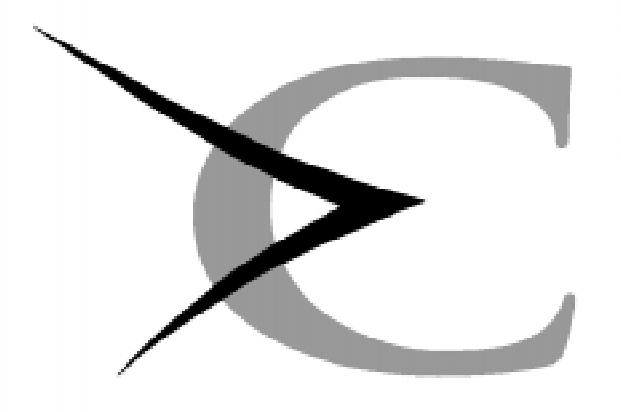

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Louis Lévy-Garboua,
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Reported Job Satisfaction: What Does It Mean?*

Louis Lévy-Garboua†*, Claude Montmarquette*‡

Résumé / Abstract

En rapportant sa satisfaction vis-à-vis son travail ou toute autre expérience, un individu ne communique pas le nombre d'unités d'utilité qu'il ressent. Plutôt, conditionnellement à ses expériences antérieures, il exprime a posteriori sa préférence relativement à d'autres emplois ou situations alternatives. Cette nouvelle interprétation de la satisfaction révélée rend à la théorie microéconomique son pouvoir explicatif tout en reconnaissant le rôle essentiel joué par la différence entre la situation d'une personne et les opportunités. Les différences a posteriori dans la richesse humaine sont les meilleurs prédicteurs de la satisfaction révélée. Les modèles statiques de l'utilité relative et ceux d'utilité subjective sont tous rejetés par les données, de même que le modèle économique où la satisfaction de l'emploi est une mesure de la richesse humaine a posteriori. Le modèle de choix a posteriori explique pourquoi dans les enquêtes une grande majorité de personnes expriment leur bonheur ou leur satisfaction, pourquoi les jeunes et les vieux ne réagissent pas aux différentielles de revenus courants et pourquoi le passé joue davantage que la situation présente ou future.

By reporting his satisfaction with his job or any other experience, an individual does not communicate the number of utils that he feels. Instead, he expresses his posterior preference over available alternatives conditional on acquired knowledge of the past. This new interpretation of reported job satisfaction restores the power of microeconomic theory without denying the eesential role of discrepancies between one's situation and available opportunities. Posterior human wealth discrepancies are found to be the best predictor of reported job satisfaction. Static models of relative utility and other

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subjective well-being assumptions are all unambiguously rejected by the data, as well as an "economic" model in which job satisfaction is a measure of posterior human wealth. The "posterior choice" model readily explains why so many people usually report themselves as happy or satisfied, why both younger and older age groups are insensitive to current earning discrepancies, and why the past weighs more heavily than the present and the future.

Mots Clés : Satisfaction à l'emploi, modèles d'utilité relative, modèle de choix a posteriori

Keywords : Job satisfaction, Relative utility models, Posterior choice model

JEL : J28

1 Introduction

People often express judgments of satisfaction or dissatisfaction towards their own past experience of a brand, a film, their job, the incumbent government, and even their whole life. What do these judgments mean and how can we make sense of them for predicting important economic behavior like sales of a new brand, strikes, quits, school enrollments, electoral outcomes, and even suicides?

Since opinions are often much easier to collect than objective data, the popularity of opinion surveys among marketing services, psychologists, political scientists and sociologists is hardly surprising. But a majority of economists are still reluctant to use this abundant data, with a few notable exceptions (Hamermesh 1977, Freeman 1978, Borjas 1979, and quite recently, Clark and Oswald 1994, 1996). They view personal judgments of satisfaction and other subjective opinions as a black box that should be opened only by psychologists and sociologists. But, on the other hand, they are not happy with the stories told by the latter as they contradict the accepted, and otherwise successful, theory of utility.

What do psychologists, sociologists and a few daring economists have to say about self reported job satisfaction? First of all, they interpret this judgment as a direct measure of the utility or well-being felt by the respondent. Should this measure be ordinal or cardinal is an unsettled question, but whatever position is taken on this issue, the sensitive problem of interpersonal utility comparisons has to be tackled. Once we make these steps, we have no other choice than accepting the discomforting story that money alone does not buy satisfaction. More than twenty years ago, Duncan (1975) and Easterlin (1973, 1975) have provided descriptive statistics showing that, under the above interpretation, raising the incomes of all does not increase the happiness of all. This finding has been replicated on many occasions. For example, Scitovsky (1992) reports for the U.S. that over a period of 25 years where per capita income rose by 62%, "the proportion of people who consider themselves very happy, fairly happy and not too happy has hardly changed at all". These studies have also suggested that the individual's ranking in the income distribution of an economy, or relative income, has a significant impact on the level of well-being. Easterlin (1995) provides a synthesis of recent evidence. Partly as a result of the poor predictability of economic factors, researchers have turned to psychological theories of "subjective well-being" (SWB), that adopt "non economic" utility functions in which enters some sort of discrepancy between objective conditions of life (e.g., income, consumption) and a subjectively defined reference. Under various assumptions about the reference, SWB theories are consistent with

the Duncan-Easterlin observations while the conventional economic view is not.

Our first objective in this paper is to reconsider the competing, economic and non economic, interpretations of reported (job) satisfaction as felt utility. We extend previous work by specifying lifetime utility, and a semi-flexible functional form which nests a variety of (broadly defined) SWB hypotheses: relative utility (among others, Van Praag 1968, Van de Stadt et alii 1985, Hamermesh 1977), social comparison (e.g., Veblen 1899, Duesenberry 1962, Clark and Oswald 1996), cognitive dissonance (e.g., Festinger 1957, Gilad et alii 1987), disappointment (e.g., Loomes and Sugden 1986), and loss aversion (Tversky and Kahneman 1991). The main result of our econometric tests on Canadian cross-sectional data is that the parsimonious assumption of relative utility should be accepted, and both the economic model and other SWB hypotheses rejected.

Our second objective is to specify an econometric model that beats the benchmark of relative utility, and to restore the power of microeconomic theory, by taking a life cycle's view of job's choice and by giving a new ordinal interpretation of happiness and satisfaction judgments. We achieve these two tasks in the paper. Specifically, we argue that the job satisfaction reported in questionnaires is always *conditional on the individual's having previously chosen and experienced that job*. It is the mere judgment that the respondent would now repeat his past choice if he had to choose again. We view reported job satisfaction not as a measure of felt utility, but as a potential choice conditional on past experiences which may be simply called *a posterior choice* of own job. The latter choice is conditional on available information at the time of the survey including the "surprises" which occurred since the time of the choice. Moreover, we maintain that communication in the form of reporting satisfaction or dissatisfaction in a questionnaire is fundamentally an act, which reveals an ordinal preference exactly like the purchase of an item would. The reason is that, if you wish to make yourself understood by other persons with whom you communicate but who cannot feel physically what you feel, you must convey messages that have an ordinal value because only the latter will mean the same to all. The life cycle model which we derive from this new interpretation in the paper is consistent with the earlier findings of Duncan and Easterlin but also makes new stark predictions, confirmed by the data. It readily explains why so many persons usually report themselves as happy or satisfied, why they are typically more satisfied with their job than with their pay or with the government; why the frequency of those reporting job satisfaction increases (is U-shaped) with age; why job satisfaction negatively correlates with voluntary quits and union affiliation; why current earnings

discrepancies have hardly any influence on job satisfaction in both the younger and the older age-groups; and why past earnings discrepancies weigh more heavily than current ones on job satisfaction. The posterior choice model also demonstrates that reported job satisfaction has two components, one of which is backward-looking and known with certainty, and the other is forward-looking and based on a personal expectation. Obviously, the weights of these two components change drastically over the life cycle and this has interesting implications. Finally, in avoiding the need to assume equivalence of scales of reported satisfaction or happiness across individuals, we widen the range of qualitative data that are amenable to economic analysis in such fields as job mobility, job matching, individual responses to changing incentives and nonpecuniary rewards and other sorts of human behavior (for other applications to consumer choice, fairness and paradoxes to the theory of riskless choice, see Lévy-Garboua and Montmarquette 1996a, 1996b).

Section 2 introduces the theory of job satisfaction as felt utility with a lifetime extension of the neoclassical utility model and a discussion of the subjective well-being models. Section 3 develops the theory of reported job satisfaction as a posterior choice. Section 4 introduces the data and earnings functions that we use later to estimate reference earnings, earnings discrepancies, and past earnings from cross-sectional data. Section 5 describes the econometric specifications of the models and some related estimation problems. Section 6 presents the estimates of reported job satisfaction consistent with seven SWB assumptions, posterior choice, and lifetime utility. Section 7 concludes.

2 Job satisfaction as felt utility: Theory

2.1 The Lifetime Utility Model

The standard microeconomic theory considers that individuals have a definite lifetime indirect utility function:

$$U = U\left(H, u\right), \tag{1}$$

where U stands for lifetime utility, H for (human) wealth, and u is a vector of non-pecuniary amenities, hours of work (effort) and utilities from other spheres of life.[1]

The interesting feature about studying job satisfaction rather than, say, happiness about life is that (human) wealth acts in (1) as a poten-

[1] Prices of goods and interest rates, which have no variability on cross-sectional data, are not reported in equation (1).

tially measurable subutility of an objective nature. This offers a unique opportunity for testing alternative theories of utility in a direct fashion as will be done here. What has been estimated in the literature, however, is not equation (1) but a static approximation of it, like $U = U(y, u)$, in which y designates current earnings (net of education and training costs). This static utility model is admittedly very coarse but it is easily estimated on cross-section data.

