)	(0.019)
Mu(3)	1.32	1.32
	(0.024)	(0.024)
Mu(4)	1.87	1.87
	(0.030)	(0.030)
Mu(5)	2.22	2.22
	(0.036)	(0.036)
Mu(6)	2.44	2.43
	(0.041)	(0.040)

TABLE 8 (continued)

Number of observations	4486	4486
Log-likelihood	-7054.9	-7059.6
Log-likelihood at zero	-7280.6	

Note: Equation (2) is a parsimonious version of equation (1), reached by excluding variables on F tests at the 5% level (apart from log income and log hours); (Standard errors in parentheses)

TABLE 9

JOB SATISFACTION EQUATIONS WITH INCOME AND EDUCATION
ORDERED PROBIT

	1	2	3	4
Log income	-0.001	-0.03	0.04	0.05
	(0.03)	(0.03)	(0.03)	(0.04)
Degree	-0.45	-0.35	-0.39	-0.53
	(0.06)	(0.07)	(0.07)	(0.07)
A-level approx	-0.27	-0.17	-0.20	-0.31
	(0.05)	(0.05)	(0.05)	(0.05)
O-level approx	-0.18	-0.09	-0.11	-0.17
	(0.04)	(0.05)	(0.05)	(0.05)
Log hours	-0.27	-0.22	-0.21	-0.19
	(0.05)	(0.05)	(0.05)	(0.05)
Age 20-29		0.07	-0.04	-0.06
		(0.07)	(0.07)	(0.07)
Age 30-39		0.10	-0.01	-0.04
		(0.07)	(0.07)	(0.07)
Age 40-49		0.16	0.04	-0.01
		(0.07)	(0.07)	(0.07)
Age 50-59		0.30	0.20	0.17
		(0.08)	(0.08)	(0.08)
Age 60+		0.59	0.54	0.47
		(0.11)	(0.11)	(0.11)
Male			-0.27	-0.22
			(0.04)	(0.04)
Regional Dummies				✓
Health dummies				✓
Race dummies				✓
Industry dummies				✓
Number of observations	4506			
Log-likelihood	-7233.9	-7209.5	-7181.1	-7097.8
Log-likelihood at zero	-7313.3			

(Standard errors in parentheses)

TABLE 10

PAY SATISFACTION EQUATION WITH INCOME AND EDUCATION - ORDERED PROBIT

Log income	0.53
	(0.04)
Degree	-0.32
	(0.07)
A-level approx	-0.16
	(0.05)
O-level approx	-0.08
	(0.05)
Log hours	-0.83
	(0.05)
Age 20-29	-0.16
	(0.07)
Age 30-39	-0.17
	(0.07)
Age 40-49	-0.17
	(0.07)
Age 50-59	-0.01
	(0.08)
Age 60+	0.27
	(0.10)
Male	-0.28
	(0.04)
Regional dummies	✓
Industry dummies	✓
Health dummies	✓
Race dummies	✓
Number of observations	4499
Log-likelihood	-8208.6
Log-likelihood at zero	-8427.7

(Standard errors in parentheses)

APPENDIX

Variable	Mean	Std Dev
Job satisfaction overall	5.50	1.51
Male	0.54	0.50
Trade Union member	0.29	0.45
Promotion opportunities	0.42	0.49
EDUCATION		
Degree,Teaching or other higher qf	0.269	0.44
Nursing, A-level or O-level	0.377	0.48
Other or no qualifications	0.316	0.46
Age 16-19	0.07	0.25
Age 20-29	0.23	0.42
Age 30-39	0.25	0.44
Age 40-49	0.25	0.43
Age 50-59	0.14	0.35
Age 60+	0.05	0.22
Health excellent	0.339	0.47
Health good	0.479	0.50
Health fair to poor	0.182	0.38
Establishment size 1-24	0.298	0.45
Establishment size 25-199	0.289	0.45
Establishment size 200+	0.248	0.43
Temporary/short term contract worker	0.11	0.31
Pay includes incentive payments	0.23	0.42
Part-time	0.24	0.43
Trade union recognised at work	0.43	0.50
Managerial responsibilities	0.30	0.46
Pension member	0.40	0.49
Job tenure (days)	1317.51	2061.19
Job tenure squared	5983645.5	18898710.7
Log gross monthly income	6.53	0.89
Log usual weekly work hours	3.42	0.53
Log predicted gross income	6.52	0.79
Log (gross monthly income/ predicted monthly income)	0.00	0.40
Has second job	0.10	0.30
Renter	0.21	0.41
EDUCATION (Tables 9 and 10)		
Degree	0.098	0.29
Teaching, other higher, nursing or A-level	0.310	0.46
Other qualifications	0.342	0.47
No qualifications	0.211	0.40
Job satisfaction with pay	4.49	1.95

