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Abstract

The authors first investigate how income and job characteristics affect life satisfaction, then estimate compensating differentials for non-financial job characteristics. To address potential problems with using life satisfaction data as dependent variables, they draw on three Canadian surveys (conducted in the years 2002–2003) with different samples and questions, and they use individual personality measures, various robustness checks, and cross-testing with measures of domain satisfaction. The life satisfaction results show strikingly large values for non-financial job characteristics, especially workplace trust. For example, a one-third-standard-deviation increase in trust in management is equivalent to an income increase of more than one-third. These results, if confirmed by further research in other settings, suggest either that it is very costly to build and maintain workplace trust or that there are opportunities to improve workplace environments so as to increase both life satisfaction and workplace efficiency. The life satisfaction results show strikingly large values for non-financial job characteristics, especially for workplace trust, which we treat as a primary measure of the quality of workplace social capital. For example, an increase of trust in management that covers one tenth of the survey respondents is equivalent to an income increase of more than one-third. If these results should be confirmed in further work, and other countries, they would suggest either that it is very costly to build and maintain workplace trust or that there are opportunities to improve workplace environments so as to increase both life satisfaction and workplace efficiency.

HOW'S THE JOB? WELL-BEING AND SOCIAL CAPITAL IN THE WORKPLACE

JOHN F. HELLIWELL and HAIFANG HUANG*

The authors first investigate how income and job characteristics affect life satisfaction, then estimate compensating differentials for non-financial job characteristics. To address potential problems with using life satisfaction data as dependent variables, they draw on three Canadian surveys (conducted in the years 2002–2003) with different samples and questions, and they use individual personality measures, various robustness checks, and cross-testing with measures of domain satisfaction. The life satisfaction results show strikingly large values for non-financial job characteristics, especially workplace trust. For example, a one-third-standard-deviation increase in trust in management is equivalent to an income increase of more than one-third. These results, if confirmed by further research in other settings, suggest either that it is very costly to build and maintain workplace trust or that there are opportunities to improve workplace environments so as to increase both life satisfaction and workplace efficiency.

Adam Smith (1850, Book 1, Chap. 10, Pt. 1) argued that in the absence of policy or other impediments to mobility, wages would tend to adjust so as to be the same for all jobs of equivalent characteristics, so that wage differences would reflect the relative attractiveness of different kinds of employment. Smith's first factor—the agreeableness

or disagreeableness of the job—underlies subsequent research attempting to establish the value of life (Viscusi 1993) and to assess the value of different job characteristics, mainly those that are disagreeable rather than agreeable in nature. Valuing non-financial job characteristics is also our main focus in this paper. Our methodology, however, differs

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Appendices with additional information and results, including summary statistics, correlation tables, and various experimental regressions, are available at <http://www.econ.ubc.ca/helliwell/> under the category "Publications." The confidential data from the 2003 General Social Survey (GSS) and the 2002 Ethnic Diversity Survey (EDS) are hosted in the Research Data Centres (RDC). The data is accessible to researchers from within and outside Canada upon approval of the application for access. More information can be found from <http://www.statcan.ca/english/rdc/index.htm>. For access to the Canadian Equality, Security and Community (ESC) survey, or inquiries about other data or methodological issues, please contact John Helliwell at Department of Economics, 997–1873 East Mall, University of British Columbia, Vancouver, BC V6T 1Z1, Canada; john.helliwell@ubc.ca.

from that of most previous studies, since we do not estimate compensating differentials by using wages as the dependent variable, but instead calculate the income equivalents of different job characteristics by comparing the effects of income and job characteristics as factors influencing life satisfaction, with the latter being treated as a direct measure of utility.

In addition to specific measures of job characteristics and summary measures of job satisfaction, our measures of job quality include workplace trust, which we use as a measure of social capital in the workplace. The importance of social capital—defined by the OECD as “networks together with shared norms, values and understandings that facilitate co-operation within and among groups” (OECD 2001:41)—had by the millennium been widely recognized, and today social capital as a construct has pervasive influence throughout the social sciences (Putnam 2000). Surveys that collect measures of life satisfaction in conjunction with measures of social capital provide evidence that social capital (measured by marriage and family, ties to friends and neighbors, civic engagement, trustworthiness, and trust) is strongly linked to subjective well-being (Helliwell and Putnam 2004). The research so far has largely ignored life satisfaction and social capital in the workplace. Given the fact that workers spend about half of their weekday waking hours on the job, this omission is too important to ignore. Fortunately, the three surveys we use in this paper all provide measures of perceived trust in workplaces, in terms of either trust in management or trust among co-workers. We use these trust measures as a proxy for workplace social capital, which we view as part of job amenities. We hypothesize that there exists a market in which workers trade-off between trust and wages. The market, however, can be inefficient due to lack of information and the costs of searching for and changing jobs. The estimated compensating differentials can provide an implicit estimate of such costs. So far as we know, ours are the first estimates of compensating differentials for workplace trust.

The concept of compensating differentials provides, we think, the best way of framing

and presenting our workplace results. Using life satisfaction data to directly estimate a representative utility function, with ratios of the resultant coefficients subsequently used to estimate compensating differentials, seems a natural procedure, provided that one is prepared to accept the use of subjective measures of life satisfaction as proxy measures of utility, and that sufficiently strong, credible, and independent estimates can be obtained for the utility of both income and job characteristics. The use of measures of subjective well-being is longer established in psychology (for example, Kahneman, Diener, and Schwarz 1999) than in economics, despite the pioneering work of Easterlin (1974). However, there has been a large recent increase in the pace of economic research using subjective well-being data, as surveyed by Frey and Stutzer (2002) and Clark Frijters and Shields (2008).

Some papers have employed subjective well-being equations to estimate the effects of income relative to other features of life, using essentially the same reasoning and methodology we employ here (Judge et al 2001). There have also been papers explaining job satisfaction, and others exploring the linkages between job satisfaction and job performance.¹ Some papers explaining job satisfaction have interpreted ratios of coefficients in job satisfaction equations as compensating differentials (Blanchflower and Oswald 2004; Clark and Oswald 2002). In this paper we estimate the effects of income and job characteristics on both job satisfaction and life satisfaction, and we discuss the implications of the results for estimating compensating differentials. We also explore several aspects of the effects of income on life satisfaction. This is necessary for the accurate measurement of compensating differentials, and the results may also be of interest in their own right.

Problems with Usual Methods of Estimating Compensating Differentials

Most previous attempts to value non-financial aspects of jobs have focused on job

¹See the survey by Judge et al. (2001).

hazards, and have used wages or incomes as the dependent variable. The most obvious estimation problem is that posed by unmeasured differences in employee ability and training. With the usual assumption that safety is a normal good, more able or better-trained workers are in a position to choose jobs that produce more income and more safety. A typical estimation form is

$$(1) \quad \ln(y_i) = \alpha - \beta X_i + \gamma Z_i + \theta Z u_i + \varepsilon_i$$

where y_i is the earnings level for worker i ; X_i is a vector of job characteristics, applicable to worker i 's job, with compensating differentials estimated by the coefficient vector β ; the Z_i are measured characteristics of worker i ; the $Z u_i$ are unmeasured characteristics of the worker, the job, or the market environment in which the wage is being paid; and the ε_i are the assumed error terms. With cross-sectional data, the unobservable earning potential becomes part of the error term, so that the error term is correlated with both the dependent variable (earnings) and the job characteristics used as independent variables. The estimation of β will be biased downward (Hwang, Reed, and Hubbard 1992).

Data from one of the surveys on which we draw for this study can be used to illustrate the reality of this problem, and to show also that attempts to remove the bias by allowing for the effects of education on income are likely to be insufficient. In the Canadian Equality, Security and Community (ESC) survey, working respondents are asked to indicate the extent to which their jobs and workplaces possess several characteristics that are presumed (and subsequently found) to have a positive influence on life satisfaction, independent of the level of income. Each respondent is asked whether his or her job allows substantial independent decision-making, requires a high level of skill, has a variety of tasks, provides enough time to get the work done, and is free of conflicting demands.² Respondents are also asked to

rate the level of trust that workers have in management at their workplace. Of these six factors, three have positive correlations with income (decision scope, skill, and variety), and the other three have negative correlations. This pattern holds whether the correlations with income are measured individually or jointly, and whether or not the substantial effects of education on income are allowed for in the way depicted by equation (1).³ The empirical results reported by Brown (1980) suggest that while omitted ability may be part of the story, it is not the only reason for earlier failures to find plausible estimates of equalizing differentials.