The question arises whether the felt utility reported by an individual of given age is forward-looking, which is the way economists tend to think about it (e.g., Hamermesh 1977). In such case, we should write human wealth after age a as the present value of expected future earnings, $E_a V_a \equiv y_{a+1} + \frac{y_{a+2}}{1+r} + ...$, where r is the interest rate per period. We would need an explicit model of earnings expectations as a function of past magnitudes[2]. However, it is perhaps more intuitive to think of someone expressing what he felt in the past as much as what he expects in the future. This would become more obvious if subjects were asked to report their satisfaction with the last play they saw (e.g., Lévy-Garboua and Montmarquette 1996b) because it would now be understood that they have no intention of attending the same show once again even if they liked it. Consequently, it may be preferable to use for an individual at age a the following expression of his lifetime human wealth :

$$H_a \equiv \sum_{t=1}^{a} \frac{y_t}{(1+r)^{t-1}} + \frac{E_a V_a}{(1+r)^a} \tag{2}$$

The first term is the discounted sum of all past and current earnings. It has the crucial property of being known with certainty by respondents and, thus, does not rest on the latter's idiosyncratic way of forming expectations. Equation (2) describes job satisfaction as the sum of this backward-looking component[3] and the more conventional forward-looking component. The weight of these two parts varies systematically over the life-cycle : the forward looking part dominates for the younger group, and the backward looking part dominates for the older group. According to equation (2), the regression coefficient of current earnings

[2]This approach was adopted in an earlier version of the paper (Lévy-Garboua and Montmarquette 1994).

[3]"Backward-looking" is a convenient but partly inappropriate expression. In equation (2), it describes a posterior forward-looking view of the known past and present, an interpretation that truly anticipates our discussion of section 3. At this stage of the analysis, it could still be argued alternatively that the past and the future should both be discounted from the present period. Such ambiguity is one of the conceptual difficulties raised by the treatment of reported satisfaction as a direct measure of felt utility. Whatever interpretation is chosen will be tested in section 6.3 but the latter will, in fact, be more badly rejected than the former.

should decrease with experience; this prediction is not supported by the forward-looking utility model. This offers a very convenient way to test which of these two interpretations is to be preferred as will be done is section 6. Things are slightly more complicated, though, because the unobservable expected future earnings will be correlated with current earnings. Training and deferred payment schemes will create a downward bias on the coefficient of current earnings in the earlier career because current earnings will then be negatively correlated with future earnings. Therefore, it seems wise for testing the theory to distinguish at least three periods of life : (i) early career; (ii) mid-career; (iii) late career. The relation of current earnings with job satisfaction is expected to be inversely U-shaped across age groups.

The lifetime utility model (in anyone of its two versions) highlights the basic inability of the standard economic approach to explain the following stylized facts :

1. uniform economic growth does not increase reported happiness and job satisfaction (among others, Easterlin (1973, 1975, 1995) and Duncan (1975));

2. the frequency of reported job satisfaction typically increases with age (this point will be confirmed by table 4);

3. according to a few studies (e.g., Clark 1993, Clark and Oswald 1996), women and lower-educated workers seem to be more satisfied with their job although they receive lower wages on average.

All of these facts (the third set should be taken with more caution than the first two) are plainly contradicted by the lifetime utility model[4], although the two last refutations were concealed in previous discussions by the widespread use of the theoretically unattractive static form of the utility model.

2.2 Subjective well-being models

The basic refutation of the static and lifetime utility models has led many social scientists to rely on alternative theories, further designated as SWB models. The latter form a rather heterogeneous family, but they can all be summarized by a modified utility function :

$$U = U(H, H^*, u) \tag{3}$$

Equation (3), which substitutes for (1), incorporates an additional argument H^* that symbolizes some *reference* (human) wealth. The word

[4] Uniform economic growth will raise current and future earnings in equation (2). Under steady growth, job satisfaction should also be the greatest for younger generations. Finally, permanently higher wages should produce greater job satisfaction.

"reference" wealth and earnings has received in the literature at least three different meanings. Hamermesh (1977) considers market opportunities to be the natural economic reference and describes it by the individual's reservation (next best) human wealth. Theories of interdependent preferences, pioneered by Veblen (1899) and Duesenberry (1949), emphasize the comparison of one's wealth to that of other similar persons. An ordinalist version of the theory has been recently applied to job satisfaction by Clark and Oswald (1996), and a cardinalist version of relative utility was suggested a long time ago by Van Praag (1968) and his Dutch colleagues (a recent evidence is Van de Stadt, Kapteyn and Van de Geer 1985), to construct subjective poverty scales. The theory of interdependent preferences may be held either in a weak form or in a strong form. The proposition that favorable and unfavorable comparisons, symmetrically, have an impact on satisfaction and dissatisfaction judgments, tested by Clark and Oswald (1996), is the weak form. The assessment that only unfavorable comparisons or envious feelings matter determines the strong form (Brenner (1983))[5]. Lastly, social researchers have pointed out that, in a dynamic setting, the most natural reference for an individual is perhaps his own prior expectation of wealth. Cohen and Axelrod (1984) argue that individuals adapt their preferences after observing pleasant and unpleasant surprises, i.e. discrepancies between expected utility and experienced utility. Loomes and Sugden (1986) contend that the feelings of disappointment and elation arouse respectively when expectations have not been met or have been superseded. Gilad, Kaish and Loeb (1987) set the general form of utility functions consistent with the psychological theory of cognitive dissonance. According to the latter, initiated by Festinger (1957), people choose to believe that they are satisfied in spite of a bad experience by ignoring the dissonant information. It takes a "very" bad surprise to adjust to reality. Finally, Tversky and Kahneman (1991) have explained many anomalies of risk-

[5]Duesenberry (1962:32) clearly favored the strong form but eventually shifted to the weak form in the formal statement of his theory: "The analysis of the forces causing impulses to consume shows that these arise when an individual makes an unfavorable comparison of his living standard with that of someone else. If these impulses must be rejected, the individual is dissatisfied with his position. [...]. Consequently, the dissatisfaction with his consumption standard which an individual must undergo is a function of the ratio of his expenditures to those of people with whom he associates.

Thus if C_i is the consumption expenditure of one individual and U_i is his utility index, we may write $U_i = U_i\left(C_i/\sum \alpha_{ij} C_j\right)$ where C_j is the consumption of the j^{th} individual and α_{ij} is the weight applied by the i^{th} consumer to the expenditure of the j^{th}". The strong form of Duesenberry's theory is obtained by assuming that $\alpha_{ij} = 0$ whenever $C_j \leq C_i$.

less choice by their theory of loss aversion, where utility is concave for gains and convex for losses, both measured from a reference point which would often be one's initial position.

In most cases, the SWB models have not been presented in a readily testable form. It is such a test that we wish to pursue here. We follow common practice by restricting our investigation to a static utility, and postpone the test of the lifetime utility model until section 6. Our empirical strategy is to estimate reported job satisfaction by a semi-flexible functional form whose arguments are a value y_i^* of current reference earnings of individual i (age a is omitted), an appropriate function of earnings discrepancy $\varepsilon_i \equiv y_i - y_i^*$ and control utility shifters. The chosen functional form should also nest the standard quasi-linear static utility :

$$U_i = \alpha_i + \gamma\, y_i, \tag{4}$$

where γ is a positive constant, and $\alpha_i = \alpha + Z_i\,\beta$ is a linear equation of psycho-sociological factors including education, gender, the felt disutility of work, dissatisfaction with marriage, dissatisfaction with health and a number of individual taste-shifters. Aside from its simplicity, a quasi-linear utility ensures that the unobserved value of job amenities and unearned income enters into α_i or an additive error component. Since an equivalent of (4) is :

$U_i = \alpha_i + \gamma\, y_i^* + \gamma\, \varepsilon_i$, the simplest modified utility which nests the standard utility is :

$$U_i = \alpha_i + \gamma_1 y_i^* + \gamma_2 \varepsilon_i, \tag{5}$$

where γ_1 and γ_2 are allowed to be unequal. Equation (5) is a linear form of the social comparison model when $0 \leq \gamma_1 < \gamma_2$, which boils down to the pure relative utility model when $\gamma_1 = 0$. However, many of the mentioned SWB models include non-linear effects of earnings discrepancies. The following piece-wise linear form is a fairly flexible way of introducing nonlinearities while nesting equations (4) and (5) :

$$U_i = \alpha_i + \gamma_1 y_i^* + \gamma_2 \varepsilon_i + \gamma_3 D\varepsilon_i + \gamma_4 D_+ \varepsilon_i + \gamma_5 D_- \varepsilon_i. \tag{6}$$

D is a dummy variable equal to 1 when $-\theta\sigma_\varepsilon \leq \varepsilon_i < 0$, that is when the difference between realized and reference wage is negative and smaller or equal (in absolute terms) than a value assumed here proportional to the standard error of the earnings discrepancies; D is equal to 0 otherwise. Similarly, D_+ is equal to 1 when $\varepsilon_i > \phi\sigma_\varepsilon$ and 0 otherwise, and D_- is equal to 1 when $\varepsilon_i < -\theta\sigma_\varepsilon$ and 0 otherwise. θ and ϕ are both positive but need not be equal. α_i captures the direct effect of

personal characteristics and other components of utility on self-reported job satisfaction.

