

Putting a Price Tag on Friendships, Relatives, and Neighbors: Using Surveys of Life Satisfaction to Value Social Relationships

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Abstract:

There is substantial evidence in the psychology and sociology literature that social relationships promote happiness and satisfaction for the individual. Yet the size of their relative impact upon wellbeing when measured against other influences such as income and health remains largely unknown. Using a rich panel dataset from the British Household Panel Survey, this paper explores the use of shadow pricing method to measure, and to put a financial value upon, the satisfaction with life gained by an increase in the frequency of meeting up with friends, relatives, and neighbors. By allowing personality traits to be factored out from the life satisfaction equation, an increase in the level of social involvement with friends and relatives is worth up to an extra £85,000 (or \$127,500) a year. Talking to neighbors on most days, on the other hand, is equivalent to an increase in income of around £37,000 (or \$55,000) per annum.

Keywords: social relationships, friends, neighbors, social capital, life satisfaction, shadow pricing, economics of happiness

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This paper explores the links between social relationships, income, and human satisfaction. Can money buy the greatest amount of happiness for us? Or do the sources of true and lasting satisfaction come from having deep interpersonal relationships with close friends and other people in the community? Since it normally requires both time and effort to achieve either higher income or a stable social relationship with someone, the weight attached to each individual's investment decision thus depends upon the type of possession – money or friendship – that he or she believes will yield a larger impact on happiness than the other.

But how do we work out the relative importance of these two things? How do we know which is better for us: a large pay rise or more quality time spent with close friends and relatives? On what grounds should a government base its decision in selecting the most appropriate set of policy instruments (e.g. between those that favor income and those that favor work-life balance) that will maximize the sum of happiness of the people living in that country? These are extraordinarily difficult questions, but they seem important.

For a long time, there has been no simple way to assess the size of different influences upon happiness and satisfaction with life in general. Economists have, however, recently developed a way to do so. The process simply involves taking a random sample of individuals, record their satisfaction levels of the people in these samples at different points in time, and then use simple statistical methods (regression equations) to work out the implied 'shadow price' of different occurrences in life. For example, economists have been able to show using happiness surveys that marriage (compared to being single) is worth around £70,000 (or \$105,000) a year for a representative person in Great Britain. Separation, on the other hand, is equivalent to around minus £170,000 (or \$255,000) a year (see Clark and Oswald, 2002). The

method generalizes, and has been used by economists to calculate the happiness loss induced by non-intangibles such as the fear of crime (Moore and Shepherd, 2006) and the aircraft noise (Van Praag and Baarsma, 2005).

This paper studies the numbers that people report when asked about how satisfied they are with their life. It estimates what may be some of the first microeconomic life satisfaction equations with measures of social relationships as explanatory variables for British data: the British Household Panel Survey (BHPS). It also makes one of the first attempts to assess the size, and to put a financial value upon, the satisfaction induced by changes in social network status, which is measured by the frequency of meeting with friends and relatives, as well as the frequency of talking to neighbors, in the past year.

There are limitations to wellbeing statistics, and an inquiry in this field faces the disadvantage that controlled experiments cannot be done. However, it seems impossible in our attempt to understand the connections between human satisfaction and social relationships without, in part, listening to what human beings have to say about their own lives. This paper can also be understood as an empirical application to *experienced* utility, a concept advocated in a seminal work by Kahneman *et al* (1997). It argues, in essence, that measures of experienced utility (such as an overall view of one's satisfaction with life) can be used as reasonable substitutes to observing individual choices. For more detailed theoretical discussions on the link between subjective wellbeing data and experienced utility, see also Kahneman and Thaler (1991), and Rabin (1998).

The paper is structured as follows. Section 1 reviews the literature on happiness and measurement. Section 2 outlines the data and the empirical strategy used in this article. Section 3 presents cross-sectional results on the estimated financial value of social relationships and other life events. Section 4 introduces controls for individual

fixed effects (or unobserved heterogeneity), and reports panel estimates on the size of life satisfaction induced by changes in the level of social network status. Section 5 discusses arguments and counter-arguments, and conclusions are set out in Section 6.

1. Measuring Happiness

Psychologists have, for many decades, extensively studied the sources of human satisfaction². In their view, the definition of life satisfaction or happiness is taken to be the degree to which one views as favorable one's life as a whole, or some particular domain of one's life. As an attitude that is not accessible to public observation, psychologists believe that a concept such as life satisfaction can be studied, in part, by asking people how they feel.

One issue in the psychology literature has been whether these self-rated well-being measures are, in their terminology, valid and reliable. A first argument in defense of using self-reported measures comes from evidence that they have often been shown to correlate substantially with other subjective data. These include, for instance, how different sets of well-being measures can be shown to be well correlated with subjective recall of positive and negative events (Seidlitz *et al*, 1997), with assessments of the person's happiness by friends and family (Pavot and Diener, 1993), reports by spouses (Costa and McCrae, 1988), and with memory measures, in which people must remember good versus bad events from their lives (Balatsky and Diener, 1993). A second argument is based on findings within psychology literature of a well-defined correlation between well-being responses and various physical measures. For example, statistics on self-reported well-being have been shown to be positively correlated with

²Recent work includes Argyle (1989), Fox and Kahneman (1992), and Diener and Suh (2000). For a comprehensive

the duration of genuine or the so-called “Duchenne” smile (Eckman *et al*, 1990), measures of responses to stress such as heart rate and blood pressure (Shedler *et al*, 1993) and the risk of getting coronary heart disease (Sales and House, 1971).

Rather than summarize the psychological literature’s assessment of well-being data, this paper refers readers to the checks on self-rated happiness statistics discussed in Argyle (1989), and Myers (1993), and to psychologists articles on reliability and validity, such as Fordyce (1985), Larsen *et al* (1984), Pavot and Diener (1993), and Watson and Clark (1991).