More recently, Lang and Majumdar (2004), using a theoretical job search model in which jobs are depicted as having both pecuniary and non-pecuniary aspects, showed that when certain frictions are present, the resulting equilibrium allocation of workers to jobs can be expected to produce a cross-sectional positive simple correlation between income and (favorable) non-pecuniary job characteristics, even if workers are homogeneous. This happens because in a Butters equilibrium (see footnote 2 of the cited paper for detailed description), firms use a mixed strategy, offering different combinations of wages and nonwage amenities (for example job safety) to workers. Some of these packages give firms higher profit, but are less likely to be accepted by workers. Some other packages give firms lower profit, but are more likely to attract workers. When firms offer the unattractive packages, they tend to reduce wages and job amenities at the same time, assuming that wages and amenities are normal goods. If the equilibrium admits a continuum of attractive/unattractive packages, there will be a positive cross-sectional correlation between wages and amenities under some rather general conditions.

²The answers to the job characteristics questions are given on a four-point scale. The trust in management question has a 1–10-point scale. All responses to these questions are converted to a 0 to 1 scale for the analysis presented below.

³If a version of equation (1) is estimated using all six job characteristics and three education-level variables, the sign patterns are as described in the text. Of the "correctly" (negatively) signed job characteristics, "free of conflicting demands" is statistically insignificant. See the Appendix for details.

Using Life Satisfaction Data to Value Job Characteristics

The econometric difficulties posed by using wage equations to identify compensating differentials suggest that it might be more promising to use subjective well-being data as a direct measure of utility, thereby permitting compensating differentials to be estimated as ratios of coefficients estimating the well-being effects of income and job characteristics. More precisely, our proposed approach is to linearize a general utility function $U(y, X)$ at the equilibrium point, then to estimate the marginal contributions of job characteristics and income to life satisfaction, and finally to calculate the compensating differentials directly from these estimated coefficients as ratios of the job characteristics coefficients to the coefficient on the (log of) income. To the extent that jobs are actually available with the characteristics in question, these ratios should reflect the prevailing market valuations of job attributes, usually described as compensating differentials.⁴

Our estimation strategy generally treats reported job characteristics as exogenous variables. To guard against the risks that there are excluded variables (pertaining perhaps to personality, for example) that would cause respondents to give more positive assessments of job characteristics and of satisfaction with their jobs and lives, we test the robustness of our results in many ways, and generally choose specifications that produce lower rather than higher estimates of the effects of workplace characteristics on measures of job and life satisfaction.

In its general form, the proposed strategy is described by

$$(2) \quad LS_i = \delta \Phi_y(y_i) + \mu \Phi_x(X_i) + \gamma Z_i + \varepsilon_i$$

$$(3) \quad \beta = \mu/\delta,$$

⁴A very similar approach has been used by Frey and Stutzer (2004) to value commuting time in Switzerland, and by van Praag and Baarsma (2005) to estimate compensating differentials for aircraft noise in the neighborhoods surrounding Amsterdam Airport. As already noted, the same procedure is implicitly used by all well-being researchers attaching monetary equivalents to any aspect of life.

where LS is the mnemonic for life satisfaction, $\Phi_y(y)$ is the functional form for income, $\Phi_x(X)$ is the functional form for job attributes, and Z_i are all other controls. We use the log functional form to reflect not only standard economic assumptions, but also many empirical results suggesting that less affluent agents derive greater utility from extra income. Therefore, $\Phi_y(y) = \log(y)$. For job attributes, we assume that their per unit contribution to workers is the same regardless of income or level of X , so that $\Phi_x(X_i) = X_i$.

We take into account this functional form in expressing compensating differentials. For instance, in our empirically preferred case where income is in log form and X is in linear form, β will be the log change in income (we convert to percentage changes in our key tables of results) that has for the average employee the same life satisfaction effect as a hypothetical change in the non-financial job characteristic X .

Regarding the use of log income, we have also considered alternative ways of estimating the effects of income on life satisfaction. In our previous work (for example, Helliwell 2003), we included dummy variables for each of several income classes, so as not to constrain the all-important functional form linking income and life satisfaction. For the current paper, we tested the logarithmic form and found it to be an acceptable simplification.⁵ We prefer the logarithmic over the linear form for two main reasons. First, it increases comparability with earlier studies of compensating differentials using the log form. Second, if a logarithmic form

⁵For all three surveys, an encompassing model for life satisfaction including both household income and its logarithm ($r = .73$ between these two variables in ESC) allows the linear income variable, but not the log form, to be excluded. The pure linear form is also dominated in all three surveys by an equation including the income class dummy variables. To add comparability with other studies, we have also calculated compensating differentials from a model using linear income. For changes covering 10% of the sample, moving from the mean, the compensating differentials calculated using the linear form for income are always larger (on average, two times larger) than those using the theoretically and empirically preferable log-linear form. Thus our wish to err, if at all, on the low side also supports our selection of the log-linear form.

should prove to be empirically defensible, it introduces in a simple way the presumed non-linearities that reduce capacity to pay as incomes fall very low, and reveals declining marginal utility of consumption as incomes get large.

We also include in the vector of Z_i the log of average household income in the census tract in which the respondent resides. We include census tract income because (a) research shows it has a significant negative effect on individual SWB, and (b) it is positively correlated with individual incomes. Hence the coefficient on individual income is higher if the census tract income is included. So including census tract income is consistent with our general strategy of choosing larger over smaller estimates of the SWB effect of income relative to that of trust or other workplace characteristics.

The Z_i vector also includes many direct determinants of utility, included to ensure as best we can that our estimates of the effects of income and workplace characteristics are relatively accurate and, hence, useful for constructing estimates of the income-equivalent values of various elements of workplace amenities and job satisfaction. These control variables include gender, age, and marital status, as well as level of education, immigration status, and ethnic information. They also include a measure of self-perceived health status (on a scale 1 to 5, with higher numbers representing better health), which we believe controls not only for physical health, but also for psychological health and some unobserved personality differences. Furthermore, we have information from all three surveys about the respondent's frequency of contacts with family members outside the household, with friends, and with neighbors, and also the number of memberships (or extent of activity) in voluntary organizations.⁶ Finally, we also make use of a "mastery" scale included

in the GSS survey, which is derived from a set of questions designed to document the extent to which respondents feel they are in command of their circumstances (more later about mastery). The measures of social interaction and of mastery are both likely to be correlated with individual personality differences that might be expected to be positively correlated with subjective assessments of workplace trust, and also with job characteristics and income.

We use survey-ordered Probit estimation with errors presumed to be clustered at the level of the census tract to allow for omitted community-level determinants of life satisfaction. Although the Probit and linear forms give similar results for compensating differentials, the Probit form is perhaps more convincing, since it permits us to drop the cardinality assumption required for the linear form.

The approach of using life satisfaction as the dependent variable is not without its potential drawbacks. The biggest concern is the likely contamination by omitted individual fixed effects. A person whose nature is more confident or cheerful may have the tendency to report a high level of life satisfaction and job satisfaction, as well as more favorable impressions of the workplace he or she is working in. We deal with this possible contamination through multiple levels of controls. When there are variables that directly measure some aspects of individual personality, such as the mastery scale in the GSS, we include them in the regression. We also include variables that might reflect personality in the same way as do self-assessments of life satisfaction: for example, subjective health assessments, satisfaction in other life domains (in GSS), and sociability, such as interactions with neighbors, friends, and family outside the household. We find, as expected, that the addition of these variables usually lowers the estimated compensating differentials. We suspect that these control variables may even over-compensate for personal fixed effects. This is a risk we are willing to take to remain on the conservative side in our estimates of compensating differentials. Our decision not to use instrumental variables for household income was made in part for

⁶These measures are all scaled between zero and one, although they are not defined in the same way across all three surveys, so their coefficients are not strictly comparable across surveys. For more information about these controls, and how they influence life satisfaction, see Helliwell (2003, 2006) and Helliwell and Putnam (2004).

the same reason. The usually presumed risk is that income and life satisfaction might both be affected by the same excluded variables, and in the same direction. If so, then use of instrumental variables for income would lower the estimated life satisfaction effects of income, and would hence run against our general estimation strategy. In addition, any of the candidate variables are also likely to have direct effects on life satisfaction beyond those flowing indirectly through income.

Data and Empirical Implementation

Our three survey sources include the second wave (2002–2003) of the SSHRC-supported Equality, Security, and Community survey (ESC hereafter, and described in more detail in Soroka et al. 2007)⁷ and two Statistics Canada surveys: the 2002 post-censal Ethnic Diversity Survey (EDS), and the 2003 General Social Survey (GSS). The scope and contents of the two latter surveys are described in detail on the Statistics Canada websites,⁸ and these data were accessed through the Inter-University Research Data Centre located at UBC. The surveys differ in their sample size and the nature and number of questions asked. For the results reported in this paper, we generally restrict our analysis to the working population, comprising roughly 2,000 usable respondents for the second wave of the ESC, 20,000 for the EDS, and 10,000 for the GSS. Fortunately, the same life satisfaction question⁹ is asked in all three surveys: “In general, how satisfied are you with your life as a whole these days, on a scale of ...?” A ten-point scale is used for responses in the ESC and GSS, and a 5-point scale in the

EDS. We use survey-ordered Probit regressions for the estimations, and use the ratio of coefficients to capture the relative marginal probability effects. The scale difference is therefore inconsequential, beyond any possible information loss in the more restricted five-point scale.