Figure 1 helps to visualize the specific functional forms of job satisfaction with respect to earnings discrepancies embedded in equation (6), holding reference earnings and other variables constant.

[Insert Figure 1 about here.]

3 Reported satisfaction as a posterior choice

Let us remark that you never ask someone whether he or she is satisfied with something that he or she has not gotten or experienced before. So, the satisfaction or dissatisfaction that someone reports, say, regarding his job must be *conditional* on this person having chosen his job in the past and had experience of it. At the moment an individual made his or her particular choice, the choice itself could be seen as an expression of satisfaction; some time later, when asked to express a judgment, this judgment of satisfaction should then be interpreted as a potential act of choice conditional on past experiences. So to speak, the prior choice of a job manifests an expected satisfaction, *while reporting satisfaction of one's job reveals a kind of posterior choice*. Surprisingly, these points have gone unnoticed in previous studies of (job) satisfaction. Moreover, remember that we always measure satisfaction as *reported* by respondents in questionnaires. Their answer must have an *ordinal* value because an outside observer (say the econometrician) would simply not understand a cardinal response expressed in a subjective scale, and the purpose of communication from one subject to another is obviously to make oneself understood.

We now examine the implications of this new interpretation of reported job satisfaction. An individual making the posterior choice of his own job would be in the peculiar position of knowing what happened until the present date. He would report satisfaction, i.e. confirm his own past choices, if and only if, his (partly known) expected human wealth was greater than his (partly known) alternatives.

Let J_a be an ordinal index of job satisfaction at age a. We define

$$\begin{cases} J_a = 1 \text{ if } H_a + u > H_a^* + u^* \\ \\ J_a = 0 \text{ if } H_a + u \leq H_a^* + u^*, \end{cases} \tag{7}$$

where (u^*) u designates the (reservation) value of non pecuniary determinants of utility. The analysis is easily extended when more than two

answers are allowed (as was the case in the survey we used), by considering several alternative answers in decreasing order of value. Assuming a binary answer without loss of generality, we report (2) into (7) and write the following condition for reporting job satisfaction:

$$J_a = 1 \text{ iff } \sum_{t=1}^{a} \frac{y_t - y_t^*}{(1+r)^{t-1}} + \frac{E_a V_a - E_a V_a^*}{(1+r)^a} + u - u^* > 0. \qquad (8)$$

Since the past is known with certainty, the individual's risk attitude does not affect the backward looking part of this expression. Thus, *the posterior choice model predicts that reported satisfaction solely depends on discrepancies without being in contradiction with accepted economic theory.*

The theory also predicts two of the three stylized facts spelled out in section 2. Uniform economic growth will not make anyone happier because it will raise all opportunities in equal proportions. The frequency of reported job satisfaction typically increases with age because rational individuals always choose the best job and, under rational expectations, they cannot be systematically wrong in the long run. The backward-looking component of expression (8) is thus likely to be permanently positive after reaching a sufficient number of years, while the forward-looking component converges towards zero. The upward-sloping relationship of job satisfaction with age is not necessarily monotonic, though, and it may be U-shaped. Contrary to Hamermesh (1977), this result does not require any job specificity of human investments. On the other hand, the model does not predict any systematic effect of sex or education on job satisfaction, *ceteris paribus.* Being a man or a university graduate will tend to increase earnings permanently in all occupations, and this will not affect the sign of (8) unless it has a differential effect on the non-pecuniary value of jobs.

But the posterior choice model has even more to say. A stylized fact of previous studies of satisfaction judgments (including ours) is that responses are typically concentrated in the upper segments of the satisfaction scale (e.g., Campbell 1981, Krahn and Lowe 1988). Most people usually report that they are happy or pretty happy! This well-known fact has often been overlooked on the ground that the satisfaction index is an arbitrary measure of SWB. Although this argument may not be quite convincing (why should researchers bother about satisfaction judgments if they are noise), it can no longer be addressed to us if we interpret reported satisfaction as a meaningful choice. Indeed, the rationality assumption implies that, under certainty, individuals always be

satisfied with choices which they deliberately made. A corollary is that respondents would be less satisfied on average with experiences out of their control. A good instance is offered by the surveys on the political popularity of governments in democratic regimes. As a little half of respondents did not support the incumbent government in the polls, it is not surprising that so little consensus is usually found in these judgments. Other convincing evidence is the fact that respondents report greater overall job satisfaction than pay satisfaction. The mean scores (standard deviations) found by Clark and Oswald (1996, data appendix) on a 1-7 scale were respectively 5.50 (1.51) and 4.49 (1.95). A suggested interpretation is that individuals control their job as a whole better than their pay, because choosing a job is a package deal whose single elements, like pay, cannot be freely and separately chosen.

Lastly, it should be noted that the "posterior choice" underlies no real decision, but it does point to some real decision. Omitting the non pecuniary value of jobs for simplicity, equations (7) and (8) indicate that reported job satisfaction means: $H_a - H_a^* > 0$, whereas the decision to stay in the job is governed by: $E_a V_a - E_a V_a^* > 0$. Neither of these two conditions implies the other, but the posterior choice of job and the ex ante choice of staying correlate (Freeman 1978; Akerlof, Rose and Yellen 1988). One can be more accurate and derive from (8) the two following implications: (i) those individuals who suffered a null or negative discrepancy in their past career's value (i.e., $\sum_{t=1}^{a} \frac{y_t - y_t^*}{(1+r)^{t-1}} \leq 0$) and now report job satisfaction intend to stay; (ii) those who enjoyed a positive discrepancy in their past career's value and now report job dissatisfaction intend to quit, unionize, or do whatever is best in order to improve their future career. The foregoing analysis demonstrates that job satisfaction cannot be a consequence, but is rather a cause, of job turnover and union affiliation. Hence the common practice of including tenure and union affiliation among the explanatory variables of job satisfaction (e.g., Borjas 1979, Freeman 1978; Clark and Oswald 1996) is not warranted under this new interpretation.

4 The data and earnings functions

In a survey conducted by Statistics Canada in 1986, several thousand individuals across Canada answered the following question : What is your level of satisfaction (with categorical answers) with your job or principal activity? The survey also contains information about the respondent's wage over the last twelve months, age, gender, level of education, years

of experience, number of weeks (part time or full time) employed over the last 12 months, socioeconomic work status, linguistic ability, region of residence, country of birth, marital status, religion status, and the level of satisfaction concerning the respondent's health, leisure and marital situation. These variables, described in Table 1, account for factors affecting the level of satisfaction and/or the determinants of earnings. The sample of 2,600 observations consists of individuals who all declared nonzero wages for the period considered and were not self-employed.

[Insert Table 1 about here.]

In order to estimate past earnings, reservation earnings and earnings discrepancies, we ran separate earnings regressions for the following age-groups : 15-24, 25-34, 35-44, 45 and over. Our initial justification for partitioning the sample is that we can test the crucial prediction that the coefficient of current earnings (discrepancies) should be inversely U-shaped with age. An additional motivation will appear in subsection 5.2. Another point of departure from previous studies (e.g., Hamermesh 1977, Clark and Oswald, 1996) is that we do not use the log earnings specification popularized by Mincer (1974). We choose to regress earnings directly (see (12)) because the causative latent variable is human wealth (human wealth discrepancy), which is additive in earnings (earnings discrepancies). If we had estimated the Mincerian equation $\log y = \log y^* + v$, the generated earnings discrepancy would have been : $\varepsilon \equiv y - y^* = y\,(1 - e^{-v})$. Since the latter is proportional to earnings, we would have introduced a spurious correlation of $y^*$and ε. This might be partly responsible for the weak influence of reference earnings on job satisfaction found in previous studies, holding the discrepancy term constant.

Columns (1) and (2) of Table 2 present for each group the OLS estimates with heteroskedastic-consistent standard errors. Column (2) introduces a smaller number of explanatory variables than column (1), for reasons that will become apparent in subsection 5.2. Many variables are statistically significant with their expected signs. In particular, we noted that men are better paid than women across all age-groups, and that the level of education is an important determinant of wage. The experience variables are important in the 25-34 age-group, but the worker's socioeconomic work status and his part time work status affect all age-groups. For the 35-44, the worker's region of residence and religion status also played a significant role.

[Insert Table 2 about here.]

5 Econometric specifications and problems

5.1 Job satisfaction as felt utility

In principle, equation (6) can be estimated with either one of the three main definitions of reference earnings that we mentioned in subsection 2.2. However, we argue that both reservation earnings and expected earnings can be hardly distinguished empirically from comparison earnings. It should first be clear that the earnings predicted for a given individual from a random sample in cross-section serve as a good econometric estimate for his comparison earnings. The same figure should also come close to that individual's reservation earnings because the variety of earnings which can be observed from the sample simulate the market opportunities that would be revealed by his search for the best offer. Finally, as far as an econometrician who cannot rely on panel data will be happy enough to estimate the expected wage from cross-section, it will make a decent econometric guess for the individual's expected earnings. Therefore, all three definitions of reference earnings are close to the age-specific earnings predicted by a statistical earnings function. The earnings discrepancy is then simply the estimated residual of an earnings function. Note for instance that Hamermesh (1977) and Clark and Oswald (1996) have both adopted the same "statistical" method while using a different concept of reference earnings. Keeping this in mind, we shall be able to test nine utility models against the null, which we simply call the "statistical" model. Moreover, these models are partially nested and this will permit selecting the best one, i.e. the most parsimonious non rejected model. All of the felt utility models of job satisfaction which will be tested are summarized in Table 3.