While psychologists have been using survey measures of life satisfaction to study the composition of individual’s well-being for the most part of the last century, it is only in recent years that they have become the subject of economic analysis. In what has since emerged as seminal research, Easterlin (1974, see also 1995 for update) was one of the first economists to study the relationship between income and satisfaction in the United States. One of his aims was to show that, at a point in time, people with more income are, on average, happier with their lives than those with less. However, once income levels are above a minimal absolute threshold, average satisfaction levels within a country tend to be highly stable over time, even in the face of significant economic growth. This has led to interest in the role of relative rather than absolute income (e.g. Clark and Oswald, 1997; Ferrer-i-Carbonell, 2005), as well as income aspirations (Stutzer, 2004) in determining life satisfaction.

Though by no means exhaustive, economists have also used survey measures of life satisfaction to estimate the non-pecuniary effects of unemployment (Winkelmann and Winkelmann, 1998), to study social norms in the labor market (Clark, 2003; Stutzer and Lalive, 2004) and past unemployment (Clark *et al*, 2001), to understand people’s preferences between unemployment and inflation (Di Tella *et al*, 2003), to measure the

review on the research progress in the last three decades of subjective wellbeing, see Diener *et al* (1999).

effects of political institution (Frey and Stutzer, 2000), the impact of women's rights (Pezzini, 2005), and the effects of crime (Powdthavee, 2005), on satisfaction. Regarding other factors affecting people's satisfaction with life, most studies have found the level of reported life satisfaction to be high among those who are married, women, whites, the well-educated, the self-employed, the retired, and those occupied with home duties. Life satisfaction is apparently U-shaped in age³. The results are not only consistent with the findings in the literature of psychology, but also seem to hold across different countries and time periods.

One of the influences on life satisfaction that is highly relevant to this paper is the level of social capital in the society (Putnam, 1995). Recent cross-sectional studies from both sociology and the recent economics of happiness literature have shown that key aspects of social capital - such as trust and membership in voluntary associations - contribute greatly to higher individual well-being (Putnam, 2000; Helliwell, 2003, 2006). Many studies that use cross-sectional data have shown that individuals with rich networks of active social relationships, that do not include people living in the same household, tend to be happier with their lives (Phillips, 1967; Burt, 1987). One explanation for their findings is that happiness tends to increase with the number of people available for discussing important matters. Taylor *et al* (2001) analyze the cross-sectional relationship between social network and happiness. Using the national survey of Black Americans, the authors find that - in addition to demographic and economic factors - social relations and network factors (i.e., subjective family closeness, support from family, number of friends, the presence of fictive kin, church attendance, and frequency of contact with neighbors) are significantly associated with self-rated happiness and life satisfaction scores. Umberson *et al* (1996) find insignificant gender differences in the long-term impact of social relationships upon psychological well-

³For a comprehensive review on the determinants of life satisfaction, see Oswald, 1997.

being. Pinqart and Sorenson (2000) explore the links between socioeconomic status, social network, and competence with subjective well-being in the elderly. They show frequency of contact with friends to be positively correlated with self-reported life satisfaction than having contact with adult children, *ceteris paribus*. A study on adolescents has shown that, on average, children who are integrated into friendship networks at school have better mental health than those who are socially excluded (Ueno, 2005). In a rare longitudinal study on the relationship between social relationships and psychological well-being, Thoits (1983) shows that a gain in social identities (e.g. the number of positions held by an individual and validated in role relationship) is associated negatively with measures of psychological distress.

While there is substantial evidence that people with strong social ties tend to report on average higher levels of happiness and satisfaction than others, the size of their impact upon wellbeing when measured against other influences remains largely unknown. Most studies on social relationships and wellbeing only report the significance of the estimated correlations, or mention the coefficient size in passing without comparing its impact relative to other occurrences in our lives⁴. This article will be one of the first to do so by applying shadow pricing method to measure the monetary valuation of social networks against other influences upon life satisfaction.

2. Data and Empirical Strategy

This paper begins by examining individual-level data from six waves, Wave 7-10 and Wave 12⁵, of the British Household Panel Survey (BHPS) collected between 1997 and

⁴ One exception is a work by John Helliwell and Haifang Huang (2005) who attempt to estimate the value of workplace trust on life satisfaction for Canada.

⁵The life satisfaction question was first introduced in wave 6 of the BHPS. It was then dropped for wave 11, but reintroduced again for wave 12.

2003⁶. The BHPS asks over 22,000 randomly selected individuals from 10,000 British households in repeated cross-sections the same question: “*How dissatisfied or satisfied are you with your life overall?*”, with seven possible response categories ranging from “1. *very dissatisfied*” to “7. *very satisfied*”. There is both entry into and exit from the panel, leading to unbalanced data with an increasing number of individual interviews over time. This is due to the inclusion in the original household sample of children who turned 16, and the new members of household formed by original panel members.

In addition to information on life satisfaction, respondents in the BHPS are asked the following social network questions: “*How often do you meet friends or relatives who are not living with you, whether here at your home or elsewhere?*” and “*How often do you talk to your neighbors?*” The answers are coded in five ordinal categories: “1. *never*, 2. *less often than once a month*, 3. *once or twice a month*, 4. *once or twice a week*, 5. *on most days*”. There is a high response rate to both social network questions; the average attrition (or missing) rate is approximately 0.2% across all waves.

[TABLE 1 HERE]

The analysis will refer to individuals of working age (aged 16-65). This produces 54,421 observations in total, rising from 8,775 in wave 7 to 12,648 in wave 12. The data covers 18,547 different individuals, 5,007 of whom are presented over all five waves. Some descriptive statistics are given in Table A1.

Cross-tabulations of the raw data and their main patterns are presented in Table 1. Note that the responses of “*less often than once a month*” and “*never*” are merged into one due to a small number of respondents in the “*never*” category. Taking the

⁶The wave 7 data were collected between late 1997 and early 1998. The wave 8 data were collected between late

numbers at face value, only 2% say they meet up with their friends less than once a month to never at all, while over 45% report having socialized with friends or relatives from outside the household on most days. With regards to how often the respondent talks to his or her neighbors, around 10% say they talk to their neighbors less than once a month to never at all, whereas approximately 36% say they talk to their neighbors on most days.