ESC: The Second-Wave Canadian Equality, Security, and Community Survey

ESC asked a job satisfaction question on a 10-point scale, as well as a number of questions relating to job characteristics, which we use in two different ways, both to estimate a reduced-form equation in which job characteristics are used directly as part of the explanation for life satisfaction, and in the estimation of an instrumental variable for job satisfaction designed to avoid variation due to income effects, personality differences, and issues related to the framing of questions. The wording of the relevant questions is shown in Appendix Table A1.

Equations (4) to (7) describe our estimation approach. Among these equations, we interpret equations (4) and (6) as direct utility functions. Equation (4) is designed to estimate compensating differentials for specific job characteristics:

$$(4) \quad LS_i = \alpha + \delta_1 \ln(y_i) + \delta_2 \ln(y_{ct}) + \mu X_i + \gamma Z_i + \theta Z_{u_i} + \varepsilon_i$$

LS_i is life satisfaction for respondent i , measured on a scale of 1 to 10, y_i is the level of income of the respondent's household (we partition household income into personal income and income from other family members; there is more discussion of this point later), y_{ct} is the average level of household income in the respondent's census tract, and the other variables are as in equation (1), except that the coefficients now measure their impact on life satisfaction rather than on wages, and the variable set is expanded to include all other determinants of life satisfaction. When we use equation (4) for the working population sample to estimate the value of job characteristics, we do so by taking the ratio of a coefficient on one of the components of the job characteristic vector X to δ_1 , the coefficient on log income. This

⁷Description of the survey can also be found on the website maintained by the Centre for Research on Economic and Social Policy, University of British Columbia. URL: <http://www2.arts.ubc.ca/cresp/bk2nonsec.htm>.

⁸For the EDS, www.statcan.ca/english/sdds/4508.htm; for GSS, <http://www.statcan.ca/cgi-bin/imdb/p2SV.pl?Function=getSurvey&SurvId=21136&SurvVer=1&InstalId=21137&InstaVer=1&SDDS=5024&lang=en&db=imdb&imdbg=f&adm=8&dis=2>.

⁹Diener et al. (1985) reported that answers to the life satisfaction question were the strongest (tied with “my life is close to ideal”) component of their multi-factor satisfaction with life scale, and had the highest intertemporal correlation.

matches the functional form assumptions implicit in most previous attempts to evaluate job characteristics using wage equations. It assumes that for each worker the monetary value of a change in some job characteristic is measured as a fraction of his or her income, which in turn implies that higher-income households are prepared to give up more dollars to obtain a higher level of non-financial job satisfaction. We report later on the fit and implications of alternative functional forms, finding that this simple form performs well against more complex alternatives. In any event, all of the versions we have considered give us similar basic results.

In equations (5) to (7), we limit the well-being effects of job characteristics by assuming that they flow entirely through direct measures of job satisfaction. This is equivalent to estimating the well-being effect of job satisfaction using instrumental variables. In reporting the estimation results, we will compare the findings based on this approach, as represented by equation (6), with those based on the reduced-form equation (4).

$$(5) \quad JS_i = \alpha_j + \delta_{1j} \ln(y_i) + \delta_{2j} \ln(y_{it}) \\ + \mu_j X_i + \gamma_j Z_i + \theta_j Z u_i + \varepsilon_{ij}$$

$$(6) \quad LS_i = \alpha + \delta_1 \ln(y_i) + \delta_2 \ln(y_{it}) \\ + \mu JS_n_i + \gamma Z_i + \theta Z u_i + \varepsilon_p$$

where

$$(7) \quad JS_n_i = \widehat{JS}_i - \widehat{\delta}_{1j} * \ln(y_i)$$

where JS_i is the measure of job satisfaction and JS_n_i is the adjusted measure of non-financial job satisfaction we define for the ESC survey. The main challenge in estimating the well-being effect of job satisfaction is the possibility that survey responses about job satisfaction and about life satisfaction are influenced by the same excluded variables or are subject to similar measurement errors. We want to eliminate, or even over-compensate for, these risks of positive bias so that our estimates of the well-being effects of job satisfaction can reasonably be thought to err on the conservative side. This consideration motivates the two-stage instrumental estimation described by equations (5) and (6). The ESC survey provides a fairly broad set of answers to par-

ticular questions about job characteristics, which we collect in vector X_i for worker i . These are specific enough to remove the personality factors that commonly influence assessments of both job and life satisfaction, while numerous enough to span the main determinants of job satisfaction, and hence provide a suitable basis for instrumental variables regression. This should serve to eliminate the risks from omitted variables, question-framing and placing issues, and two-way causality.

In equation (7) we remove the effects of income entirely from our instrumented job satisfaction. In this equation, \widehat{JS}_i is the fitted value of life satisfaction from equation (5), and $\widehat{\delta}_{1j}$ is the estimated coefficient of log income in the first-stage regression for job satisfaction using equation (5). The adjusted measure JS_n in equation (7) is what we use in the life satisfaction equation (6). JS_n is to be seen as a measure of non-financial job satisfaction. The ratio of its coefficient to that of log income thus measures the log change in household income that would provide the same life satisfaction as a one-unit change in non-financial job satisfaction. We choose to purge the income effect from job satisfaction so that when we estimate equation (6), all the force of income will flow through the coefficient of income variables, or δ_1 . We expect this to increase the coefficient size of the income effect, thereby reducing the compensating differential. This reflects our desire to err on the conservative side in estimating the compensating differentials.¹⁰ In general, we prefer the reduced form equation (4) over the two-stage approach

¹⁰Another possibility would be to simply leave income out of the first-stage JS equation, intending that the full reduced-form effects of income would thereby be captured in the LS equation. However, given the positive simple correlations between income and other job characteristics, this would be expected to bias downward the estimated effect of income in the LS equation, something that we are anxious to avoid. Experiments with the ESC data show this to be the case. By excluding income from the first-stage regression, we obtain a smaller income effect in the LS equation, and hence a larger estimate of the compensating differential, than we get using our preferred method, although the difference is very small.

Table 1. Well-Being Equations in ESC and GSS, Estimated with Instrumented/Adjusted Job Satisfaction: Survey Ordered Probit

Dependent Variable: Life Satisfaction (1–10 point scale)	ESC Sample		GSS Sample
	No. Obs. = 1862 F(33, 557) = 12.6	No. Obs. = 1862 F(28, 562) = 13.7	No. Obs. = 9949 F(37, 3532) = 66
Mastery Scale, with Income Effect Subtracted (GSS only)			1.05 [0.10]***
Job Satisfaction, with Income Effect Subtracted (instrumented in ESC, adjusted in GSS) ^a		0.15 [0.02]***	0.15 [0.01]***
Log of Personal Income	0.19 [0.04]***	0.22 [0.04]***	
Log of Other Family Members' Income	0.07 [0.02]***	0.06 [0.02]***	
Log of Total Household Income (GSS only)			0.21 [0.03]***
Log of Avg. Household Income in Census Tract	-0.19 [0.08]**	-0.18 [0.08]**	-0.18 [0.04]***
Satisfaction with Health (GSS only)			0.20 [0.02]***
Satisfaction with the Way Other Time Is Spent (GSS only)			0.20 [0.01]***
Satisfaction with Financial Situation, with Income Effect Subtracted (GSS only)			0.16 [0.01]***
Job: Makes Own Decisions (ESC only)	-0.16 [0.12]		
Job: Requires Skill (ESC only)	0.35 [0.12]***		
Job: Has Enough Time (ESC only)	0.20 [0.09]**		
Job: Free of Conflicting Demands (ESC only)	0.16 [0.08]**		
Job: Has Variety of Tasks (ESC only)	0.37 [0.13]***		
Job: Trust in Management (ESC), or in Co-Workers (GSS)	0.56 [0.11]***		
Self-Perceived Health Status, scaled 1 to 5	0.26 [0.03]***	0.25 [0.03]***	0.04 [0.02]*
Gender: Male	-0.14 [0.05]**	-0.12 [0.05]**	-0.10 [0.03]***
Age Group: 25-34	-0.26 [0.11]**	-0.24 [0.11]**	-0.17 [0.06]***
Age Group: 35-44	-0.14 [0.11]	-0.10 [0.11]	-0.27 [0.06]***
Age Group: 45-54	-0.17 [0.12]	-0.16 [0.12]	-0.30 [0.06]***
Age Group: 55-64	0.08 [0.14]	0.07 [0.14]	-0.27 [0.07]***
Age Group: 65 up	0.13 [0.3]	0.04 [0.3]	-0.07 [0.15]
Marital Status: Married	0.25 [0.09]***	0.26 [0.09]***	0.32 [0.04]***
Marital Status: As If Married	0.31 [0.1]***	0.35 [0.11]***	0.21 [0.04]***
Marital Status: Divorced	-0.08 [0.17]	-0.08 [0.16]	-0.12 [0.07]*
Marital Status: Separated	-0.27 [0.16]	-0.28 [0.15]*	-0.05 [0.05]
Marital Status: Widowed	-0.32 [0.32]	-0.33 [0.34]	-0.22 [0.11]**
Education: High School	-0.06 [0.11]	-0.05 [0.11]	-0.18 [0.06]***
Education: Some College, No University Degree	-0.06 [0.1]	-0.04 [0.1]	-0.15 [0.05]***
Education: University Degree	-0.06 [0.11]	-0.04 [0.11]	-0.23 [0.06]***

Continued

of equation (6), since the latter requires all of the influence of non-financial job characteristics on life satisfaction to flow through job satisfaction. The more general reduced form admits the very real possibility, which we shall demonstrate later, that non-financial job characteristics have some direct effects on life satisfaction beyond those mediated by job satisfaction.