[Insert Table 3 about here.]

Although Table 3 and Figure 1 describe the same reality, they have quite different expositional virtues. Figure 1 helps us to distinguish SWB models at first glance. On the other hand, Table 3 is a convenient frame for visualizing which model is nested in which.

5.2 The construction of lifetime earnings and reference earnings from cross-section data

A full test of the lifetime utility and posterior choice models requires knowledge of past earnings and reservation earnings. A static version of these would be empirically undistinguishable from the economic and relative utility models mentioned in Table 3. Although panel data could

solve this problem, we present here a shortcut method which permits the construction of lifetime earnings from cross-section data. Most surveys being of the latter type, we believe it is important for the progress of future research to suggest a cheap and operational way of beating the static benchmark.

Ex ante job decisions are taken under uncertainty and surprises must inevitably occur with the passage of time. Our empirical strategy for the construction of past reservation earnings is to reconstitute individual surprises econometrically. We acknowledge the fact that earnings surprises originate in the release of new information about the productivity of self and others and that one part of it correlates with life-cycle variables whose exact value is unknown in youth but gets determined sequentially. We divided the past and present in three periods for reasons mentioned below. Each period is characterized by a different stock of information, the amount of available information increasing over time. Periods might be of unequal length both within and between age-groups. The first period is simply around school-leaving age. For most individuals, relevant information is then restricted to education level, gender and nationality. Rational career expectations should be based on just that, and the predictable returns to experience. Period 1 reservation earnings have been estimated from that information only and the coefficients of the corresponding earnings functions appear in column 2 of Table 2. While information is minimal at school-leaving age, it is maximal currently, and a natural definition of currently available information is given by the complete list of variables which enter the age-specific earnings functions reported in Table 2.[6]

Current reservation earnings have been calculated by imputing to each individual observed values of the latter variables and taking the coefficients found in column 1. Since information is acquired sequentially, this methodology can also be used to estimate the reservation earnings of an intermediate period in which the worker has a good idea of the factors which affect earnings but draws his comparison from a heterogeneous

[6]The statistical variables which are meant to capture the release of new information through the life-cycle appear in column 1. They include measures of the time allocated to work (JOBWKS, WPART, LTDS), place of residence (ONT), marital status (MARRD, DIVOR), health (HEDS), religion status (NOREL), and socio-economic status (WSSP, WSTF). We are conscious that it is not common practice in the human capital literature to include socio-economic status in the earnings function since it is, at least in part, a choice variable. But the aim pursued here is not to obtain consistent estimates of the returns to education and experience. It is rather to get a close econometric simulation of an individual's reference earnings by taking the mean earnings of a sample of "similar" persons. Presumably, age and broadly defined elements of socio-economic attainment are basic indicators of similarity with respect to job.

sample. Consequently, period 2 reservation earnings have been simulated by taking the coefficients of column 1 and attributing to each worker the age-specific *average* value of the variables, listed in column 1, which remain unknown by the workers at that time.[7]

Having thus computed the three period reservation earnings $(\hat{y}_{1,}\ \hat{y}_{2,}\ \hat{y}_3)$ for every individual (denoting the school-leaving period by 1 and the current period by 3), we now turn on to the estimation of own earnings in the same periods (y_1, y_2, y_3). The end-period earnings, y_3, are currently observed in the sample. As for the remaining two past periods, we consistently define :

$$y_2 = \hat{y}_3\ ;\ y_1 = \hat{y}_2, \tag{9}$$

from the assumption that the updating of an individual's opportunities with experience follows his discovery of ever more complete information about his personal situation. Another way of justifying (9) is to say that an individual's reference earnings in any period but the first one should be his own earnings one period back.

Cross-sectional estimates for past (reservation) earnings should be corrected for the spurious effect of experience between the period in the past and the period of the survey. Taking age-group-specific earnings and job satisfaction functions allows us to control for much of this effect by addition of a constant term. The further introduction of experience (EXPER) among the explanatory variables of the job satisfaction equation produced no significant result and was eventually abandoned. This brings another motivation for splitting the sample by age-group.

Finally, we consider four successive periods in the past for the lifetime utility model by application of equation (9) one period back :

$$J_i = \alpha + Z_i\beta + \varphi_1\hat{y}_{1,i} + \varphi_2\hat{y}_{2,i} + \varphi_3\hat{y}_{3,i} + \varphi_4 y_{3,i} + \varsigma_i, \tag{10}$$

The posterior choice model is specified with just the three periods in the past :

$$J_i = \alpha + Z_i\beta + \psi_1\hat{\varepsilon}_{1i} + \psi_2\hat{\varepsilon}_{2i} + \psi_3\hat{\varepsilon}_{3i} + \varsigma_i, \tag{11}$$

with $\hat{\varepsilon}_{3i} = y_{3i} - \hat{y}_{3i}\ ;\ \hat{\varepsilon}_{2i}\ = \hat{y}_{3i} - \hat{y}_{2i}\ ;\ \hat{\varepsilon}_{1i}\ = \hat{y}_{2i} - \hat{y}_{1i}$.

If job satisfaction is partly backward-looking, it is expected that the coefficients of earnings in (10) and the coefficients of earnings discrepancies in (11) decrease over time :

[7] This concerns all the variables except gender, education level, nationality and experience (and the square).

$$\begin{aligned} \varphi_1 &> \varphi_2 > \varphi_3 > \varphi_4 \ ; \\ \psi_1 &> \psi_2 > \psi_3. \end{aligned}$$

In both equations (10) and (11), the error term ς_i captures the forward-looking part of human wealth (discrepancy), unobserved variables and measurement errors. Since the present value of future lifetime earnings declines with experience, the variance of the error term in equations (10) and (6) must also decline with experience if reported job satisfaction is to be interpreted as felt utility. Consequently, all our regressions will be corrected for heteroskedasticity. The foregoing analysis must be adapted to the posterior choice model described by equation (11). As a matter of fact, the present value of future lifetime earnings discrepancies would only decline with experience if the latter were positively correlated, and we know that this will frequently, but not necessarily, happen. So, heteroskedasticity may once more be a problem.

5.3 The problem of using generated regressors

Past earnings and earnings discrepancies, which enter as explanatory variables in the job satisfaction equations, are estimates drawn from age-group-specific earnings functions. For instance, the earnings discrepancy ε_i is obtained as the residual of :

$$y_i = W_i\lambda + \varepsilon_i, \tag{12}$$

in which it is assumed that W_i' is a set of exogenous variables independent of ε_i.

Ideally, we want to estimate jointly the determinants of job satisfaction and (reference) earnings. The presence, however, of a discrete variable in the job satisfaction equation and, the additional difficulty of dealing with unobserved past earnings for the posterior choice and lifetime utility models convert a simple computational problem into a rather complex one. An alternative is to consider two-stage estimators. Unfortunately, as shown by Pagan (1984, 1986), McAleer and McKenzie (1991) among others, generally in the context of linear models, these two-stage and related estimators could have severe limitations including efficiency losses. In some cases, inconsistency could result for nonlinear models. All models considered here are vulnerable on that last account, but one can expect to improve consistency by assuming that $E(\varsigma_i\varepsilon_i) = 0$ (also an identifying restriction for some models). This weak exogeneity assump-

tion[8] presumes that the unobserved determinants of earnings should be uncorrelated with the unobserved determinants of job satisfaction. Such assumption should be verified by discrepancy models inasmuch unobserved determinants of earnings, like ability, have an equal effect on reference earnings and thus do not affect the future earnings discrepancies which form the major component of S_i. On the other hand, it is more problematic if the true model is the economic model (in either static, or lifetime version), the relative utility, or the social comparison model (in either weak or strong form). Moreover, the above assumption might be invalidated by the presence of job specific investments and efficiency wage incentives.

Parametric two-step estimators substitute for the latent regressors in (6), (10) and (11), their least square estimates $\hat{y}\left(= W\left(W'W\right)^{-1}W'y = P_W y\right)$ and $\hat{\varepsilon} = (y - \hat{y})$ from the earnings equation (12).

Specifically, for the posterior choice model (11), we obtain after some manipulations :

$$J_i = \alpha + Z_i\beta + \psi_1(\hat{y}_{2,i} - \hat{y}_{1,i}) + \psi_2(\hat{y}_{3,i} - \hat{y}_{2,i}) + \psi_3(y_{3,i} - \hat{y}_{3,i}) + \mu_i,$$

with the composite error μ_i :

$$\mu_i = \varsigma_i + \psi_1\left(v_1 - r_1 + P_{w_{1,}i}\varepsilon_{1,i}\right) + \psi_2\left(v_2 - r_2 + P_{w_{2,}i}\varepsilon_{2,i}\right) + \psi_3 P_{w_{3,i}}\varepsilon_{3,i}. \tag{13}$$

The v and r are additional error terms due to our estimates of the observed and reservation earnings in periods 2 and 1 based on current data (period 3). Under the null, $H_0 : \psi_j = 0$ for all $j's$, the two-step procedure yields consistent and efficient estimates. For $\psi_j \neq 0$, the error term is non-spherical causing not only an efficiency problem, but some parameter estimates might be inconsistent in the context of a discrete dependent variable. Some corrections for the heteroskedasticity problem will be proposed, and likelihood ratio tests will be used for statistical inferences.