Among British adults of working age, 43% of men and 50% of women say they meet up with their friends on a daily basis. The figures are slightly smaller when it comes to socialization with neighbors; 33% and 39% for men and women, respectively. Interactions with friends and relatives take place more often among the young. The older cohort (aged over 30), on the other hand, tends to spend more time talking to their neighbors than the younger cohort (30 and under).

Table 1 also reports the distribution of life satisfaction for different groups of people in Great Britain. In the whole British sample, life satisfaction scores appear to be skewed towards the top of the possible answer distribution; three-quarter of the sample having scored more than 4 on the life satisfaction scale. On average men and women give similar life satisfaction answers. There are no apparent differences in life satisfaction responses between people from different age groups.

For our empirical strategy, I follow the Blanchflower and Oswald (2004) study and assume that there exists a generalized reported well-being function

$$r = h(u(s, y, z, t)) + e, \tag{1}$$

where r denotes some self-reported number or level collected in the survey. The $u(\dots)$ function is the respondent's true well-being and is observable only to the

1998 and early 1999, and so on.

individual asked; $h(\cdot)$ is a non-differentiable function relating actual to reported well-being; s represents social network status; y denotes income; z is a set of socio-demographic and personal characteristics; and e is an error term that subsumes the inability of human beings to communicate accurately their well-being levels. The true well-being $u(\dots)$ is assumed to be increasing and concave in both s and y .

The monetary valuation of social relationships and other life events can then be determined by estimating the empirical counterpart to equation (1), which for this article is:

$$LF_{it} = \alpha + \beta_1 S_{1it} + \beta_2 S_{2it} + \beta_3 S_{3it} + \lambda y_{it} + Z'_{it} \delta + e_{it}, \quad (2)$$

where LF is the reported life satisfaction for individual i at time t ; S_j are dummy variables for the extent of social relationships with friends, relatives, and neighbors; y is the real annual household income per capita (in thousands); and the Z vector consists of other variables that are known to influence wellbeing, including dummies for gender, marital status, employment status, health, education, home ownership, region, and year, as well as age, age squared, household size, number of days spent hospitalized last year, and number of children.

Provided that the estimated coefficient on income, λ , from equation (2) is positive and statistically significant (i.e. in that life satisfaction is increasing with income), it can then be used to calculate the ‘shadow price’ of social relationships, S_j . Imagine that an individual begins to see more of his or her friends in period t compared to $t-1$, i.e. a move from S_1 to S_2 , where $S_2 > S_1$. The implied shadow price of this transition is then equivalent to the extra income, or increment to y , which is required to keep the individual with the lower level of social network status, e.g. at S_1 , at the same

level of life satisfaction. The shadow price equation can be thought of algebraically as:

$$SP = (\beta_2 - \beta_1) / \lambda. \quad (3)$$

In other words, an individual with S_1 level of social network status and an income of $y + SP$ will have the same level of life satisfaction as an individual with S_2 level of social network status and an income of y . The unit of these valuations is in pound sterling.

3. Cross-section Results

Table 2 presents the estimated coefficients of two life satisfaction functions for Great Britain. In the first equation, an ordered probit is used to exploit the ranking information in the originally scaled dependent variable. In the second one, an ordinary least squares (OLS) which treats life satisfaction scale as cardinal is estimated. Since the BHPS is longitudinal in nature, random disturbances are potentially correlated within groups of individuals. Hence, in order to correct for aggregation bias standard errors are clustered by personal identification in all cross-sectional specifications⁷.

[TABLE 2 HERE]

Both ordered probit and OLS equations show positive and statistically significant relationships between both measures of social relationships (e.g. the frequency of (i)

⁷See Moulton (1990) for more discussions on potential pitfalls of estimating aggregate variables on micro units when standard errors are not corrected for.

meeting friends and relatives, and (ii) talking to neighbors) and life satisfaction. The first column of Table 2 shows that there is a positive and complete monotonicity in the dummies for frequencies of social interaction in an ordered probit equation with only exogenous personal characteristics, i.e. age, age-squared, and gender, as additional controls. Note that the omitted variables here are seeing friends or talking to neighbors less than once a month to never at all.

The second column moves on to an ordered probit regression with full specification, adding dummy variables for marital status, health, education, employment status, home-ownership, household size, as well as number of children, the number of days spent in hospital last year, real annual household income per capita (in £1,000), region, and year of the interview. With these control variables, dummies for frequencies of social interaction continue to be very strongly positively correlated with individual life satisfaction; the values of z -statistics are greater than 3 for all but one social network dummies. The OLS regression in the third column of Table 2 also offers qualitatively similar results to the ordered probit. The last column estimates suggest that people who meet up with friends or relatives on most days tend to report around 0.38 score points more satisfaction than those who meet up with friends less than once a month to none at all, *ceteris paribus*. Similarly, people who talk to their neighbors on most days report, on average, around 0.24 score points more satisfaction than those who talk to their neighbors less than once a month to never at all.

Table 2's other results show perception of life to be associated positively and significantly with real annual household income per capita. Men have, on average, lower levels of life satisfaction than women and that there is a pronounced U-shaped in age, minimizing at around early 40s. The married has the highest level of life satisfaction, and the separated has the lowest. Unemployed people report, on average, a significantly lower life satisfaction score than employed individuals. This is consistent

with the finding from previous studies on the non-pecuniary costs of unemployment on an individual's subjective well-being levels (see Winkelmann and Winkelmann, 1998; Clark *et al*, 2001). The retired are generally happy with their lives. Controlling for income and employment status, life satisfaction is on average lower for those with higher levels of education. These dummies refer to the highest level of education achieved rather than to years of schooling. One plausible explanation for this is that there may be a comparison effect in education, where education raises expectation as well as outcomes (Clark and Oswald, 1996). Perception of life is higher for those owning their home outright, whilst the size of the household appears to be positively correlated with how one views one's life at the cross-section. On the other hand, number of children - conditional on the household size - is strongly negatively associated with self-rated life satisfaction. As expected, a proxy for poor objective health status (e.g. the number of days the respondent stayed in hospital the previous year) is negatively and significantly associated with the overall perception of life. There is, however, a stronger correlation between dummies for subjective health status and reported life satisfaction.