We present estimation results using equations (4) and (6) in the first two columns of Table 1.¹¹ Column (1) refers to equation

(4). It has six job characteristics, including the measure of workplace trust, in the vector of X_i . In column (2) we present the results from equation (6), in which the instrumented non-financial job satisfaction is the only workplace variable. The first-stage estimation of equation (5), to provide the instruments for equation (6), is shown in Appendix Table A2.

We calculate the compensating differentials for a job characteristic (or job satisfac-

¹¹Besides the tables presented in this publication, we also prepared a set of auxiliary tables that are available at

<http://www.econ.ubc.ca/helliwell/> under the category "Publications." These auxiliary tables include summary statistics, correlation tables, and various experimental regressions.

Table 1. Continued

Dependent Variable: Life Satisfaction (1–10 point scale)	ESC Sample		GSS Sample
	No. Obs. = 1862 <i>F</i> (33, 557) = 12.6	No. Obs. = 1862 <i>F</i> (28, 562) = 13.7	No. Obs. = 9949 <i>F</i> (37, 3532) = 66
Contacts with Family Member outside Household	0.09 [0.09]	0.08 [0.09]	0.17 [0.04]***
Contacts with Friends	0.28 [0.1]***	0.26 [0.1]***	0.01 [0.06]
Contacts with Neighbors	0.02 [0.08]	0.04 [0.08]	-0.04 [0.05]
Number of Memberships or Extent of Activity	-0.01 [0.01]	-0.01 [0.02]	-0.01 [0.03]
Trust in General	0.06 [0.06]	0.05 [0.06]	-0.07 [0.03]**
Trust in Neighbors	0.19 [0.08]**	0.20 [0.08]**	0.07 [0.02]***
Trust in Police / Confidence in Police	0.28 [0.11]***	0.31 [0.1]***	0.24 [0.06]***
Importance of Religion	0.06 [0.1]	0.07 [0.1]	0.10 [0.05]**
Frequency of Attending Religious Services	0.06 [0.11]	0.03 [0.11]	-0.06 [0.05]
Immigrant (GSS only)			-0.02 [0.04]
Ethnic: Aboriginal (GSS only)			0.13 [0.09]
Ethnic: Chinese (GSS only)			-0.09 [0.08]
Ethnic: South Asian (GSS only)			-0.20 [0.10]**
Ethnic: Others, Excluding Those of Western Europe (GSS only)			0.01 [0.04]
Living in Non-Tracted Area (GSS only)			-0.02 [0.03]

^aIn ESC, we instrument job satisfaction with job characteristics and workplace trust. We then remove the estimated income effect through subtraction. In GSS, due to lack of sufficient workplace information, we use reported job satisfaction net of the estimated income effect.

Here we use a linear predictive model in the first-stage regression. Alternatively, we can use linear regressions for both the first stage and the second stage. These two approaches give similar results. For example, the ratio of coefficients between trust in management and the log of income is 2.89 under the all-linear assumption, versus 2.97 in this table.

Further notes:

All satisfaction measures are on the scale of 1–10, and health is on a 5-point scale. Mastery scale and trust measures, all job characteristics, and family, friends, neighbors, and religious measures are recoded to cover the interval between 0 and 1.0.

ESC stands for the Canadian Equality, Security, and Community Survey, wave 2002/03. GSS stands for the Canadian General Social Survey–Cycle 17, Social Engagement Survey, 2003.

Standard errors are in brackets.

*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

tion) based on the ratio of its estimated coefficient to that of the log of income. This ratio is reported in Table 2. The compensating differential is calculated for a change in a job characteristic that is equal to one-third of the sample standard deviation of the characteristic at issue. If the distribution is normal, one-third of a standard deviation covers slightly more than 10% of the sample when starting from the mean. Since many of the variables are in categories, and the distributions in any event differ from the normal, we also present alternative calculations showing the compensating differential for a characteristic change that is equal to one-tenth of the bottom-to-top scale. Both measures of compensating differentials are presented in Table 2.

We shall defer further discussion of the estimated results until after we have presented the implementation of our empirical strategy in GSS and the EDS.

The GSS: The Canadian 2003 General Social Survey

The biggest difference between GSS and ESC is that in GSS we have no specific measures of job characteristics except for trust in co-workers. We therefore need a different empirical strategy. If we were to mimic the instrumental approach similar to that in ESC by regressing job satisfaction on workplace variables first, we would have to rely solely on variation in workplace trust. We instead adopt the alternative approach of using reported job satisfaction after purging it of the

Table 2. Estimated Compensating Differentials and Their Standard Errors

Panel A: Compensating Differentials for Non-Financial Job Satisfaction, ESC and GSS	
ESC (based on column 2 of Table 1)	
Ratio: coefficient of non-financial job satisfaction over coefficient of log of personal income	0.66 [0.17]*** ^a
The implied percentage income equivalence of a one-unit increase out of a ten-point scale	94.4% ^b [24.3%] ^c
Increase equal to one-third of a standard deviation	42% ^d [10.8%]
GSS (based on column 3 of Table 1)	
Ratio: coefficient of non-financial job satisfaction over coefficient of the log of family income	0.71 [0.10]*** [0.10]*** ^e
The implied percentage income equivalence of a one-unit increase out of a ten-point scale	103.5% [15%]
Increase equal to one-third of a standard deviation	41.4% [5.8%]
Panel B: Compensating Differentials for Specific Job Characteristics, ESC Only	
Job: Requires skill (based on column 1 of Table 1)	
Ratio: job attribute's coefficient over the coefficient of the log of personal income	1.85 [0.88]**
The implied percentage income equivalence for one-tenth of the total scale	20.4% ^f [9.7%]
The implied percentage income equivalence for one-third of a standard deviation	18.0% [8.6%]
Job: Have enough time (based on column 1 of Table 1)	
Ratio: job attribute's coefficient over the coefficient of the log of personal income	1.06 [0.55]*
The implied percentage income equivalence for one-tenth of the total scale	11.2% [5.8%]
The implied percentage income equivalence for one-third of a standard deviation	11.9% [6.2%]
Job: Has variety of tasks (based on column 1 of Table 1)	
Ratio: job attribute's coefficient over the coefficient of the log of personal income	1.97 [0.89]**
The implied percentage income equivalence for one-tenth of the total scale	21.7% [9.8%]
The implied percentage income equivalence for one-third of a standard deviation	16.7% [8.5%]
Job: Trust in management (based on column 1 of Table 1)	
Ratio: job attribute's coefficient over the coefficient of the log of personal income	2.97 [0.93]***
The implied percentage income equivalence for one-tenth of the total scale	34.5% [10.8%]
The implied percentage income equivalence for one-third of a standard deviation	29.0% [9.1%]

Note: In panel B, only job characteristics that have statistically significant compensating differentials ($p < .10$) are shown. This means we left out "making own decisions" and "free of conflicting demands."

^aThe standard error of the ratio is calculated from the covariance matrix using the Delta method.

^bCompensating differentials for a one-unit increase out of a ten-point scale are calculated as $(\exp(\text{ratio}) - 1)$.

^cThis is just the compensating differential multiplied by the estimated coefficients of variation of the ratio.

^dThis is simply the compensating differential for one point multiplied by a factor equal to one-third of a standard deviation of the relevant variable. Such a move covers about one-tenth of the sample. If the distribution is normal, one-third of a standard deviation covers slightly more than 10% of the sample when starting from the middle.

^eGSS provides bootstrap weights, so we perform bootstrapping as a measure alternative to the standard error.

^fThe income equivalence for one-tenth of the total scale is calculated from the ratio as $(\exp(\text{ratio}/10) - 1)$.

Standard errors are in brackets.