Comparable specifications can be derived for the lifetime utility, and static SWB models by substituting $\hat{y}$ for y^* and $\hat{\varepsilon}$ for ε into equation (10) and (6). In the previous empirical literature on job satisfaction, this problem of generated regressors has been completely ignored.

[8] See Engle, Hendry and Richard (1983) for a discussion of weak exogeneity.

6 Empirical results on job satisfaction

Our estimation of equations (6), (10) and (11) rests on an ordered probit model[9] to account for the categorical nature of the dependent variable.[10] Let J_i be the observed, ordinal satisfaction variable that has three possible outcomes. J_i is related to the latent variable U_i by a set of constants or thresholds such that :

$$\begin{array}{rll} J_i = 0 & \text{if} & U_i \leq \delta_0, \\ = 1 & \text{if} & \delta_0 < U_i \leq \delta_1, \\ = 2 & \text{if} & \delta_1 < U_i. \end{array} \tag{14}$$

This model implies that the probability of obtaining an observation with $J_i = 1$ is :

$$Prob\left(J_i = 1\right) = F\left(\left(\delta_1 - X_i'\phi\right)/w_i\right) - F\left(\left(\delta_0 - X_i'\phi\right)/w_i\right),$$

where F is the cumulative normal distribution function and 'w_i' is the individual specific standard deviation. The latter is either 1 for all i (homoskedasticity), or, to account for heteroskedasticity, w_i which adds no new parameter, or $e^{\pi' w_i}$ for multiplicative heteroskedasticity adding an additional parameter vector π'. Similar expressions can be found for the other observed J_i values. When an intercept, α, is included in the equation for U_i, identification is achieved by setting $\delta_0 = 0$.

The three categories for the dependent variable job satisfaction, JOBS, range from the lowest to the highest level of satisfaction : "totally and rather displeased", "rather satisfied" and "fully satisfied". The percentages of observations in each category for the overall sample of 2600 observations are respectively : 9.38%, 43.12%, 47.50%. High levels of job satisfaction are not unusual in these surveys [see Krahn and Lowe (1988)] and is predicted by the posterior choice model.

In Table 4, we present the level of satisfaction by age-groups. It can be seen that the proportion of fully satisfied individuals increases with age as predicted by the same model.

[9] The ordered probit model is presented in Maddala (1983) and was first estimated by McKelvey and Zavoina (1975). Greene (1995, 480) discusses the technical details of integrating the heterosckedasticity in the basic model.

[10] The discreteness of the statistical measure of reported job satisfaction conforms well with the conventional and unconventional (eg. Hamermesh 1977, Clark 1993) theories of ordinal utility. Defendors of a cardinalist conception must face the problem of converting an ordinal statement onto a cardinal scale. They solve it by asking respondents to evaluate their feelings on a detailed Likert-type scale (for instance, Michalos (1985) uses a 7-point scale: terrible=1,..., delightful=7). Psychologists usually treat the stated rank as a continuous variable. Van de Stadt et al (1985) use the more sophisticated information maximization argument of Van Praag (1968).

[Insert Table 4 about here.]

Analyzing the frequency data between the level of satisfaction and the level of education, we reject the independence of the two variables for the 15-24 (p-value = 0.036) and the 35-44 (p-value = 0.068) age-groups. Here the level of satisfaction appears to increase with the level of education, a result coherent with the lifetime utility model. In the posterior choice framework, such dependence might be due to job rationing which would thus decrease with education level in these age groups. The independence between the level of satisfaction and gender of the respondent is never rejected as predicted by the posterior choice model. These two results are at variance with the recent findings of Clark and Oswald (1996) and Clark (1993) on British data, which seems to imply that job tastes do not systematically differ by education and gender. The lack of robustness of these effects leaves little substance to ad hoc determinations of job satisfaction in comparison with discrepancy factors.

6.1 Test of SWB models:

We obtained ordered probit estimates for all the felt utility models. The results respect the specificity of each model (in terms of constrained coefficients)[11] and the ordered probits were corrected for multiplicative heteroskedasticity with the years of experience variable, EXPER[12]. The first important finding is that, with only one exception, the statistical model, or null hypothesis, cannot be rejected in the young (15-24) and older (45+) age groups. This cannot be accommodated under a static interpretation of utility, but corroborates the (partly) backward looking nature of satisfaction and the presence of training and other deferred payment schemes in early career. For space reasons, we do not report these results which are available on request.

Moreover, the only exception for which the likelihood ratio test rejects the statistical model in favor of the loss aversion model (p-value = 0.012) concerns the 15-24 age-group. For that case, the coefficients γ_2, γ_3, γ_4, γ_5 are all significant but with the wrong sign, except for γ_3.

[11] For example, for the loss aversion model, the proportional factor fixing the range of each dummy variable is set to $\theta = 1.5$ for the negative earnings discrepancies while $\phi = 1$. On the other models $\theta = \phi = 1$. These values yield a sufficient number of observations for all categories. Different values were tried without modifying the results.

[12] EXPER is a variable used in the first stage of the estimation procedure and has a relatively large variance. Different variables and a combination of variables were also tried without improving the correction given by EXPER.

Results for the 25-34 and 35-44 age-groups, reported in Tables 5a and 5b respectively, are less negative.

[Insert Table 5A about here.]

In the 25-34 age group, likelihood ratio tests indicate that all felt utility models are preferred to the restricted log likelihood associated with the null with p-values less than 1%. However, all economic and SWB models are not equally good. A simple t-test rejects the assumption that $\gamma_1 = \gamma_2$ and accepts $\gamma_1 < \gamma_2$, but a likelihood ratio test rejects any difference between the two models[13]**.** In turn, the unrestricted log likelihoods of the social comparison (weak form), the cognitive dissonance II, the disappointment-elation and the loss aversion models are statistically no different from the restricted log likelihood of the parsimonious relative utility model. The loop is closed to favor the relative utility model when we note that the disappointment-elation model is preferred to the restricted social comparison (strong form) model (p-value = 0.0064), and the cognitive dissonance II model is preferred to the restricted cognitive dissonance I model (p-value= 0.00075). In the relative utility model,[14] a positive (negative) discrepancy will positively (negatively) influence the utility.

[Insert Table 5B about here.]

In the 35-44 age-group, only the economic model, the relative utility model and the social comparison model (weak form) are preferred to the null. These results are obtained from likelihood ratio tests with p-values less than or equal to 5%. Again, the unrestricted log likelihood of social comparison (weak form) model is statistically no different from the restricted log likelihood of the economic and the relative utility model. The relative utility model remains the preferred model.

It is also possible to evaluate each SWB utility function for its own sake. Even if we restrict attention to the results reported in tables 5A and 5B for the intermediate age groups, the nonlinearities implied by cognitive dissonance II ($\gamma_5 > 0$), disappointment/elation ($\gamma_3 > 0$), and loss aversion ($\gamma_2 > 0$) are strongly rejected by a Student test and the coefficients are insignificant with the wrong sign, most of the time. Such

[13] **The loglikelihoods of the economic model are reported in ** of Tables 5A and 5B.**

[14] The relative utility model is empirically undistinguishable from the differential satisfaction hypothesis of Hamermesh (1977), and from the surprise model of Cohen and Axelrod (1984) although earlier discussion has shown that the use of generated regressors may raise less problems if one of the latter models is the true one.

refutations do not occur for the other models, although some coefficients may be insignificant.

To summarize, all of the static utility models are rejected against the null (which simply relates job satisfaction to statistical determinants of taste like gender and education) in the younger and in the older age groups. In the two intermediate age-groups, a simple discrepancy model fares better than the null and cannot be rejected against any other SWB hypothesis. However, the conventional economic model relating job satisfaction to earnings cannot be ruled out, at this stage, in the 35-44 age-group.

It was mentioned earlier that the use of generated regressors cannot throw doubt on the test when the theory is to be rejected. Therefore, social comparison (in weak and strong form), cognitive dissonance (I and II), disappointment-elation, and loss aversion do not appear to be promising tracks for understanding job satisfaction in view of the complication added by these theories. Of course, some of these theories are perhaps better suited to the analysis of choices under risk and other domains of behavior for which they were primitively designed. Disappointment-elation is a case at hand. Our claim is simply that none of the more complicated utility functions involving discrepancy terms that have been suggested in the literature is a better predictor of job satisfaction than a linear function of earnings discrepancy. Nor is the conventional economic model.

6.2 Test of the posterior choice model:

Table 6 presents the results of the posterior choice model for all age-groups. We first note, once more, that it does not perform better than the statistical model in the 15-24 and 45+ age-groups, but this is now consistent with the lifetime interpretation (see the discussion in 2.1). Also predicted by this model, the coefficient of the current earnings discrepancy $\widehat{\varepsilon}_3$ is inversely U- shaped and the peak is attained by the 25-34 age-group. The same observations could have been made from tables 5A and 5B about relative utility models, but were not predicted by the latter. In order to make a crucial empirical distinction between both interpretations, it is necessary to look at the coefficients of past earnings discrepancies, $\hat{\varepsilon}_1$ and $\hat{\varepsilon}_2$. The fact that they appear with the correct sign, are also significant in the intermediate age groups (at the 5% level in the 25-34 age group and at the 10% level in the 35-44 age group), and follow the inverse U-shaped pattern across age-groups, is highly supportive of our new interpretation. An even more decisive argument is supplied by the log likelihood test: in the middle age-groups, the unrestricted loglike-

lihood of the posterior choice model is statistically significantly greater (p values=0.0069 and 0.0219 in the 25-34 and 35-44 age-groups respectively) than the restricted log likelihood of the relative utility model. It seems to be the first time that a new model has been able to beat the benchmark of simple discrepancy theories! Furthermore, this result has been obtained in spite of the presumably great imprecision of the cross-section estimates for past earnings discrepancies, which drives the related coefficients towards zero.