[TABLE 3 HERE]

Table 3 presents the estimated valuations of social relationships, as well as other occurrences in life. The figures are derived from applying equation (3) to the estimated coefficients taken from the ordered probit and OLS regressions in Table 2. The way to interpret these financial values is fairly straightforward. A positive figure basically implies that an individual who moves from the first status to the second would need to receive that financial amount to be (just) unaffected by the transition in question. So, an individual who only sees his or her friends or relatives less than once a month to never

at all would require around an extra £63,000 a year to be just as satisfied with life as an individual who sees his or her friends or relatives on most days. On the other hand, a move from talking to neighbors less than once a month to talking to neighbors on most days is approximately £20,000 cheaper ($SP_{neighbors} \cong \text{£}40,000$). These are huge effects, considering that an average real annual household income per capita across the whole sample is only about £9,800⁸. However, it should be noted that these values are, of course, for the average individual in the sample. The regression method implicitly uses a best fitting linear function and thus averages across the data points.

There are also large psychological benefits from getting married ($SP_{married} \cong \text{£}64k - \text{£}68k$), and moving in together ($SP_{cohabiting} \cong \text{£}54k - \text{£}57k$). Improvement in health has one of the largest effects on life satisfaction; a move from having a very poor health to having an excellent health is worth around an extra £300,000 a year. Separation has a very high negative valuation upon perception of life ($SP_{separation} \cong -\text{£}57,000$ a year). The valuation of divorce is quantitatively smaller than that of separation ($SP_{divorce} \cong -\text{£}22,000$). There is also a large psychic cost associated with joblessness. The cross-sectional estimates suggest that a pay package around £66,000 to £74,000 a year is required to compensate for being unemployed (compared to being employed full-time). This is consistent with previous studies that find large non-pecuniary costs associated with being unemployed (see also Winkelmann and Winkelmann, 1998; Powdthavee, 2006). Disability is associated with around minus £61,000 a year.

4. Panel Data Estimates

⁸ In order to get these valuations in US\$, readers will have to multiply each of these figures by 1.5.

One concern with the shadow pricing method carried out on cross-sectional data is the presence of the unobserved differences in individual inborn dispositions. There is growing evidence in psychological research that persistent personality traits such as extroversion and agreeableness, for example, are very important predictors of reported well-being (see, for example, De Neve and Cooper, 1999). On the other hand, studies have shown that people who spend more of their time with their friends are also more likely to place trust in people (Argyle and Henderson, 1985), tend to be more extraverted and less neurotic (Stokes, 1985), and have low self-anxiety (Russell *et al*, 1984) and high self-esteem (Hughes and Demo, 1989). One can also conjecture that certain personality traits simultaneously promote happiness, but make survey respondents disinclined to admit that they are lonely. Similarly, some personality traits such as extraversion and self-confidence that are thought to promote wellbeing overlaps considerably with the desirable things human resources are told to look for when interviewing job candidates (Darity and Goldsmith, 1996). This is consistent with the recent findings that happy people are more productive and thus are more likely to earn higher incomes than unhappy people (see Graham *et al*, 2004). Given that personalities jointly influence life satisfaction, frequency of social contacts, and income, cross-section equations will be unreliable if these in-born dispositions are not controlled for in the regressions.

[TABLE 4 HERE]

A more pragmatic question is, given that most people have already placed themselves in the high social network category in the pooled sample (i.e. over 80% have reported to meet up with friends, relatives, or neighbors at least once a week over the past year), is there any happiness to be gained (loss) from an increase (decrease) in the level of social

network status? Repeated observations on the same individual allow controls for unobserved individual differences in the normal way. One simple test is therefore to correlate between changes in frequency of social interactions and life satisfaction in the panel data. Table 4's transition matrix makes these calculations. There seems to be little trend in the reported life satisfaction for those who do not see more or less of their friends and relatives between t and $t+1$. The same can also be said with respect to changes in the frequency of talking to neighbors. However, the second panel of Table 4 shows that those who experience an increase in the frequency of social contacts also experience a rise in life satisfaction, whereas those who engage in less social interactions with others outside the household in $t+1$ compared to t report on average a fall in satisfaction score. The rise (and fall) of wellbeing also appears to be monotonic with changes in the frequency of social interaction, i.e. a move from "seeing friends or relatives less than once a month" to "seeing friends or relatives less than once a week" yields an average change in life satisfaction score of 0.06, whereas a move from "seeing friends or relatives less than once a month" to "seeing friends or relatives on most days" yields an average change in life satisfaction score of 0.11. The evidence of a positive relationship between increases in the level of social contacts and life satisfaction is less robust for the changes in frequency of talking to neighbors, however.

[TABLE 5 HERE]

Treating life satisfaction scores as cardinal, Table 5 presents the main results from fixed effects regression. Intuitively, the fixed effects regression estimates the changes in life satisfaction induced by changes in social network status, holding other things constant. In this process, any individual fixed effects will be factored out from the regression.

The dummies for frequency of meeting up with friends and relatives continue to

enter life satisfaction equation in a positive and well-defined manner, though the size of the coefficients is markedly smaller than that estimated by OLS. Two of the dummy variables representing the frequency of talking to neighbors are also positive and statistically significant at conventional levels. Controlling for individual fixed effects, the coefficient on income continues to be positive and statistically well-defined at the 5%. There are also significant changes in the coefficient size for other explanatory variables, as indicated by the percentage change from OLS estimates shown in the last column.

Given the stark difference in the OLS and fixed effects estimates, it is not surprising that the null hypothesis of no correlation between unobserved individual personality trait and explanatory variables is soundly rejected. A Wu-Hausman test can be constructed around the OLS/fixed effects contrast. The value of the test-statistic of this null yields an asymptotically distributed χ^2_{52} of -6,023, and we can conclude that there is a statistically important positive inborn personality bias on the observed relationship between frequency of social contacts, income, and life satisfaction in our sample.

[TABLE 6 HERE]

Table 6 reports the estimated valuations of social relationships based on Table 4's fixed effects estimates. By allowing unobserved individual personality traits to be factored out from the life satisfaction equation, a move from "seeing friends or relatives less than once a month" to "seeing friends or relatives on most days" is now estimated to be worth an extra £85,000 a year for a representative individual. This is a significant increase (around 33%) from the value estimated by OLS. Despite the reduction in the absolute size of the social network coefficients, there is a substantial increase in the

valuation of “seeing friends or relatives once a month” of approximately 64% from £35,000 to £57,500.