*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

direct effects of income. Thus we explicitly convert the overall measure of job satisfaction into one that reflects only satisfaction with non-financial aspects of the job. Formally, we define non-financial satisfaction in GSS as

$$(7-b) \quad JSn_i = JS_i - \hat{\delta}_{1j} * \ln(y_i)$$

This differs from equation (7) in that equation (7) uses the fitted value of job satisfaction. The GSS approach has the advantage of including the effects of all the additional determinants of non-financial job satisfaction, but at the expense of some possible

bias caused by unobservable individual fixed effects that influence both job satisfaction and life satisfaction. We attempt to deal with this risk by testing the robustness of the job satisfaction effect to the inclusion of other variables likely to be correlated with both job satisfaction and life satisfaction. These include a mastery variable and various measures of satisfaction in other domains of life. We also perform robustness checks using quintile regressions and eliminating respondents with little variation in their answers to the domain-satisfaction questions. In the following discussion, we describe the

use of the mastery and domain satisfaction variables in more detail.

Controlling for Mastery

GSS contains a series of questions designed to measure each respondent's psychological coping resources (Pearlin and Schooler 1978:20). The "mastery scale" thereby constructed may run the risk of over-correcting for the effects of pure personality differences, since the answers document the extent to which respondents feel they are in command of their circumstances.¹² The answers will thus be influenced not just by underlying personality traits, but also by the current range of problems exercising each respondent's coping skills.

To illustrate the change caused by adding the mastery scale, we compare two regressions for life satisfaction, one with the mastery scale and the other without, but otherwise identical. The two regressions are presented in Table 3. Because the previous literature has argued that the often-found positive relation between job satisfaction and life satisfaction might be due to the correlation with unmeasured personality differences (Arvey et al. 1989; Heller et al. 2002), it is important to note some of the key consequences of including individual-level personality variables.

We adjusted the mastery scale to remove its correlation with income, so as to avoid the lower income coefficient in the LS equation that would otherwise result. We had previously observed from our experiments that the effects of income on life satisfaction are much smaller when the unadjusted mastery scale is included in the equation. This may be because those with better coping personalities are more able to find and hold higher-paying

positions. It may also be because those who have higher incomes, from any source, may feel better placed to deal with whatever comes their way. The coefficient on non-financial job satisfaction, on the other hand, is unchanged by addition of the mastery scale. Combined with the lower estimated effects of income, this means that making explicit allowance for individual personality differences raises rather than lowers the size of the resulting estimates of compensating variations for non-financial job satisfaction. Since we wish our estimates of these differentials to err if anything on the conservative side (because they are likely to be thought surprisingly large), we base our results on a measure of mastery adjusted to remove its correlation with income. This procedure restores the income coefficient to what it was without the inclusion of the mastery scale, making it easier to compare the GSS results with those from the other surveys, since the ESC and the EDS do not have personality variables.

The first thing to note with regard to the results shown in Table 3 is that personality does indeed appear to have a strong positive relationship with life satisfaction, with the statistical significance of the mastery scale coefficient being exceeded only by that of job satisfaction. This is consistent with numerous psychological studies, including those of identical twins raised together or apart (Tellegen et al. 1988), that show a large degree of heritability in happiness-determining aspects of personality. It is remarkable, and encouraging, that the introduction of such an important variable has almost no effect on the size and statistical significance of the coefficient on job satisfaction. Nor does it lead to statistically significant changes in some frequently observed cross-sectional correlations that skeptics have ascribed to personality differences. For example, it has been argued that the strong positive correlation between being married and being satisfied with life exists because marriage is to a substantial degree a sorting device that enables those who are outgoing and able to cope well to find and wed equally self-assured spouses, making marriage a prize rather than a causal factor. Our results cast some doubt on that interpretation, as the coefficient

¹²The index, labeled a "mastery scale" by Statistics Canada, is based on a principal component analysis of extent of agreement with the following statements: I have little control over the things that happen to me; There is really no way I can solve some of the problems I have; There is little I can do to change many of the important things in my life; I often feel helpless in dealing with the problems of life; Sometimes I feel that I'm being pushed around in life; What happens to me in the future depends mainly on me; I can do just about anything I really set my mind to do.

Table 3. Before the Final GSS Equation in Table 1, from Survey Ordered Probit

<i>Dependent Variable: Life Satisfaction (1–10 Point Scale)</i>	<i>GSS Sample</i>	
	<i>No. Obs. = 9,949 F(33,3536) = 59.2</i>	<i>No. Obs. = 9,949 F(34,3535) = 60.46</i>
Mastery Scale, with Income Effect Subtracted		1.20 [0.1]***
Job Satisfaction, with Income Effect Subtracted	0.24 [0.01]***	0.23 [0.01]***
Log of Total Household Income	0.14 [0.03]***	0.17 [0.03]***
Log of Avg. Household Income in Census Tract	-0.17 [0.04]***	-0.16 [0.04]***
Self-Perceived Health Status, Scaled 1 to 5	0.32 [0.02]***	0.30 [0.02]***
Gender: Male	-0.05 [0.03]**	-0.06 [0.02]***
Age Group: 25~34	-0.22 [0.06]***	-0.21 [0.06]***
Age Group: 35~44	-0.37 [0.06]***	-0.35 [0.06]***
Age Group: 45~54	-0.43 [0.06]***	-0.38 [0.06]***
Age Group: 55~64	-0.35 [0.07]***	-0.30 [0.07]***
Age Group: 65 up	-0.17 [0.15]	-0.11 [0.15]
Marital Status: Married	0.27 [0.04]***	0.28 [0.04]***
Marital Status: As If Married	0.16 [0.04]***	0.16 [0.04]***
Marital Status: Divorced	-0.23 [0.07]***	-0.24 [0.06]***
Marital Status: Separated	-0.07 [0.05]	-0.09 [0.05]*
Marital Status: Widowed	-0.17 [0.11]	-0.18 [0.11]
Education: High School	-0.21 [0.06]***	-0.21 [0.06]***
Education: Some College, No University Degree	-0.19 [0.05]***	-0.22 [0.05]***
Education: University Degree	-0.26 [0.06]***	-0.32 [0.06]***
Contacts with Family Member outside Household	0.21 [0.04]***	0.21 [0.04]***
Contacts with Friends	0.13 [0.05]**	0.12 [0.05]**
Contacts with Neighbors	0.00 [0.05]	-0.01 [0.05]
Number of Memberships or Extent of Activity	0.04 [0.03]	0.01 [0.03]
Trust in General	-0.02 [0.03]	-0.07 [0.03]**
Trust in Neighbors	0.13 [0.02]***	0.12 [0.02]***
Trust in Police / Confidence in Police	0.31 [0.06]***	0.28 [0.06]***
Importance of Religion	0.10 [0.05]**	0.12 [0.05]**
Frequency of Attending Religious Services	-0.09 [0.05]*	-0.08 [0.05]
Immigrant	-0.03 [0.04]	-0.01 [0.04]
Ethnic: Aboriginal	0.14 [0.08]*	0.13 [0.08]
Ethnic: Chinese	-0.09 [0.08]	-0.03 [0.08]
Ethnic: South Asia	-0.19 [0.11]*	-0.13 [0.11]
Ethnic: Others, Excluding Those of Western Europe (GSS only)	-0.02 [0.04]	0.00 [0.04]
Living in Non-Tracted Area	0.00 [0.03]	0.01 [0.03]

Notes: The difference between the two columns is the addition of the mastery scale in the second column. When the domain satisfaction variables are then added, the result is Table 1's GSS equation. All satisfaction measures are on the scale of 1–10, and health is on a 5-point scale. Mastery scale and trust measures, all job characteristics, and family, friends, neighbors, and religious measures are recoded to cover the interval between 0 and 1.0. GSS stands for the Canadian General Social Survey–Cycle 17, Social Engagement Survey, 2003. Standard errors are in brackets.