APPENDIX (continued)

Monthly unearned income	68.31	140.28
No. of children - 0	0.602	0.49
No. of children - 1	0.184	0.38
No. of children - 2	0.157	0.36
No. of children - 3	0.048	0.21
No. of children - 4	0.009	0.09
No. of children - 5+	0.001	0.02
No. in household - 1	0.078	0.26
No. in household - 2	0.300	0.45
No. in household - 3	0.236	0.42
No. in household - 4	0.256	0.43
No. in household - 5	0.104	0.30
No. in household - 6+	0.025	0.15

Note: these use unweighted data.

REFERENCES

Adams, J.S. (1963), 'Toward an Understanding of Inequity', Journal of Social Psychology, 67, pp.422-436.

Adams, J.S. (1965), 'Inequity in Social Exchange', in Berkowitz, L. (ed) (1965) Advances in Experimental Social Psychology, 2, Academic Press, New York and London.

Akerlof, G.A. and Yellen, J.L. (1990), 'The Fair Wage - Effort Hypothesis and Unemployment', Quarterly Journal of Economics, 105, pp.255-284.

Argyle, M. (1989), The Social Psychology of Work (2nd Edition), Penguin Press, Harmondsworth.

Baxter, J.L. (1988), Social and Psychological Foundations of Economic Analysis, Harvester Wheatsheaf, New York.

Bernstein, M. and Crosby, F.J. (1980), 'An Empirical Examination of Relative Deprivation Theory', Journal of Experimental Social Psychology, 16, pp.442-456.

Bewley, T. and Brainard, W. (1993), 'A Depressed Labor Market, As Explained by Participants', Working Paper, Yale University.

Blanchflower, D.G. and Oswald, A.J. (1992), 'Entrepreneurship, Happiness and Supernormal Returns: Evidence from Britain and the US', NBER Working Paper 4228, Cambridge, Mass.

Bolton, G. (1991), 'A Comparative Model of Bargaining: Theory and Evidence', American Economic Review, 81, pp.1096-1136.

Borjas, G.J. (1979), 'Job Satisfaction, Wages and Unions', Journal of Human Resources, 14, pp.21-40.

Boskin, M. and Sheshinski, E. (1978), 'Optimal Redistributive Taxation When Individual Welfare Depends Upon Relative Income', Quarterly Journal of Economics, 92, pp.589-601.

Brown, W. and Sisson, K. (1975), 'The Use of Comparisons in Workplace Wage Determination', British Journal of Industrial Relations, 13, pp.25-53.

Browning, M., Deaton A. and Irish M. (1985), 'A Profitable Approach to Labor Supply and Commodity Demands over the Life-Cycle', Econometrica, 53, pp.503-544.

Cappelli, P. and Chauvin, K. (1991), 'An Inter-Plant Test of the Efficiency Wage Hypothesis', Quarterly Journal of Economics, 106, pp.769-787.

Cappelli, P. and Sherer, P.D. (1988), 'Satisfaction, Market Wages and Labour Relations: An Airline Study', Industrial Relations, 27, pp.56-73.

Clark, A.E. (1993), 'Job Satisfaction and Gender: Why are Women so Happy at Work?', University of Essex, Department of Economics, Discussion Paper no.415.

Clark, A.E. (1994), 'The Economics of Job Satisfaction', in British Households Today, Buck, N., Rose, D., and Scott, J. (eds), forthcoming.

Clark, A.E., Oswald, A.J., and Warr, P.B. (1993), 'Is Job Satisfaction U-shaped in Age?', London School of Economics, Centre for Economic Performance, mimeo.

Clark, A.E. and Oswald, A.J. (1994), 'Unhappiness and Unemployment', Economic Journal, forthcoming.

Clegg, C.W. (1983), 'Psychology of Employee Lateness, Absence and Turnover: A Methodological Critique and an Empirical Study', Journal of Applied Psychology, 68, pp.88-101.