On the other hand, there is only a slight change in the valuations of the frequency of talking to neighbors. A move from “talking to neighbors less than once a month” to “talking to neighbors on most days” continues to be worth within the range of £35,000-£40,000 a year. Table 6’s other results also yield some surprising findings. Getting married is now worth only about £50,000, whereas moving in together (compared to being single) is equivalent to the individual receiving an extra income of £82,500 a year. The psychic cost of separation has increased nearly two folds from the one estimated in Table 2, and is now remarkably large at minus £139,000. There seems to be little variation in terms of life satisfaction between single people and divorcees once individual fixed effects are controlled for in the regression. This finding is consistent with the recent conclusion made by Gardner and Oswald (2006) that divorced couples tend to gain happiness from the dissolution of their marriage. Widowhood, on the other hand, is equivalent to a drop in income of around £200,000 a year.

Both unemployment and disability continue to have large negative valuations; the psychic cost of unemployment is now minus £143,000, while for disability is estimated to be worth around minus £165,500. The largest valuation in Table 5’s fixed effects regression continues to come from health. Someone whose health has declined from excellent to very poor would require a payment of £480,000 a year in order for the life satisfaction score to remain unchanged.

5. Arguments and counter arguments

A number of arguments suggest themselves.

One is that individuals are not randomly assigned to the quality of social networks that they possess, and so the calculation of the value of social relationships may only represent the association in the data rather than clear cause-and-effect. In other words, it is arguable that the observed relationship between the frequency of social interaction and life satisfaction may in fact be a spurious one. This is an important problem, and in some sense it is common throughout applied economics. The pragmatic response here is that at this point in the history of social science research it is necessary to document patterns and be circumspect about causality. In any case, our results are backed up by the substantive evidence in the psychology and sociology literature that social relationships provide a significant protective effect to wellbeing (see Rosenberg and McCullough, 1981; Argyle and Furnham, 1983; Thoits, 1985; Wellman and Wortley, 1990). Furthermore, it is also worth bearing in mind that the positive correlation between social relationships and life satisfaction still exists even when a significant proportion of personality traits bias has already been accounted for in the estimation of these life events.

Second, the observed correlation between life satisfaction and the frequency of talking to neighbors are merely the reflection of the overall quality of the neighborhood rather than the benefits of social interaction itself. It is not implausible to think that people who live in a relatively better neighborhood (i.e. low crime rate, better quality housings, etc.) will also be happier with their lives, and as a result are more likely to be friendly to their neighbors, as well as have a higher tendency to engage in the local scheme of things such as neighborhood watch and other voluntary organizations. One simple test for this is to control for the quality of neighborhood (e.g. quality of housing, noise and crime in the streets, average local district income, etc.) in our fixed effects regression, and see whether there is a significant reduction in the coefficient size for the frequency

of talking to neighbors. However, as can be seen from Table A2 in the appendix, there seems to be little change in the magnitudes of the social network coefficients once a set of neighborhood variables have been included in the fixed effect estimation. This result strengthens our earlier finding of a persistent, positive, and well-defined relationship between the frequency of talking to neighbors and perception of life as a whole.

Third, one may question the validity of the social network scales used in this article. Many of the measures of social networks used in previous studies are arguably more objective in the sense that they can be objectively measured, i.e. the number of friends or the density of acquaintanceship as measured by the proportion of its residents who are acquainted with one another (see, for example, Freudenburg, 1986). Nevertheless, we are reminded as social scientists to be interested in all important aspects of social relations - whether it is objectively measurable or the individual's own perception of his or her quantity or quality of social networks. In any case, we can carry out a simple validity test on social network scales by examine the channels by which they can affect the overall life satisfaction. As can be seen from Table A3's domain satisfaction regressions, the dummies for frequency of meeting up with friends and relatives are associated positively and statistically significantly with satisfactions with social life and leisure time, but are insignificantly related to satisfactions with health, income, housing, and job. On the other hand, the dummies for frequency of talking to neighbors are positive and monotonically increasing with satisfactions with social life, leisure time, and housing, and are only marginally correlated with satisfaction with job. In other words, our measures of social networks are shown to be correlated with the things that we expect them to have some influences over, i.e. satisfactions with social life and the use of leisure time, and are uncorrelated with other things that we believe frequency of social interactions do not have a direct relationship with such as satisfactions with

income and health, *ceteris paribus*.

Fourth, the large valuations of social relationships and other life events are only a reflection of the weak role of income in these life satisfaction equations. This is true. However, the finding that income only plays a small part in influencing our wellbeing is in fact one of the central conclusions reached in this paper. It appears that other possessions in life such as social relationships, long-lasting marriage, and good health matter a lot more than what average level of income can normally buy.

6. Conclusions

This paper explores the old age question: what matters more to our happiness – money or social relationships? Using panel surveys of life satisfaction for Great Britain, it estimates one of the first micro-econometric life satisfaction equations with frequency of contact with friends, relatives, and neighbors as independent variables. The paper also makes use of the shadow pricing method, which is more commonly used in the cost-benefit analysis in the field of economics, in order to put a financial value upon social relationships and other life events. By allowing unobserved individual fixed effects to be factored out from the life satisfaction equation, an increase in the level of social interaction with friends and relatives is estimated to be worth up to an extra £85,000 a year. This is strikingly large. The estimated figure is even larger than that of getting married (which is worth approximately £50,000). It can compensate for nearly two-third of the happiness loss from going through a separation (minus £139,000) or unemployment (minus £143,000). It is also roughly nine times larger than the average real household income per capita in the dataset, which is around £9,800 a year.

The large valuation of social relationships also suggests that governments should

start to rethink some of the policies that only encourage income growth. Take mobility policy for example. More mobility may lead to an increase in income for the individual, but it can also affect the quality of the existing social networks as well as the new one (see Layard, 2006). With this reasonably new pricing method, governments now have a way to weigh both *tangible* and *intangible* costs of such policy against its benefits, and reallocate their resources more effectively and efficiently in order to maximize the sum of happiness of their people.