*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

on marriage retains its size and statistical significance when the mastery variable is included. The introduction of the mastery scale does, however, have expected effects on other variables, such as education and age.¹³

¹³The previously modest negative partial effects of higher education on life satisfaction (the simple correlation is strongly positive) become larger and more

Using Domain Satisfaction Measures to Deal with Personality, Framing, and Spill-Over Effects

Even after we partially control for personality differences with the mastery scale,

significantly negative, as one would expect to be the case if education provides students a chance to develop their latent coping skills. The inclusion of the mastery

our GSS equations remain exposed to the possibility of framing effects, reverse causality, or spill-over effects, and there is some remaining risk that variations in optimism through time and across individuals might skew answers to all satisfaction equations in ways not fully accounted for by the inclusion of the mastery scale. Fortunately, the GSS includes other domain satisfaction questions, each of which is likely to have a direct effect on life satisfaction but also to be subject to similar biases. We have therefore included the GSS responses to three key domain satisfaction questions, one related to health satisfaction, a second measuring satisfaction with the way non-work time is spent, and the third measuring financial satisfaction. The financial satisfaction variable is purged of the influence of income, so as to keep all income effects flowing through the main income variable. These satisfaction questions were asked at the same place in the GSS as the life satisfaction and job satisfaction questions, and are scaled in exactly the same way. If framing effects were pervasive, then there would be substantial collinearity among the domain satisfaction variables, and imprecise coefficients would result. In fact, each of the domain satisfaction measures has a highly significant coefficient in the life satisfaction equation. However, including the additional domain satisfaction variables does provide extra insurance against the possibility that our job satisfaction results are driven by individual fixed effects of various types, and in the process also reduces substantially the coefficient on non-financial job satisfaction. We have also undertaken experiments to ensure that our results are robust to the exclusion of groups of respondents whose answers suggest the risk of measurement error, such as those who give nearly identical

scale also sharpens the rise in subjective well-being after middle age, just as was previously found for health. Thus older age is more likely to lead to increased happiness for those who keep their physical health and self-perceived ability to cope with whatever life throws their way. The fact that the mastery scale itself has a negative simple correlation with age may suggest either a decline in *bravado* as age occurs or, alternatively or additionally, that older people see themselves as having a smaller range of options for dealing with life's exigencies.

answers to all of the satisfaction questions.¹⁴

The GSS life satisfaction equation in the last column of Table 1 provides our most conservative estimate of the life satisfaction effects of non-financial job satisfaction. It includes job satisfaction measured net of the estimate of the effects of personal income (the selection of income measures is discussed shortly), other non-financial domain satisfaction answers, and the effects of personality, as represented by the mastery scale, again net of income effects. The equation thus yields the smallest¹⁵ estimate of the value, expressed in log of household income, of non-financial job satisfaction. This is given by the ratio of the job satisfaction coefficient to the coefficient on the log of household income. The resulting estimated compensating differentials for non-financial job satisfaction are presented in Table 2, together with those from the ESC.

The EDS: The Canadian 2002 Ethnic Diversity Survey

This is the largest of the three surveys we use, but includes little in the way of job characteristics. However, it does include one question on life satisfaction and another on the degree of trust among workplace colleagues, along with a wide range of other variables found to be relevant in the explanation of cross-sectional differences in life satisfaction. We therefore use life satisfaction equations based on this large sample to provide a third source of estimates of the value of workplace trust.

Comparing Results for Three Surveys

Contextual Income Effects Differ for Family and Neighborhood

One significant feature of our treatment of income has been to consider various measures of contextual income levels, which allows us to test absolute versus relative income

¹⁴Results are shown in Table EA3 of the electronic appendix.

¹⁵Compared, for example, to the alternatives shown in Table 4.

models. As a starting point, we compared personal and household income as determinants of life satisfaction reported by the survey respondent (who, in our samples, was employed, and was as likely to be female as male). We found in all three surveys that the coefficients on household income were statistically significant and positive in the life satisfaction equation after we controlled for personal income. Household income is stronger than personal income in explaining life satisfaction, with the reverse being the case for job satisfaction.¹⁶ The positive life-satisfaction spill-over from the incomes of other household members implies that the empathy and income-pooling effects dominate relative income effects at this closest level of aggregation, echoing the South African results of Kingdon and Knight (2007).

When we include the log of the average household income in the census tract, the coefficient is negative and strongly significant in all three surveys, in each case being large enough to make the life satisfaction effects of household income mostly (entirely, in the case of the GSS) relative in nature. There are important implications of this result. The negative externalities implied by the negative well-being effects of rising comparator incomes and expenditure have been noted by economists from Veblen (1899) on, including Easterlin (1995), Frank (1997), Layard (2005), Clark et al. (2008), Luttmer (2005), and Helliwell and Barrington-Leigh (2007).

Including average census tract household income raises the size of our estimates of the positive life-satisfaction effects of house-

hold income. The resulting estimates of compensating differentials are thus smaller than they would otherwise be. This fits our general strategy of wishing to err, if at all, on the conservative side when estimating compensating differentials.

Compensating differentials. Now we are ready to return to Table 2 showing our estimates of compensating differentials. Table 2 presents estimates of the income-equivalent value of several non-financial job characteristics, including workplace trust. Table 4 presents a comparison, across surveys and across equation specifications, of the estimated compensating differentials for workplace trust. For both ESC and GSS we calculate standard errors for the compensating differentials using the delta method and the relevant parts of the parameter variance-covariance matrix. In the case of the GSS and EDS, we are also able to use bootstrapping procedures (Phillips 2004) to calculate the standard errors for the ratios as the standard deviations of the distribution of the estimated ratios from 200 bootstrap replications.

The estimated compensating differentials for non-financial job satisfaction are very large in both the ESC and the GSS. The log income value of a one-point change in job satisfaction, on a ten-point scale, is estimated to be .66 in the ESC and .71 in the GSS. As shown in the first panel of Table 2, a one-point increase on the ten-point job-satisfaction scale would have the same life satisfaction consequence as a doubling of income. A move that roughly equals one-third of the sample standard deviation of non-financial job satisfaction, which covers roughly 10% of the sample when starting from the midpoint of a normal distribution, is equivalent to 40% of income. These results are from our preferred equations, chosen to make all available adjustments to avoid over-statement of the effect. In the case of the ESC, the equation is based on an instrument driven from specific job characteristics, while the GSS equation includes the mastery scale and three other measures of domain satisfaction. In both cases the effects of income on job satisfaction have been removed to ensure that all income effects flow through the income

¹⁶We subtract the effect of personal income from job satisfaction to create non-financial job satisfaction in the GSS and ESC. We do so because personal income is likely to be better than household income as a measure of the respondent's income from the job being evaluated. In the life satisfaction equation it is desirable to divide total household income into own income and income from other members. This is done in the case of the ESC. The GSS data do not allow us to do this partition in a meaningful way, because GSS household income is in categories. As a result, we calculate compensating differentials using household income in the GSS, but use the personal income in the ESC. We experimented with calculating compensating differentials using household income in the ESC and obtained results very similar to those obtained using personal income.

Table 4. Compensating Differentials for Workplace Trust: GSS, EDS, and ESC

Panel A: Trust in Co-Workers in the Canadian General Social Survey-Cycle 17, 2003	
<i>Controlling for income, education, and demographics</i>	
Ratio: coefficient of trust in co-workers over coefficient of log family income	4.26 [0.84]*** ^a [0.80]*** ^b
The implied percentage income equivalence of a jump of trust from 75% to the top of the distribution ^c	160.7% ^d [31.7%] ^e
Adding controls of mastery scale	
Ratio: coefficient of trust in co-workers over coefficient of log family income	3.68 [0.75]*** [0.74]***
The implied percentage income equivalence of a jump of trust from 75% to the top of the distribution	128.2% [26.1%]
<i>Adding controls in form of satisfaction in other domains</i> (that is, column 3 of Table 1)	
Ratio: coefficient of trust in co-workers over coefficient of log family income	1.75 [0.38]*** [0.37]***
The implied percentage income equivalence of a jump of trust from 75% to the top of the distribution	48.4% [10.5%]
Panel B: Trust in Co-Workers in the Canadian Ethnic Diversity Survey, 2003	
<i>Controlling for income, education, and demographics</i>	
Ratio: coefficient of trust in co-workers over coefficient of log family income	6.54 [1.21]*** [1.26]***
The implied percentage income equivalence of a jump of trust from 75% to the top of the distribution	300.6% [55.6%]
Panel C: Trust in Management in the Canadian Equality, Community and Security Survey, 2002/2003	
<i>Controlling for income, education, and demographics</i> (that is, column 1 of Table 1)	
Ratio: coefficient of trust in management over coefficient of log personal income	2.97 [0.93]***
The implied percentage income equivalence of a jump of trust from 75% to top of the distribution	92.0% [27.3%]

^aThe standard error of the ratio is calculated from the covariance matrix using the Delta method.

^bGSS provides bootstrap weights, so we perform bootstrapping as a measure alternative to the standard error.

^cThe 75%-to-top jump in trust is best approximated by an increase of 0.225 in GSS, 0.212 in EDS, and 0.22 in ESC.

^dThe income equivalence is calculated from the ratio as $(\exp(\text{ratio} \times \text{size of jump}) - 1)$

^eThis is just the compensating differential multiplied by the estimated coefficients of variation of the ratio. Standard errors are in brackets.

*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

variable, so that the ratio should measure the income value of a change in non-financial job satisfaction.

The ESC also permits us to assess the importance of specific job characteristics, and to do so in two ways. One way is simply to estimate the reduced form, so as to reveal the net effects of job characteristics on life satisfaction. This is done in the bottom panel of Table 2. To move by an amount roughly equal to 10% of the sample mean of a given job characteristic (more precisely,

one-third of the sample standard deviation) has an income equivalence ranging from 12% for having sufficient time to complete the assigned tasks, to almost 20% for both skill-requirements and variety, to 30% for trust in management. Table 2 also shows the compensating differentials for a move that covers one-tenth of the distance from the bottom to the top of the scale.