The ranking of the three coefficients of past and current earnings discrepancies provides new strong evidence in favor of the posterior choice model. In conformity with theoretical predictions, it is found that a discrepancy's effect on reported job satisfaction is the greater the more distant it was experienced in the past. This pattern is exactly observed in three age-groups, and the coefficients of $\hat{\varepsilon}_1$ and $\hat{\varepsilon}_3$ are truly apart. The only violation concerns an age group (15-24) for which the prediction was not reliable for two reasons: the incidence of human investments and other deferred payment schemes in early career, and the "thinness of past" for recent school-leavers. As it is, the set of results should be quite convincing because it runs counter the loose intuition that more remote events should be discounted.

[Insert Table 6 about here]

One interesting feature of the posterior choice model is the theoretical possibility of retrieving, from the coefficients of the time varying earnings discrepancy variables, the rate of interest (or time preference) for the average individual in our sample. Unfortunately, the periods that correspond to the three estimated discrepancies are not defined with any precision, so that any calculation is highly speculative without panel data. The main impression that emerges from the data, at this stage, is that the average discount rate is substantially greater in the early career than later on.

All the estimations, for both the felt utility models and the posterior choice model, were done correcting for multiplicative heteroskedasticity of the second stage estimation with the experience variable, EXPER. The coefficient estimates of this variable are always negative and statistically significant for some regressions (see Table 5B and 6). The negative value suggests that the residual variance in the level of reported job satisfaction decreases with the labor market experience of the individuals. This result is consistent with the fact that the forward looking part of human wealth discrepancy (see equation (8)) is essentially in the residual and decreases with experience on average as the span of the remaining working life decreases.

6.3 Test of the lifetime utility model:

We conclude this empirical section by showing the ordered probit estimates of equation (10) in table 7. This provides an extended test of the conventional economic model by substituting lifetime past earnings for current earnings. If the lifetime utility model were true, all coefficients of earnings should take positive and decreasing values from the past to the present. Our results plainly contradict these predictions: the coefficient of $\hat{y}_1$ is always negative (significant at the 10% level in the 35-44 age group), and the coefficients of $\hat{y}_2$, $\hat{y}_3$, y_3 exhibit a U-shaped pattern. Hence, there is no way to rescue the conventional economic model by adding some dynamics.

It is possible to rewrite the deterministic part of equation (11), i.e. the posterior choice model, into equation (10) since the earnings discrepancies are simple combinations of $\hat{y}_1$, $\hat{y}_2$, $\hat{y}_3$, and y_3. One gets:

$$\begin{aligned} & \psi_1 \left(\hat{y}_2 - \hat{y}_1\right) + \psi_2 \left(\hat{y}_3 - \hat{y}_2\right) + \psi_3 \left(y_3 - \hat{y}_3\right) \\ = \quad & -\psi_1 \ \hat{y}_1 + \left(\psi_1 - \psi_2\right) \hat{y}_2 + \left(\psi_2 - \psi_3\right) \hat{y}_3 + \psi_3 \ y_3 \ , \end{aligned}$$

which must be juxtaposed to: $\varphi_1 \ \hat{y}_1 + \varphi_2 \ \hat{y}_2 + \varphi_3 \ \hat{y}_3 + \varphi_4 \ y_3$.

The pattern of coefficients observed in table 7 emerges from the theoretical prediction that $\psi_1 > \psi_2 > \psi_3 > 0$. Thus we should have $\varphi_1 < 0, \varphi_2 > \varphi_3 > 0$, and $\varphi_4 > 0$. Moreover, we check that $\varphi_4 = \psi_3$ by comparing the related coefficients from tables 6 and 7. Other comparisons, and especially $\varphi_1 = -\psi_1$, are obviously more fuzzy but of the same order of magnitude.

[Insert Table 7 about here]

In summary, the lifetime utility model is unambiguously rejected in favor of the posterior choice model.[15]

7 Concluding remarks

A new theory should be preferred to the conventional wisdom when it predicts more facts, rests on fewer ad hoc assumptions, and when the prior model is consistently rejected by the data against the new one. On all these accounts, considerable evidence found in this paper indicates that, when someone reports his satisfaction with something that he has

[15] We may add a little spice to this conclusion by noticing that both models fare equally well in terms of loglikelihood (which is no surprise).

experienced, he does not really communicate the number of utils that he felt, but rather states his own preference for that thing over his best alternative conditional on what he knows and expects of both, at this time.

In simple words, reporting one's satisfaction is the judgment that one would now repeat one's past experience if one had to choose again. Under certainty and stable preferences, one would always be satisfied with an unconstrained and deliberate decision made in the past. It is merely the occurrence of surprises and constraint changes which makes the posterior preference deviate from the prior.

This new interpretation does not invalidate the empirical findings of psychological and sociological research on the subject, which emphasized the role of discrepancies between objective conditions and a reference on reported satisfaction. It is exactly what the new theory predicts. However, this important result does not require utility to be relative and comparable across persons, because choice and preference are obviously relative and ordinal concepts. Furthermore, the new theory characterizes the reference from which discrepancies are appreciated as the individual's best alternative at the time he makes a satisfaction judgment. This comes closest to the pioneering analysis of Hamermesh (1977), but we believe Festinger (1954) had essentially the same reference in mind in his illuminating theory of social comparison processes.[16]

Recognition of the intertemporal dimension of satisfaction judgments significantly improves the empirical content of the theory and illuminates several hidden aspects of human behavior. For instance, older persons appear less sensitive to current discrepancies, and discrepancies experienced in the remote past have far greater weight on job satisfaction judgments than what happens at present. These two predictions are reminiscent of the fact that wisdom comes with age and that traumas suffered during childhood have quite persistent effects on human satisfaction. The observation that current earnings discrepancies have a negligible, and perhaps negative, effect on the job satisfaction of young workers is another striking testimony that individuals have a long plan-

[16] Festinger (1954) clearly states (p.121): "Corollary III A: Given a range of possible persons for comparison, someone close to one's own ability or opinion will be chosen for comparison;" and (p. 120): "Corollary II B: When an objective, non-social basis for the evaluation of one's ability or opinion is readily available persons will not evaluate their opinions or abilities by comparison with others".

These two corollaries put together indicate that, in Festinger's mind, comparison would be a proxy for such information when the latter was not available or too costly; and thus comparison with most similar persons would be a way of evaluating one's best alternative. Festinger suggested an information-based argument for social comparison, not a theory of interdependent preferences.

ning horizon and consciously make on-the-job investments. Such a result is remarkable because studies using training data have after been unable to find consistent evidence of workers paying for their training through lower starting wages. The test of a life-cycle model on cross-sectional data may attract some suspicion on our results and the study needs to be replicated on longitudinal data. On the other hand, that limitation forced us to design an easily replicable methodology for partially recovering past earnings discrepancies from cross section.

Straightening up the interpretation of satisfaction judgments restores the power of microeconomic theory and should thus make economists feel less reluctant to exploit the wealth of such qualitative data in econometric studies of job mobility, job matching, union membership, firms' compensation policies, and many other sorts of human behavior.

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Figure 1
Illustration of Felt Utility Model