More generally, it is anticipated that this method will become more widely used to assess any difficult-to-measure costs and benefits of intangibles by researchers in other disciplines.

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Table 1: Life Satisfaction and Social Networks: BHPS: 1997-2003 (Percentages %)

	All	Men	Women	Age<=30	Age>30
<i>Frequency of meeting with friends and relatives outside household</i>					
< once a month to never	2	3	2	1	3
Once or twice a month	11	12	9	6	13
Once or twice a week	40	42	39	31	44
On most days	47	43	50	62	40
<i>Frequency of talking to neighbors</i>					
< once a month to never	10	10	9	16	7
Once or twice a month	15	16	14	17	14
Once or twice a week	40	42	38	36	41
On most days	36	33	39	31	38
<i>Life satisfaction</i>					
Very dissatisfied	2	1	2	1	2
2	2	2	2	2	3
3	6	6	6	6	7
4	15	14	15	14	15
5	30	32	29	31	30
6	33	33	32	35	32
Very satisfied	12	10	13	11	12

Note: The figures represent proportion, so that the top left-hand number, for example, means that 2% of the whole sample reported having met their friends and relatives less than once a month to never at all. Life satisfaction question asks individuals “How dissatisfied or satisfied are you with your life overall?”

Source: BHPS, 1997-2001 and 2002-2003.

**Table 2: Social Networks and Life Satisfaction Equations:
Pooled BHPS, 1997-2003**

	Ordered Probit		OLS			
	Beta	Z-ratio	Beta	Z-ratio	Beta	T-ratio
	(1)		(2)		(3)	
i) Meet friends and relatives						
Once or twice a month	0.245***	6.50	0.155***	4.27	0.210***	4.85
Once or twice a week	0.297***	8.12	0.237***	6.69	0.303***	7.17
On most days	0.323***	8.74	0.312***	8.69	0.383***	8.94
ii) Talk to neighbours						
Once or twice a month	0.068***	3.36	0.009	0.44	0.028	1.21
Once or twice a week	0.176***	9.11	0.114***	5.88	0.142***	6.47
On most days	0.202***	9.86	0.204***	9.85	0.236***	10.11
iii) Socioeconomic variables						
Men	-0.022	-1.56	-0.062***	-4.42	-0.054***	-3.60
Age	-0.048***	-15.82	-0.058***	-13.75	-0.060***	-13.11
Age-squared/100	0.062***	16.23	0.073***	13.89	0.075***	13.17
Real household income/1000			0.005***	5.74	0.006***	6.31
Married			0.342***	14.94	0.384***	14.94
Living as couple			0.289***	12.82	0.323***	12.86
Separated			-0.270***	-6.29	-0.346***	-6.58
Divorced			-0.108***	-3.01	-0.147***	-3.47
Widowed			-0.100	-1.63	-0.104	-1.60
Unemployed			-0.332***	-11.00	-0.445***	-12.35
Self employed			0.023	0.96	0.017	0.66
Retired			0.077**	2.26	0.044	1.23
Student			0.005	0.19	0.015	0.53
Disabled			-0.305***	-8.20	-0.432***	-9.61
Look after home			-0.030	-1.15	-0.075***	-2.60
Health: poor			0.440***	9.78	0.613***	10.57
Health: fair			0.819***	18.28	1.086***	18.88
Health: good			1.183***	26.18	1.503***	26.06
Health: excellent			1.515***	32.64	1.824***	31.23
Education: O-level, A-level			-0.087***	-4.53	-0.068***	-3.22
Education: University level			-0.126***	-6.31	-0.102***	-4.67
Household size			0.016**	2.48	0.017**	2.48
Own home outright			0.093***	4.90	0.097***	4.74
Days spent in hospital last year			-0.002**	-2.15	-0.004***	-2.67
Number of children			-0.061***	-6.29	-0.066***	-6.15
Constant					4.054***	32.57
Cut point_1	-2.536	(0.070)	-1.738	(0.110)		
Cut point_2	-2.144	(0.068)	-1.279	(0.110)		
Cut point_3	-1.644	(0.067)	-0.703	(0.109)		
Cut point_4	-1.050	(0.067)	-0.029	(0.109)		
Cut point_5	-0.232	(0.067)	0.871	(0.109)		
Cut point_6	0.825	(0.067)	1.994	(0.109)		
Regional dummies	No		Yes		Yes	
Wave dummies	No		Yes		Yes	
N	54,355		54,207		54,207	
Pseudo R-squared	0.0067		0.0583			
Log-likelihood	-85920		-81435			
R-squared					0.1848	

Note: Standard errors are in parentheses. Reference groups: meet with friends or relatives: less than once a month to never; female; single; health: very poor; education: no formal education; employed. Standard

errors are clustered by personal identification in all specifications. Wave dummies represent the year of the interview. * < 10%, ** < 5%, *** < 1%.

Table 3: Valuations of Social Network Status and Other Life Events Using Life Satisfaction Equations (Ordered Probit and OLS Regressions): BHPS, 1997-2003

	Ordered Probit	OLS
i) Meet friends and relatives		
Once or twice a month	£31,000	£35,000
Once or twice a week	£47,400	£50,500
On most days	£62,400	£63,833
ii) Talk to neighbours		
Once or twice a month	n.s.	n.s.
Once or twice a week	£22,800	£23,667
On most days	£40,800	£39,333
iii) Socioeconomic variables		
Married	£68,400	£64,000
Living as couple	£57,800	£53,833
Separated	-£54,000	-£57,667
Divorced	-£21,600	-£24,500
Widowed	n.s.	n.s.
Unemployed	-£66,400	-£74,167
Disabled	-£61,000	-£72,000
Health: good	£237,000	£251,000
Health: excellent	£303,000	£304,000

Note: n.s. = not significantly different from zero. The estimates are taken from the ordered probit and OLS regressions in Table 2. The valuations are annually figures, and are measured in per capita. Hence, a move from meeting friends or relatives less than once or twice a month to meeting friends or relatives on most day is worth around £62,000-£64,000 a year, *ceteris paribus*. Average real annual household income per capita at the cross-section (in 1996 Pounds) is around £9,800. At the time of writing, the value of one pound sterling is approximately 1.5 US dollars.