The second method is to estimate the effects of job characteristics on job satisfaction, and then calculate their effects on life satis-

fraction as mediated through the estimated effect of job satisfaction on life satisfaction. These two procedures are not expected to give the same answers, since they are measuring interestingly different things. The biggest difference relates to the consequences for well-being of having a job involving lots of decision-making. Decision-making has a significantly positive effect on job satisfaction, but in the reduced form the net effect is insignificantly negative, as shown in Table 1's first column and in Appendix Table A2's first column. Thus the gains on the job are offset by losses on the home front. The reverse is true for skill, variety, time available, and freedom from conflicting demands, all of which have greater effects in the reduced-form life satisfaction equation than where their impact is limited to that flowing through job satisfaction. This suggests positive spillovers from these job characteristics, in contrast to the negative ones from decision-making.

These results suggest a need for some re-interpretation of the famous Whitehall study (Marmot et al. 1991) showing that those at the higher levels in the U.K. civil service have better health outcomes. This result has been interpreted by some (for example, Wilkinson 1996) by reference to animal studies showing worse health among those in non-dominant positions in hierarchical societies. Our evidence suggests, on the contrary, that the features of jobs that give greater life satisfaction (and, by extension, better health outcomes) relate not to control (as measured by the decision-making content of the job) but instead to trustworthy management, variety, and demand for skills, features that may well be found in higher-level jobs in the Whitehall hierarchy.

Valuing Workplace Social Capital

As can be seen from the job satisfaction equations in the first-stage regressions in Table A2, the extent of workplace trust is by far the strongest determinant of job satisfaction. Workplace trust provides our key measure of social capital in the workplace. Although job satisfaction has long been known to have predictive power for absenteeism, illness, and productivity, there has been less study of the

role of workplace trust and social capital as contributors to job and life satisfaction. In a parallel way, most studies of social capital and its effects have concentrated on the influence of family, friends, and community groups, with much less attention thus far paid to either the causes or consequences of workplace social capital (Halpern 2005). Given the large fraction of waking hours spent in the workplace, it should perhaps be expected that workplace social capital might be strongly linked to life satisfaction.

The ESC, GSS, and EDS surveys all contain some measure or measures of workplace trust. The ESC asks about the extent to which management can be trusted in the respondent's workplace, while the GSS and EDS ask to what extent there is trust among colleagues. The resulting ratios for the values of workplace trust are shown in Table 4.

The social capital literature (see Halpern 2005 for a recent review) gives a central place to trust, with high levels of trust being positively related to other measures of social capital (and sometimes being used themselves as either proxy measures or direct measures of social capital), with causation likely to flow both ways (Putnam 2000). The well-being equations in Table 1 show that trust in neighbors, trust in police, and workplace trust are all independently strong determinants of respondents' subjective well-being in both the ESC and GSS. The size and significance of the workplace trust effects are even larger than for the other domains. In both surveys, inclusion of the specific trust measures renders the general trust measure insignificant in the case of the ESC, and negative with statistical significance in the GSS. Regarding the latter, it is notable that the coefficient on general trust is always positive and statistically significant if measures of specific trust are not in the equation. The fact that a variety of domain-specific trust measures have even greater well-being effects than the classical general trust responses gives us confidence that the large effects of trust on well-being are not simply due to the influence of congenital optimism on both trust and reported well-being.

Another demonstration that the measured effects of trust are not simply due to personal-

ity differences is provided by the experiments we performed using the measure of mastery scale. These experiments show that the addition/removal of the mastery scale in job satisfaction equations only changes the coefficient on workplace trust (in the GSS) by an amount equal to one standard error, while the coefficient itself remains more than ten times as large as its standard error.

Table 4 shows that there are very large compensating differentials for workplace trust. The lowest estimate we can obtain is from the GSS equation including mastery and other domains of satisfaction. We also include the GSS estimates without these variables for comparison with the ESC and EDS results, which cannot make these extra adjustments. The adjusted (lowest) GSS estimate for the ratio is 1.75, measured as the log change in income corresponding to a move from the bottom to the top of workplace trust. In the ESC, the mean workplace trust response is 6.4 on the ten-point scale, with a standard deviation of 2.5. The modal answer is 8. A one-point move up the 10-point scale, using the lowest GSS estimate, is associated with a log income value of .175, almost \$13,000 for a modal family income of \$65,000. Table 4 shows the percentage income changes matching a move from the 75th percentile to the top rung of each survey's measure of workplace trust. In all cases, the estimates are generally four or more times as large as their estimated standard errors. The lowest estimate is for the most controlled version of the GSS equation, where a move from the 75th percentile to the top level of workplace trust has a compensating differential equivalent to a 48% increase in household income. The differences among the estimates reflect several differences in the questions asked and control variables available for the three surveys.

Conclusion

Our estimates are among the first using measures of life satisfaction to estimate compensating differentials for job characteristics and are the first we know of to provide estimates of the life-satisfaction value of workplace trust. The estimated values of

several non-financial job characteristics are large. This is especially true in the case of workplace trust, for which the compensating differentials remain very large even when we make a number of adjustments aimed at eliminating risks of over-estimation. Our workplace trust results are independently estimated from three large Canadian surveys using different samples and different question wording. The estimated life satisfaction effects of workplace trust are so large as to suggest either that trust is very costly to build and maintain, or that there are unexploited gains available for trust-building activities by managers, shareholders, and employees.

Because we find large estimated effects for non-financial job characteristics relative to those for income, our estimation strategy has been to choose the specifications, among those with roughly equivalent predictive power, that produce high effects for income and low effects for non-financial job characteristics. More generally, we have more confidence in our results if and when they are robust to inclusion or exclusion of other variables in the estimated utility function. Our various tests on this score have thus far been encouraging.

What about sample heterogeneity, and the possibility that our results are contaminated by self-selection effects? In subsequent work we have disaggregated the respondents by gender and union status (Helliwell and Huang 2007; Helliwell, Huang, and Putnam 2009), and we find what appears to be significant heterogeneity of preferences by both gender and union status (see also Daniel and Sofer 1998), with some evidence in each case of selection effects. In particular, gender-specific utility functions using ESC data suggest that women attach more value to trust in management, and less to income, than do men, and the distributions of jobs show that on average women, for given education levels, are more likely to hold jobs where pay is lower and trust in management is higher. Similarly, union workers tend to attach higher value to income and lower value to trust in management than do non-union workers, while union jobs (once again for equal education levels), on average, are marked by higher pay and much lower levels of trust in management

(by almost a full point on a ten-point scale) than are non-union jobs. These results are interesting in themselves; their importance to this paper comes from our finding that the weighted-average estimates of compensating differentials for the disaggregated subgroups are very close to the values we get from the full sample. This strengthens our confidence that heterogeneity by gender and union status does not seriously compromise our full-sample results. No doubt there are other dimensions along which heterogeneity may be expected and assessed.

There is a closely related literature using job quit data to study and compare the effects of income and other aspects of employment. If the models contain income and actual job characteristics as independent variables, they can be used to estimate compensating differentials directly as ratios of coefficients. Bonhomme and Jolivet (2006) and Villanueva (2004) did just this, and since their results, like ours, show high compensating differentials for non-financial job characteristics, they help to support ours in two ways. First, they used behavioral data rather than subjective assessments as dependent variables. Consistency of compensating differentials derived from two quite different dependent variables thus provides mutual confirmation. Second, the use of quits as a dependent variable highlights the importance of information and job change costs as reasons why compensating differentials can be as high as these researchers and we have found. Other job quit studies are slightly less closely related to ours, but relevant nonetheless. Clark (2001) used job quit data to compare the effects of actual pay levels with various aspects of job satisfaction. Finding that several aspects of non-financial job satisfaction are as important as income, and sometimes more important, he argued that economists should therefore treat subjective measures of job satisfaction as having objective importance in the prediction of job changes.

Do our results for the value of workplace trust and other job characteristics really reflect compensating differentials in the usual sense, with employers who can offer better non-financial job characteristics being able to

hire workers of given quality at lower wages? We think so. Our results suggest that a firm managing to provide better jobs (as measured by some package of the non-financial job characteristics connected to higher levels of life satisfaction) would be able to reap rewards in some combination of dimensions: lower quit rates, lower monitoring costs, easier (and hence less expensive) hiring, and more effective effort from employees at all wage levels.