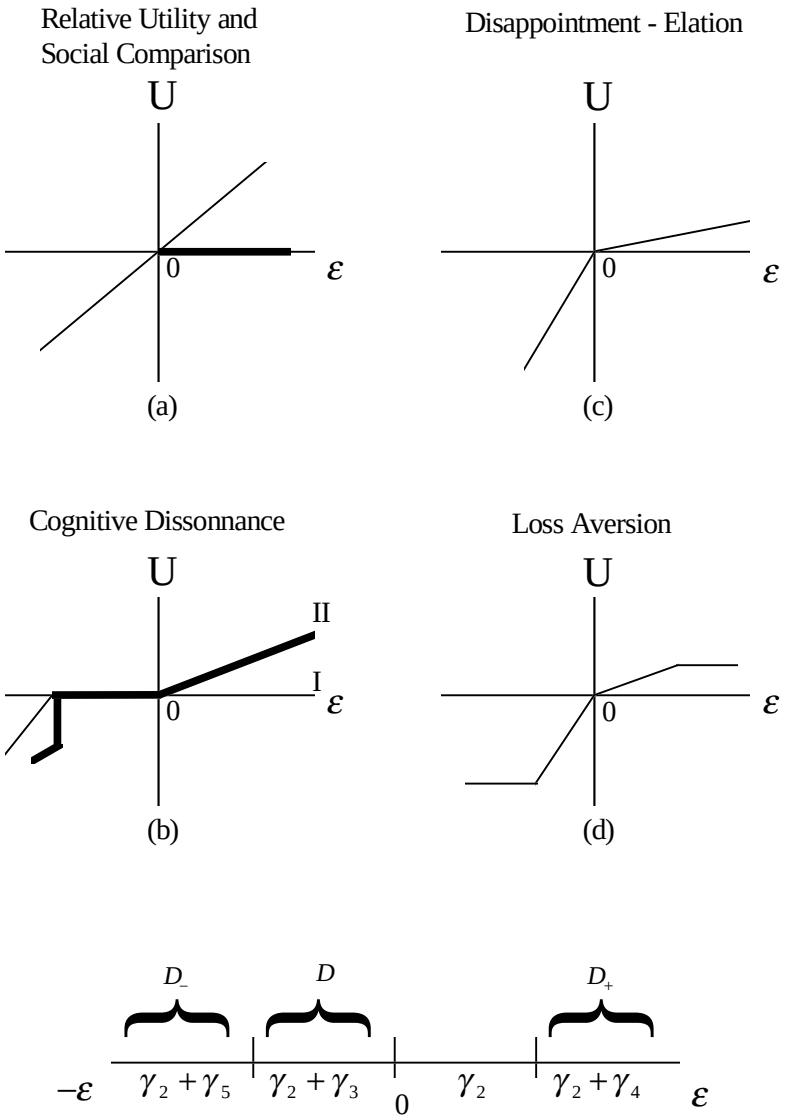

Table 1
Definition of Variables and Descriptive Statistics

Symbols	Definitions	Means (Standard Errors)
JOBS	Level of job satisfaction :	
	- totally and rather displeased	0.0938
	- rather satisfied	0.4312
	- fully satisfied	0.4750
WAGE	Wage income for the last 12 months (in $000)	22.41 (12.7)
SEXM	Gender of the respondent : male = 1; female = 0	0.5408
ED08	Education : 8 years or less = 1; 0 otherwise	0.0658
ED13-	Education : 9-13 years = 1; 0 otherwise	0.4796
ED13+	Education : 13+ years without university degree = 1; 0 otherwise	0.3034
EDUN	Education : university = 1; 0 otherwise	0.1512

Table 1 - cont'd

Symbols	Definitions	Means (Standard Errors)
EXPER	Years of experience	13.8488 (11.55)
JOBWKS	Number of weeks employed over the last 12 months	47.79 (10.14)
WPART	Over these weeks : working mostly part time = 1; 0 otherwise	0.1031
WSSP	Socioeconomic work status : professional, high level management = 1; 0 otherwise	0.1327
WSTF	Work status : specialized, technician, supervisor = 1; 0 otherwise	0.4558
WSNS	Work status : semi and unskilled = 1; 0 otherwise	0.4035
WFFL	Work status : farmer and farm laborers = 1; 0 otherwise	0.0080
LANF	Mother tongue : French = 1; 0 otherwise	0.2461

LANE	Mother tongue : English = 1; 0 otherwise	0.7188
LANB	Linguistic ability : bilingual in French and English = 1; 0 otherwise	0.0138
ONTR	Region of residence : Ontario = 1; 0 otherwise	0.2223
CAND	Country of birth : Canada = 1; 0 otherwise	0.8785
MARRD	Marital status : married = 1; 0 otherwise	0.6323
DIVOR	Marital status : divorced = 1; 0 otherwise	0.0842
NOREL	Religious status : no religion = 1; 0 otherwise	0.1127
HEDS	Health satisfaction : rather or totally displeased = 1; 0 otherwise	0.0673
LTDS	Leisure time satisfaction : rather or totally displeased = 1; 0 otherwise	0.0769
MSDS	Marital status satisfaction : rather or totally displeased = 1; 0 otherwise	0.0581

Source : The 1986 General Social Survey-Cycle 2, Statistics Canada.

Table 2
Age-Specific Earnings Functions

Explanatory Variables[a]	Age Groups 15-24 (1)	15-24 (2)	25-34 (1)	25-34 (2)	35-44 (1)	35-44 (2)	45 + (1)	45 + (2)
Constant	-3.936	6.024[a]	-4.610[a]	10.14[a]	-11.93[a]	9.719[a]	-4.164	13.60[a]
	(2.44)	(2.78)	(2.15)	(2.18)	(3.02)	(2.63)	(3.46)	(3.96)
SEXM	3.800[a]	3.103[a]	7.581[a]	8.844[a]	8.249[a]	10.74[a]	10.19[a]	12.95[a]
	(0.623)	(0.669)	(0.561)	(0.604)	(0.829)	(0.905)	(0.870)	(1.03)
ED13-	-0.222	-0.679	-1.214	-1.531	1.036	2.045	0.400	0.939
	(1.69)	(1.99)	(1.24)	(1.39)	(1.25)	(1.44)	(1.07)	(1.23)
ED13+	2.970	4.068[a]	0.800	1.940	3.895[a]	5.262[a]	2.418	4.604[a]
	(1.78)	(2.07)	(1.35)	(1.49)	(1.40)	(1.59)	(1.55)	(1.68)
EDUN	6.478[a]	8.202[a]	5.253[a]	7.265[a]	9.284[a]	14.29[a]	7.800[a]	14.73[a]
	(2.01)	(2.32)	(1.63)	(1.63)	(1.79)	1.87)	(2.18)	(2.18)
EXPER	0.829[b]	2.512[a]	1.436[a]	1.919[a]	0.427[b]	0.617[a]	0.185	0.309
	(0.442)	(0.484)	(0.221)	(0.251)	(0.224)	(0.265)	(0.191)	(0.263)
EXPER2	0.0159	-0.157[b]	-0.072[a]	-0.0946[a]	-0.0100	-0.0175[a]	-0.0051	-0.0084[b]
	(0.074)	(0.083)	(0.012)	(0.0138)	(0.0075)	(0.0088)	(0.0035)	(0.0049)

CAND	0.283 (1.21)	0.457 (1.46)	-1.236 (1.11)	-1.097 (1.22)	1.676 (1.09)	1.354 (1.24)	1.440 (1.09)	-0.332 (1.27)
JOBWKS	0.234[a] (0.021)		0.347[a] (0.026)		0.409[a] (0.039)		0.337[a] (0.047)	
WPART	-2.653[a] (0.723)		-5.358[a] (1.01)		-7.506[a] (1.34)		-8.281[a] (1.51)	
WSSP	3.980[a] (1.03)		2.820[a] (1.05)		8.879[a] (1.29)		10.79[a] (2.23)	
WSTF	2.608[a] (0.682)		2.374[a] (0.608)		4.810[a] (0.892)		4.295[a] (0.904)	
LANB	-1.848 (2.24)		2.252 (2.44)		2.588 (3.21)		-2.030 (2.45)	
ONT	0.759 (0.710)		-1.004 (0.651)		3.363[a] (1.05)		2.326[a] (1.10)	
MARRD	2.600[a] (0.664)		0.379 (0.616)		1.342 (1.11)		0.753 (1.45)	
DIVOR	3.749[b] (2.16)		1.067 (1.24)		0.909 (1.45)		-0.440 (1.51)	
NOREL	0.425 (0.782)		0.920 (0.903)		3.197[a] (1.53)		2.554[b] (1.42)	

Table 2 - cont'd

Explanatory Variables[a]	Age Groups 15-24 (1)	15-24 (2)	25-34 (1)	25-34 (2)	35-44 (1)	35-44 (2)	45 + (1)	45 + (2)
HEDS	-0.670		0.208		0.568		-1.472	
	(1.17)		(1.08)		(1.69)		(1.36)	
LTDS	-2.023[a]		0.854		-0.289		-1.348	
	(0.791)		(1.02)		(1.72)		(1.54)	
$\bar{R}^2$	0.420	0.234	0.382	0.242	0.468	0.287	0.509	0.338
N observations	414	414	1 040	1 040	670	670	476	476

Notes : ( ) Heteroskedasticity-consistent standard errors.

[a] Coefficients significant at the 5 % (2.5%) level, two tails (one tail) when appropriate.

[b] Coefficients significant at the 10 % (5%) level, two tails (one tail) when appropriate.

The ED08, WSNS and WFFL variables are excluded.

Table 3
Qualitative Predictions of Various Felt Utility Models
on Reported Job Satisfaction, and Linear Constraints on the Coefficients

Models	γ_1	γ_2	γ_3	γ_4	γ_5	**constraints**
Statistical (H_0)	0	0	0	0	0	
Economic	+	+	0	0	0	$\gamma_1 = \gamma_2$
SWB :						
Relative utility	0	+	0	0	0	
Social Comparison (weak)	+	+	0	0	0	$\gamma_2 > \gamma_1$
Social Comparison (strong)	≥ 0	0	+	0	+	$\gamma_3 = \gamma_5$
Cognitive dissonance I	≥ 0	0	0	0	+	
Cognitive dissonance II	≥ 0	+	−	0	+	$\gamma_3 = -\gamma_2$
Disappointment-elation	≥ 0	+	+	0	+	$\gamma_3 = \gamma_5$
Loss aversion	0	+	+	−	−	$\gamma_4 = \gamma_5 = -\gamma_2$

Table 4
Reported Job Satisfaction Level by Age Groups[1]

Satisfaction Levels	Age Groups			
	15-24	25-34	35-44	45+
Totally and rather displeased	54 13.04 %	106 10.19 %	47 7.01 %	37 7.77 %
Rather satisfied	197 47.58 %	469 45.10 %	279 41.64 %	176 36.97 %
Fully satisfied	163 39.37 %	465 44.71 %	344 51.34 %	263 55.25 %
Total	414	1 040	670	476

Note : [1] Number of individuals and percentages, respectively.