Table 4: Transition Matrix: Change in Social Network Status and Change in Life Satisfaction

Change in social networks from t to t+1	Meeting with friends and relatives			Talking to neighbours		
	Average changes in LS: t to t+1	Standard deviation	N	Average changes in LS: t to t+1	Standard deviation	N
i) Remain the same						
1 at t to 1 at t+1	-0.017	1.426	346	-0.080	1.319	1,376
2 at t to 2 at t+1	-0.026	1.149	1,565	-0.028	1.134	2,024
3 at t to 3 at t+1	-0.028	1.143	10,153	-0.024	1.083	9,287
4 at t to 4 at t+1	-0.039	1.250	13,248	-0.027	1.263	12,098
ii) Increased in frequency						
1 at t to 2 at t+1	0.025	1.352	316	0.001	1.244	879
1 at t to 3 at t+1	0.064	1.338	326	-0.002	1.412	851
1 at t to 4 at t+1	0.107	1.503	234	0.167	1.488	432
2 at t to 3 at t+1	-0.033	1.208	1,739	0.035	1.139	2,180
2 at t to 4 at t+1	0.006	1.264	894	0.015	1.262	614
3 at t to 4 at t+1	0.001	1.203	5,374	-0.016	1.217	4,634
iii) Reduced in frequency						
2 at t to 1 at t+1	-0.047	1.297	322	-0.107	1.265	842
3 at t to 1 at t+1	-0.111	1.428	332	-0.128	1.320	773
3 at t to 2 at t+1	-0.045	1.157	2,008	-0.051	1.149	2,272
4 at t to 1 at t+1	-0.256	1.329	246	-0.054	1.542	424
4 at t to 2 at t+1	-0.054	1.293	949	-0.066	1.390	617
4 at t to 3 at t+1	-0.041	1.208	5,645	-0.075	1.220	4,413

Note: Frequency of social interaction: 1 = “less than once a month to never”, 2 = “once or twice a month”, 3 = “once or twice a week”, 4 = “on most days”. LS = life satisfaction.

**Table 5: Social Networks and Life Satisfaction Equation:
BHPS, 1991-2003 (Fixed Effects Regression)**

	All		Changes
	Beta	T-ratio	from OLS in %
i) Meet friends and relatives			
Once or twice a month	0.115***	3.38	-45%
Once or twice a week	0.139***	4.18	-54%
On most days	0.170***	5.03	-56%
ii) Talk to neighbors			
Once or twice a month	0.013	0.63	-54%
Once or twice a week	0.045**	2.18	-68%
On most days	0.074***	3.35	-67%
iii) Socioeconomic variables			
Age	-0.069***	-3.67	-15%
Age-squared/100	0.058***	5.27	-23%
Real household income/1000	0.002**	1.96	-67%
Married	0.101**	2.44	-74%
Living as couple	0.165***	5.03	-49%
Separated	-0.278***	-4.83	+20%
Divorced	-0.072	-1.28	+51%
Widowed	-0.417***	-4.51	-301%
Unemployed	-0.286***	-10.02	+36%
Self employed	-0.012	-0.37	-171%
Retired	-0.053	-1.47	-220%
Student	0.077**	2.40	+413%
Disabled	-0.331***	-8.38	+23%
Look after home	-0.118***	-4.33	-57%
Health: poor	0.403***	10.96	-34%
Health: fair	0.657***	17.52	-40%
Health: good	0.847***	22.03	-44%
Health: excellent	0.967***	24.06	-47%
Education: O-level, A-level	0.031	0.65	+146%
Education: University level	0.058	1.22	+156%
Household size	-0.017**	-2.00	-200%
Own home outright	0.038	1.51	-61%
Days spent in hospital last year	-0.001	-1.33	+75%
Number of children	0.006	0.44	+110%
Constant	5.795***	9.16	+43%
Regional dummies	Yes		
Wave dummies	Yes		
N	54,207		
R-squared	0.0627		
F test that fixed-effects = 0	3.49	[0.000]	

Note: Standard errors are in parentheses. Change from OLS (in %) refers to the change in the coefficient size from the last column of Table 2. * < 10%, ** < 5%, *** < 1%.

Table 6: Valuations of Changes in Social Network Status and Other Life Events Using Life Satisfaction Equations (Fixed Effects Regression): BHPS, 1997-2003

	Fixed Effects	Differences from OLS in %
i) Meet friends and relatives		
Once or twice a month	£57,500	64%
Once or twice a week	£69,500	38%
On most days	£85,000	33%
ii) Talk to neighbors		
Once or twice a month	n.s.	n.a.
Once or twice a week	£22,500	-5%
On most days	£37,000	-6%
iii) Socioeconomic variables		
Married	£50,500	-21%
Living as couple	£82,500	53%
Separated	-£139,000	-141%
Divorced	n.s.	n.a.
Widowed	-£208,500	n.a.
Unemployed	-£143,000	-93%
Disabled	-£165,500	-130%
Health: good	£423,500	69%
Health: excellent	£483,000	59%

Note: n.s. = not significantly different from zero; n.a. = not applicable. The estimates are taken from the fixed-effects regression in Table 6. The valuations are annually figures, and are measured in capita. Hence, a move from meeting friends or relatives less than once or twice a month to meeting friends or relatives on most day is worth around £85,000 a year when fixed personality traits have been controlled for in the regression. An average change in real annual household income per capita (in 1996 Pounds) is around £4,000. At the time of writing, the value of one pound sterling is approximately 1.5 US dollars.