Crosby, F.J. (1976), 'A Model of Egoistical Relative Deprivation', Psychological Review, 83, pp.85-113.

Crosby, F.J. and Gonzales-Intal, A.M. (1984), 'Relative Deprivation and Equity Theories: Felt Injustice and the Undeserved Benefits of Others', in Folger, R. (1984) The Sense of Injustice, Plenum Press, New York.

Davis, J.A. (1959), 'A Formal Interpretation of the Theory of Relative Deprivation', Sociometry, 22, pp.280-296.

Deaton, A. (1992), Understanding Consumption, Oxford and New York: Oxford University Press.

Duesenberry, J.S. (1949), Income, Saving and the Theory of Consumer Behaviour, Harvard University Press, Cambridge.

Easterlin, R. (1974), 'Does Economic Growth Improve the Human Lot?' in P.A. David and W.B. Melvin (eds), Stanford University Press, Nations and Households in Economic Growth, Palo Alto.

Festinger, L. (1954), 'A Theory of Social Comparison Processes', Human Relations, 7, pp.117-140.

Frank, R.H. (1984a), 'Are Workers Paid Their Marginal Products?', American Economic Review, 74, 549-571.

Frank, R.H. (1984b), 'Interdependent Preferences and the Competitive Wage Structure', Rand Journal of Economics, 15, pp.510-520.

Frank, R.H. (1985), Choosing the Right Pond: Human Behaviour and the Quest for Status, Oxford University Press, London and New York.

Frank, R.H. and Hutchens, R.M. (1993), 'Wages, Seniority, and the Demand for Rising Consumption Profiles', Journal of Economic Behaviour and Organization, 21, pp.251-276.

Freeman, R.B. (1978), 'Job Satisfaction as an Economic Variable', American Economic Review, May, 68, pp.135-141.

Guth, W., Schmittberger, R. and Schwarz, B. (1982), 'An Experimental Analysis of Ultimatum Bargaining', Journal of Economic Behaviour and Organization, 3, pp.367-388.

Gylfason, T. and Lindbeck, A. (1984), 'Union Rivalry and Wages: An Ologopolistic Approach', Economica, 51, pp.129-139.

Hamermesh, D.S., (1977), 'Economic Aspects of Job Satisfaction', in Essays in Labor Market Analysis, Ashenfelter, O.C and Oates, W.E. (ed), John Wiley, New York.

Hochman, H.M. and Rogers, J.D. (1969), 'Pareto Optimal Redistribution', American Economic Review, 59, pp.542-557.

Homans, G.C. (1961), Social Behaviour: Its Elementary Forms, Harcourt Brace, New York.

Kahneman, D., Knetsch, J.L. and Thaler, R. (1986), 'Fairness as a Constraint on Profit Seeking: Fairness in the Market', American Economic Review, 76, pp.728-741.

Kahneman, D. (1993), 'New Challenges to the Rationality Assumption', Princeton University, mimeo.

Kapteyn, A. and Van Herwaarden, F.G. (1980), 'Interdependent Welfare Functions and Optimal Income Distribution', Journal of Public Economics, 14, pp.375-397.

Klein, S.M. and Maher, J.R. (1966), 'Education Level and Satisfaction with Pay' Personnel Psychology, 19, pp.195-208.

Kosicki, G. (1987), 'A Test of the Relative Income Hypothesis', Southern Economic Journal, 54, pp.422-434.

Lawler, E.E. (1971), Pay and Organizational Effectiveness: A Psychological View, McGraw Hill, New York.

Layard, R. (1980), 'Human Satisfactions and Public Policy', Economic Journal, 90, pp.737-750.

Lommerud, K.E. (1989), 'Educational Subsidies When Relative Income Matters', Oxford Economic Papers, 41, pp.640-652.

Mangione, T.W. and Quinn, R.P. (1975), 'Job Satisfaction, Counter Productive Behaviour and Drug Use at Work', Journal of Applied Psychology, 60, pp.114-116.

Mann, M. (19xx), 'Work and the Work Ethic', British Social Attitudes.

Maslow, A.H. (1970), Motivation and Personality, Harper and Row, New York.

McEvoy, G.M. and Cascio, W.F. (1985), 'Strategies for Reducing Employee Turnover: A Meta Analysis', Journal of Applied Psychology, 70, pp.342-353.

Meng, R. (1990), 'The Relationship Between Unions and Job Satisfaction', Applied Economics, 22, pp.1635-1648.