Some have asked, where is the optimizing economic model underlying the job-matching behavior depicted here? What equilibrating mechanisms are in play, and why are they producing such high values for workplace trust and other non-financial job characteristics? These are good questions, and if our results are to be believed, there remains a fruitful agenda for future research. To go beyond the theoretical possibilities, which are likely to be driven by issues relating to information, networks, and transaction costs, will require, for estimation, workplace-based data on job characteristics and workplace trust. We do not want to pre-judge the answers, since we do not yet have sufficient workplace-based data to enable the key elements of job design and job change to be clarified in ways that explain why so many workplaces seem to offer substantial returns from paying more attention to non-financial features of life at work. There are already research results in hand showing that high costs of job changes are likely to be an important part of the story (Bonhomme and Jolivet 2006). We hope that our use of life satisfaction data to estimate the possibilities is convincing enough to encourage further research. Ideally some of this research would be based on explicit experimentation by employers with alternative ways of improving life at work.

Finally, some job characteristics were found to influence life satisfaction by more than the effects flowing through job satisfaction, while decision-making was found to increase job satisfaction while having a net zero or negative effect on life satisfaction. We think that life satisfaction equations provide the more general and appropriate means for measuring the relative utility of income and other job-related aspects of life.

**Appendix Table A1
Key Survey Questions**

Variable	Variable Name	Original Scale
ESC: Canadian Equality, Security, and Community Survey, Wave 2002/3		
Life Satisfaction	lsatis	1~10
<i>Now a question about life satisfaction. On a scale of 1–10, where ONE means dissatisfied and TEN means satisfied, all things considered how satisfied are you with your life as a whole these days?</i>		
Job Satisfaction	jobsat_1	1~10
<i>On a scale of 1 to 10, where 1 means very poor and 10 means very good, on average, how would you rate job satisfaction for workers at your workplace?</i>		
Workplace Trust	emp_tr	1~10
<i>Using the same scale, how would you rate the level of trust that workers have in management at your workplace?</i>		
Job Characteristics	j_owndec	(for scale, see question itself)
<i>Your job allows you to make a lot of decisions on your own. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree?</i>		
	j_skill	..
<i>Your job requires a high level of skill. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree?</i>		
	j_varie	..
<i>Your job has a variety of tasks. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree?</i>		
	j_time	..
<i>You have enough time to get the job done. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree?</i>		
	j_free	..
<i>Your job is free from conflicting demands. Do you strongly agree, somewhat agree, somewhat disagree or strongly disagree?</i>		
GSS: Canadian General Social Survey-Cycle 17: Social Engagement, 2003		
Life Satisfaction	Lsatis	1~10
<i>Please rate your feelings about them, using a scale of 1 to 10 where 1 means Very dissatisfied and 10 means Very satisfied. What about: your life as a whole right now?</i>		
Job Satisfaction	jobsatis	1~10
<i>Please rate your feelings about them, using a scale of 1 to 10 where 1 means Very dissatisfied and 10 means Very satisfied. What about: your job or your main activity?</i>		

Continued

Appendix Table A1 Continued

Variable	Variable Name	Original Scale
Other Domains of Satisfaction		
<i>Please rate your feelings about them, using a scale of 1 to 10 where 1 means Very dissatisfied and 10 means Very satisfied.</i>		
<i>What about:</i>		
	satis_h	...your health?
	satis_ot	...the way you spend your other time?
	satis_fn	...your finances?
Workplace Trust		
	tr_col	1~5
<i>Using a scale of 1 to 5 where 1 means 'Cannot be trusted at all' and 5 means 'Can be trusted a lot,' how much do you trust people you work with or go to school with?</i>		
Mastery Scale		
	mastery	(for scale, see question itself)
<i>Please tell me if you strongly agree, agree, neither agree nor disagree, disagree, or strongly disagree that:</i>		
<i>... you have little control over the things that happen to you.</i>		
<i>... there is really no way you can solve some of the problems you have.</i>		
<i>... there is little you can do to change many of the important things in your life.</i>		
<i>... you often feel helpless in dealing with problems of life</i>		
<i>... sometimes you feel that you are being pushed around in life .</i>		
<i>... what happens to you in the future mostly depends on you.</i>		
<i>... you can do just about anything you really set your mind to.</i>		
EDS: The Canadian Ethnic Diversity Survey, 2002		
Life Satisfaction		
	Lsatis	1~5
<i>All things considered, how satisfied are you with your life as a whole these days? 1 measures not satisfied at all and 5 means very satisfied</i>		
Workplace Trust		
	tr_col	1~5
<i>Using a scale of 1 to 5 where 1 means cannot be trusted at all and 5 means can be trusted alot, how much do you trust each of the following group of people:</i>		
<i>People that you work with or go to school with</i>		

Note: We have either rescaled these variables, or used distributional information, to overcome the differences in scales across surveys. The solutions are described in the text and in footnotes to relevant tables.

Appendix Table A2
First-Stage Regression of Job Satisfaction in ESC and GSS, Survey Linear Regression

	<i>ESC Sample</i>	<i>GSS Sample</i>
<i>Dependent Variable: Job Satisfaction (1–10 Point Scale)</i>	<i>No. Obs. = 1,862</i> <i>R² = 0.51</i>	<i>No. Obs. = 9,949</i> <i>R² = 0.24</i>
Mastery Scale, with Income Effect Subtracted (GSS only)		1.00 [0.16]***
Log of Personal Income	0.30 [0.06]***	0.19 [0.03]***
Log of Other Family Members' Income	0.04 [0.02]*	
Log of Total Household Income (GSS only)		
Log of Avg. Household Income in Census Tract	-0.21 [0.11]*	0.02 [0.07]
Satisfaction with Health (GSS only)	0.30 [0.02]***	
Satisfaction with the Way Other Time Is Spent (GSS only)	0.05 [0.01]***	
Satisfaction with Financial Situation, with Income Effect Subtracted (GSS only)	0.22 [0.01]***	
Job: Makes Own Decision (ESC only)	0.33 [0.12]***	
Job: Requires Skill (ESC only)	0.33 [0.14]**	
Job: Has Enough Time (ESC only)	0.44 [0.12]***	
Job: Free of Conflicting Demands (ESC only)	0.32 [0.11]***	
Job: Has Variety of Tasks (ESC only)	0.09 [0.16]	
Job: Trust in Management (ESC), or Trust in Co-Workers (GSS)	4.75 [0.16]***	1.43 [0.12]***
Self-Perceived Health Status, scaled 1 to 5	0.03 [0.04]	-0.08 [0.03]***
Gender: Male	-0.14 [0.06]**	-0.07 [0.04]*
Age Group: 25–34	-0.24 [0.14]*	0.01 [0.09]
Age Group: 35–44	-0.38 [0.16]**	-0.07 [0.09]
Age Group: 45–54	-0.24 [0.16]	-0.02 [0.1]
Age Group: 55–64	-0.03 [0.19]	0.09 [0.1]
Age Group: 65 up	0.23 [0.35]	0.33 [0.18]
Marital Status: Married	-0.01 [0.11]	0.07 [0.05]
Marital Status: As If Married	-0.17 [0.14]	0.19 [0.07]***
Marital Status: Divorced	-0.04 [0.17]	0.04 [0.12]
Marital Status: Separated	-0.04 [0.18]	0.03 [0.09]
Marital Status: Widowed	-0.21 [0.45]	0.08 [0.16]
Education: High School	-0.25 [0.14]*	-0.22 [0.08]***
Education: Some College, No University Degree	-0.21 [0.13]	-0.25 [0.07]***
Education: University Degree	-0.30 [0.13]**	-0.24 [0.08]***
Contacts with Family Member outside Household	0.03 [0.12]	0.01 [0.07]
Contacts with Friends	0.44 [0.12]***	0.28 [0.08]***
Contacts with Neighbors	0.03 [0.11]	0.14 [0.07]**
Number of Memberships or Extent of Activity	0.00 [0.02]	-0.12 [0.05]**
Trust in General	0.04 [0.07]	-0.09 [0.04]**
Trust in Neighbors	0.01 [0.1]	-0.06 [0.03]**
Trust in Police / Confidence in Police	-0.17 [0.13]	0.22 [0.09]**
Importance of Religion	0.19 [0.13]	0.18 [0.07]**
Frequency of Attending Religious Services	-0.01 [0.13]	0.07 [0.08]
Immigrant (GSS only)		0.14 [0.06]**
Ethnic: Aboriginal (GSS only)		0.18 [0.12]
Ethnic: Chinese (GSS only)		-0.26 [0.12]**
Ethnic: South Asian (GSS only)		-0.26 [0.15]*
Ethnic: Others, Excluding Those of Western Europe (GSS only)		-0.01 [0.06]
Living in Non-Tracted Area (GSS only)		-0.02 [0.05]
Constant	2.13 [1.17]*	1.67 [0.76]**

Note: All satisfaction measures are on the scale of 1–10, and health is on a 5-point scale. Mastery scale and trust measures, all job characteristics, and family, friends, neighbors, and religious measures are recoded to cover the interval between 0 and 1.0. Standard errors are in brackets.

*Statistically significant at the .10 level; **at the .05 level; ***at the .01 level.

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