Table A1: Table A1: Data Descriptions, Sample Means, and Standard Deviations BHPS: 1997-2003

Variables	Descriptions	Mean (all)	(within)
Life satisfaction	life satisfaction score, coded so that 1 = very dissatisfied, 7 = very satisfied	5.16 (1.28)	(0.36)
Frequency of meeting friends and relatives	frequency of meeting friends or relatives; 1 = less than once a month to never; 4 = on most days	3.31 (0.94)	(0.54)
Frequency of talking to neighbors	frequency of talking to neighbors; 1 = less than once a month to never; 4 = on most days	3.02 (0.76)	(0.48)
Real household income per capita	annual household income per capita (*1,000), adjusted to CPI index	9.84 (8.41)	(4.29)
Subjective health index	individual assessment of health in the past year; 1 = very poor, 5 = excellent	3.76 (0.98)	(0.55)
Men	gender of the respondent, men = 1	0.46 (0.50)	-
Age	age of the respondent	38.87 (13.61)	(1.43)
Age ² /100	age-squared/100 of the respondent	16.96 (10.94)	(1.20)
Unemployed	employment status of the respondent, unemployed = 1	0.04 (0.20)	(0.13)
Self-employed	employment status of the respondent, self-employed = 1	0.07 (0.26)	(0.12)
Family-cared	employment status of the respondent, family-cared = 1	0.08 (0.28)	(0.14)
Student	employment status of the respondent, student = 1	0.07 (0.25)	(0.12)
Retired	employment status of the respondent, retired = 1	0.06 (0.24)	(0.11)
Disabled	employment status of the respondent, disabled = 1	0.05 (0.22)	(0.10)
Education: high	education level of the respondent, higher education, i.e. university level	0.44 (0.50)	(0.15)
Education: A-levels, O-levels	education level of the respondent, tertiary education, i.e. A-levels, O-levels	0.34 (0.47)	(0.15)
Household size	number of people living in the household	3.08 (1.35)	(0.47)
Own home outright	whether the respondent owns home outright, yes = 1	0.17 (0.38)	(0.15)
Number of days in hospital last year	the number of days spent in hospital last year for the respondent	0.68 (5.05)	(3.59)
Number of children	number of children in the household	0.63 (1.00)	(0.29)
Married	marital status, married = 1	0.54 (0.50)	(0.14)
Cohabited	marital status, cohabiting with a partner = 1	0.13 (0.34)	(0.16)
Separated	marital status, separated = 1	0.02 (0.14)	(0.09)
Divorced	marital status, divorced = 1	0.06 (0.23)	(0.09)
Widowed	marital status, widowed = 1	0.02 (0.14)	(0.04)

Note: Standard deviations are in parentheses.

Table A2: Life Satisfaction Equations with Neighborhood Quality Variables (Fixed Effects Regression): BHPS, 1997-2003

	All		Changes from Table 5 in %
	Beta	T-ratio	
i) Meet friends and relatives			
Once or twice a month	0.118***	3.47	3%
Once or twice a week	0.143***	4.30	4%
On most days	0.174***	5.15	3%
ii) Talk to neighbours			
Once or twice a month	0.012	0.56	-8%
Once or twice a week	0.046**	2.25	2%
On most days	0.073***	3.29	-1%
iii) Socioeconomic variables	Yes		
iv) Quality of accommodation and neighborhood			
Shortage of space	-0.019	-1.38	
Noise from neighbors	0.007	0.42	
Street noise	0.006	0.38	
Not enough lights	-0.066***	-3.17	
Lack of adequate heating	0.025	1.02	
Condensation	-0.013	-0.78	
Leaky roof	-0.017	-0.65	
Damp walls, floors, etc.	-0.059***	-2.91	
Rot in windows, floors, etc.	-0.018	-0.91	
Pollution/environmental problems	-0.021	-1.04	
Vandalism or crime	-0.023	-1.59	
Average district income (in 1,000)	0.005	0.72	
Constant	5.782***	8.96	
Regional dummies	Yes		
Wave dummies	Yes		
N	53,770		
R-squared	0.0628		
F test that fixed-effects = 0	3.42	[0.000]	

Note: Standard errors are in parentheses. * < 10%, ** < 5%, *** < 1%.

Table A3: Social Networks and Domain Satisfaction Equations (Fixed Effects Regression): BHPS, 1997-2003

	Satisfaction with health	Satisfaction with income	Satisfaction with house	Satisfaction with spouse	Satisfaction with job	Satisfaction with social life	Satisfaction with leisure time
i) Meet friends and relatives							
Once or twice a month	0.034 (0.90)	0.039 (0.93)	0.040 (0.95)	0.107*** (2.84)	0.003 (0.05)	0.130*** (3.30)	0.075* (1.76)
Once or twice a week	0.039 (1.05)	0.014 (0.35)	0.052 (1.27)	0.096*** (2.58)	0.001 (0.03)	0.218*** (5.68)	0.148*** (3.58)
On most days	0.048 (1.28)	0.021 (0.50)	0.054 (1.29)	0.067* (1.77)	0.019 (0.37)	0.318*** (8.15)	0.249*** (5.93)
ii) Talk to neighbours							
Once or twice a month	-0.050** (-2.09)	-0.020 (-0.75)	0.068*** (2.56)	-0.021 (-0.83)	0.069** (2.15)	0.034 (1.37)	0.015 (0.56)
Once or twice a week	-0.010 (-0.44)	-0.005 (-0.18)	0.169*** (6.65)	0.006 (0.26)	0.054* (1.71)	0.056** (2.38)	0.042* (1.66)
On most days	0.000 (0.01)	0.018 (0.65)	0.210*** (7.65)	0.013 (0.50)	0.067** (1.94)	0.091*** (3.57)	0.084*** (3.06)
Real household income/1000	0.001 (0.68)	0.014*** (12.59)	0.004*** (3.42)	0.001 (1.22)	0.000 (-0.16)	0.002** (2.19)	0.000 (0.38)
iii) Socioeconomic variables							
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies							
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Wave dummies							
Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	54,238	54,130	54,108	40,269	39,371	54,233	54,253
R-squared	0.4016	0.0916	0.0185	0.0038	0.0305	0.0518	0.0548

Note: Standard errors are in parentheses. Domain satisfactions, like life satisfaction, are in 7-point scale, running from “1.very dissatisfied” to “7.very satisfied”. Satisfaction with leisure time is the satisfaction with the use of leisure time rather than the amount of leisure time. * < 10%, ** < 5%, *** < 1%.