Nickell, S.J. and Andrews, M. (1983), 'Trade Unions, Real Wages and Employment in Britain 1951-79', Oxford Economic Papers, 35, pp.507-530.

Oswald, A.J. (1979), 'Wage Determination in an Economy with Many Trade Unions', Oxford Economic Papers, 31, pp.369-385.

Oswald, A.J. (1983), 'Altruism, Jealousy and the Theory of Optimal Non-Linear Taxation', Journal of Public Economics, 20, pp.77-87.

Oswald, A.J. (1992), 'Following Behaviour in Social and Economic Settings', mimeo, London School of Economics.

Palmore, E. (1969), 'Predicting Longevity: A Follow-Up Controlling for Age', Journal of Gerontology, 39, pp.109-116.

Pencavel, J. (1991), Labour Markets Under Trade Unionism: Employment, Wages and Hours, Basil Blackwell, Oxford.

Pollis, N.P. (1968), 'Reference Group Re-examined', British Journal of Sociology, 19, pp.300-307.

Pritchard, R.D. (1969), 'Equity Theory: A Review and Critique', Organizational Behaviour and Human Performance, 4, pp.176-211.

Runciman, W.G. (1966), Relative Deprivation and Social Justice, Routledge and Kegan Paul, Henley.

Sales, S.M. and House, J. (1971), 'Job Dissatisfaction as a Possible Risk Factor in Coronary Heart Disease', Journal of Chronic Diseases, 23, 861-873.

Sen, A.K. (1983), Poor, Relatively Speaking?, Oxford Economic Papers, 35, 153-169.

Scitovsky, T. (1976), The Joyless Economy, Oxford University Press, New York.

Skinner, J. and Feenberg, D. (1990), 'The Impact of the 1986 Tax Reform on Personal Saving', in J. Slemrod (ed.) Do Taxes Matter? The Impact of the Tax Reform Act of 1986, MIT Press, Cambridge, Mass.

Slemrod, J. (1992), 'Do Taxes Matter? Lessons from the 1980s', American Economic Review, 82, Papers and Proceedings, 250-256.

Solow, R.M. (1990), The Labor Market as a Social Institution, Basil Blackwell, Oxford.

Stouffer, S.A. et al. (1949) The American Soldier, Princeton University Press, Princeton.

Trevithick, J.A. (1976), 'Money Wage Inflexibility and the Keynesian Labour Supply Function', Economic Journal, 86, 327-332.

Van de Stadt, H., Kapteyn, A. and Van de Geer, S. (1985), 'The Relativity of Utility: Evidence from Panel Data', Review of Economics and Statistics, 67, pp.179-187.

Veblen, T. (1949), The Theory of the Leisure Class, George Allen and Unwin, London. Originally published 1925.

Veenhoven, R. (1991), 'Is Happiness Relative?', Social Indicators Research, 24, 1-34.

Wall, T.D., Clegg, C.W. and Jackson, P.R. (1978), 'An Evaluation of the Job Characteristics Model', Journal of Occupational Psychology, 51, pp.183-196.

Walster, E., Walster, G.W and Berscheid, E. (1973), 'New Directions in Equity Research', Journal of Personality and Social Psychology, 25, pp.151-176.

Warr, P. (ed.) (1985), Psychology at Work, Penguin Press, Harmondsworth.

Warr, P. (1992), 'Age and Occupational Well-Being', Psychology and Aging, forthcoming.

Watson, R., Storey, D. Wynarczyk, P., Keasey, K., and Short, H. (1992), 'An Empirical Analysis of the Salaries and Satisfaction Levels of Managers in Small and Medium-Size UK Enterprises', mimeo, Warwick Business School.

Weaver, C.N. (1980), 'Job Satisfaction in the United States in the 1970s', Journal of Applied Psychology, 65, pp.364-367.

Weik, K.E. (1966), 'The Concept of Equity in the Perception of Pay', Administrative Science Quarterly, 11, 414-439.

Weyant, J.M. (1986), Applied Social Psychology, Oxford University Press, New York.

Wood, A. (1978), A Theory of Pay, Cambridge University Press, Cambridge.

Zavoina, R. and McElvey, W. (1975), 'A Statistical Model for the Analysis of Ordinal-Level Dependent Variables', Journal of Mathematical Sociology, Summer, pp.103-120.