Table 5a
Ordered Probit Estimates (Standard Errors) for the Utility and Other Subjective Well-Being Models for the 25-34 Age Group

	Coefficients						
Models**	$\hat{y}$	$\hat{\epsilon}$	$D\hat{\epsilon}$	$D_+\hat{\epsilon}$	$D_-\hat{\epsilon}$	Z*	Loglkh.
Relative utility		0.01841[b] (0.0044)				7^+, 9^-, 10^-, 11^-	-961.7575
Social comparison (weak form)	0.01140 (0.0071)	0.01839[a] (0.0044)				1^-, 7^+, 9^-, 10^-, 11^-	-960.5135
Social comparison (strong form)	0.01150[b] (0.0070)		0.02839[a] (0.0084)		0.2839[a] (0.0084)	7^+, 9^-, 10^-, 11^-	-964.2231
Cognitive dissonance I	0.01148[b] (0.0070)				0.2340[a] (0.0083)	7^+, 9^-, 10^-, 11^-	-966.2201
Cognitive dissonance II	0.1143 (0.0071)	0.02135[a] (0.0067)	-0.02135[a] (0.0067)		-0.00431 (0.0117)	1^-, 7^+, 9^-, 10^-, 11^-	-960.5473
Disappointment / elation	0.01140 (0.0071)	0.01854[a] (0.0071)	-0.00037 (0.013)		-0.00037 (0.013)	1^-, 7^+, 9^-, 10^-, 11^-	-960.5131
Loss aversion		-0.00584 (0.0192)	0.03984 (0.0256)	0.00584 (0.0192)	0.00584 (0.0192)	4^+, 7^+, 9^-, 10^-, 11^-	-965.9755

Notes for Table 5a:

[a] Coefficients significant at the 5 % (2.5%) level, two tails (one tail) when appropriate.

[b] Coefficients significant at the 10 % (5%) level, two tails (one tail) when appropriate.

* Z = 1 : SEXM, 2 : ED13-, 3 : ED13+, 4 : EDUN, 5 : LANF, 6 : LANE, 7 : CAND, 8 : NOREL, 9 : HEDS, 10 : LTDS, 11 : MSDS. The number indicates the corresponding variable in Z when positively (+) or negatively (-) significant at the 5 % level. The loglikelihood for the Z* reference model (the statistical model) is -971.3756.

** The loglikelihood for the economic model is -960.8649.

The constant α and the threshold parameter δ_1 are significant in all models. The coefficients of the variable EXPER to account for the heteroskedasticity are negative but insignificant in all models.

Table 5b
Ordered Probit Estimates (Standard Errors) for the Utility and Other Subjective Well-Being Models for the 35-44 Age Group

	Coefficients						
Models**	$\hat{y}$	$\hat{\epsilon}$	$D\hat{\epsilon}$	$D_+\hat{\epsilon}$	$D_-\hat{\epsilon}$	Z*	Loglkh.
Relative utility		0.00755[a] (0.00387)				9^-, 10^-	-578.3899
Social comparison (weak form)	0.00874 (0.0058)	0.00827[a] (0.0041)				1^-, 9^-, 10^-	-577.2672
Social comparison (strong form)	0.00913 (0.0059)		0.01257[b] (0.0073)		0.01257[b] (0.0073)	9^-, 10^-	-578.1774
Cognitive dissonance I	0.00869 (0.0059)				0.00759 (0.0074)	9^-, 10^-	-579.6303
Cognitive dissonance II	0.00838 (0.0059)	0.01032[b] (0.0062)	-0.01032[b] (0.0062)		-0.00572 (0.0114)	1^-, 9^-, 10^-	-577.6880
Disappointment / elation	0.00875 (0.0059)	0.00818 (0.0065)	0.00021 (0.0119)		0.00021 (0.0119)	1^-, 9^-, 10^-	-577.2670
Loss aversion		-0.00290 (0.0162)	0.02076 (0.0217)	0.00290 (0.0162)	0.00290 (0.0162)	9^-, 10^-	-578.7712

Notes for Table 5b: [a] Coefficients significant at the 5 % (2.5%) level, two tails (one tail) when appropriate.

[b] Coefficients significant at the 10 % (5%) level, two tails (one tail) when appropriate..

* Z = 1 : SEXM, 2 : ED13-, 3 : ED13+, 4 : EDUN, 5 : LANF, 6 : LANE, 7 : CAND, 8 : NOREL, 9 : HEDS, 10 : LTDS, 11 : MSDS. The number indicates the corresponding variable in Z when positively (+) or negatively (-) significant at the 5 % level or 10 % level. The loglikelihood for the Z* reference model (the statistical model) is -581.0159.

** The loglikelihood for the economic model is -577.2696.

The constant α and the threshold parameter δ_1 are significant in all models. The coefficients of the variable EXPER to account for the heteroskedasticity are negative and significant in all models.

Table 6
Ordered Probit Estimates (Standard Errors) of the Posterior Choice Model of Job Satisfaction

Explanatory Variables and Statistics	Age Groups			
	15-24	25-34	35-44	45 +
$(\hat{y}_2 - \hat{y}_1) = \hat{\varepsilon}_1$	0.01301 (0.0397)	0.1138[a] (0.0551)	0.1883[b] (0.0986)	0.1112 (0.0731)
$(\hat{y}_3 - \hat{y}_2) = \hat{\varepsilon}_2$	-0.00718 (0.0164)	0.02235[a] (0.0081)	0.01032[b] (0.00616)	0.00701 (0.0083)
$(y_3 - \hat{y}_3) = \hat{\varepsilon}_3$	0.01393[b] (0.0085)	0.01795[a] (0.0043)	0.00846[a] (0.00410)	0.00600 (0.0045)
SEXM	0.01657 (0.109)	0.04269 (0.098)	0.3842 (0.2554)	0.3276 (0.218)
ED13-	-0.5126[a] (0.249)	0.02677 (0.137)	0.3067[b] (0.162)	0.02545 (0.109)
ED13+	-0.2215 (0.254)	0.1261 (0.151)	0.1730 (0.197)	0.5727[a] (0.278)
EDUN	0.0337[a] (0.326)	0.3893[a] (0.171)	1.152[a] (0.549)	0.8266 (0.583)
LANF	1.0540[a] (0.405)	-0.0880 (0.243)	0.3329 (0.225)	0.2272 (0.224)
LANE	1.0281[a] (0.402)	-0.1297 (0.233)	0.3067 (0.215)	0.2018 (0.219)
CAND	-0.3207 (0.199)	0.2943[a] (0.135)	-0.09914 (0.113)	-0.2686 (0.183)
NOREL	-0.4663[a] (0.152)	-0.1023 (0.104)	0.1102 (0.121)	-0.3891[a] (0.190)
HEDS	-0.3635 (0.231)	-0.3760[a] (0.139)	-0.3611[a] (0.144)	-0.2715 (0.171)
LTDS	0.03275 (0.209)	-0.2597[a] (0.115)	-0.4365[a] (0.139)	-0.6534[a] (0.235)

Table 6 - cont'd

Explanatory Variables and Statistics	Age Groups			
	15-24	25-34	35-44	45 +
MSDS	-0.4890[a] (0.216)	-0.5645[a] (0.144)	-0.05579 (0.169)	-0.2368 (0.154)
α	0.8481[a] (0.414)	1.078[a] (0.285)	0.4571 (0.351)	0.9143[a] (0.295)
δ_1	1.332[a] (0.134)	1.423[a] (0.119)	1.202[a] (0.175)	1.056[a] (0.257)
EXPER	-0.04385 (0.0284)	-0.00371 (0.002)	-0.01416[b] (0.0082)	-0.00894 (0.00740)
Loglikelihood	-385.8752	-956.7874	-574.8731	-401.2447
N observations	414	1 040	670	476

Notes : [a] Coefficients significant at the 5 % (2.5%) level, two tails (one tail) when appropriate.
[b] Coefficients significant at the 10 % (5%) level, two tails (one tail) when appropriate.

Table 7
Ordered Probit Estimates (Standard Errors) of the Lifetime Utility Model of Job Satisfaction

Explanatory Variables and Statistics	Age Group			
	15-24	25-34	35-44	45+
$\hat{y}_1$	-0.02055 (0.0629)	-0.2955 (0.427)	-0.2037[b] (0.107)	-0.9338 (1.29)
$\hat{y}_2$	0.03474 (0.101)	0.3373 (0.576)	0.2150[b] (0.130)	1.426 (2.07)
$\hat{y}_3$	-0.02119 (0.0188)	0.004379 (0.0089)	0.00203 (0.0071)	0.00091 (0.0084)
y_3	0.01396 (0.00867)	0.01782[a] (0.00427)	0.00873[a] (0.0043)	0.00573 (0.0043)
Loglikelihood	-385.8616	-956.6946	-574.7736	-401.1967

Notes : [a] Coefficients significant at the 5 % (2.5%) level, two tails (one tail) when appropriate.
[b] Coefficients significant at the 10 % (5%) level, two tails (one tail) when appropriate.

The variables that are significant in the Z vector are generally the same as those reported in Table 6. The threshold parameter δ_1 is significant in each age-group. The coefficient of the variable EXPER to account for the heteroskedasticity is negative but insignificant in each age-group.

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