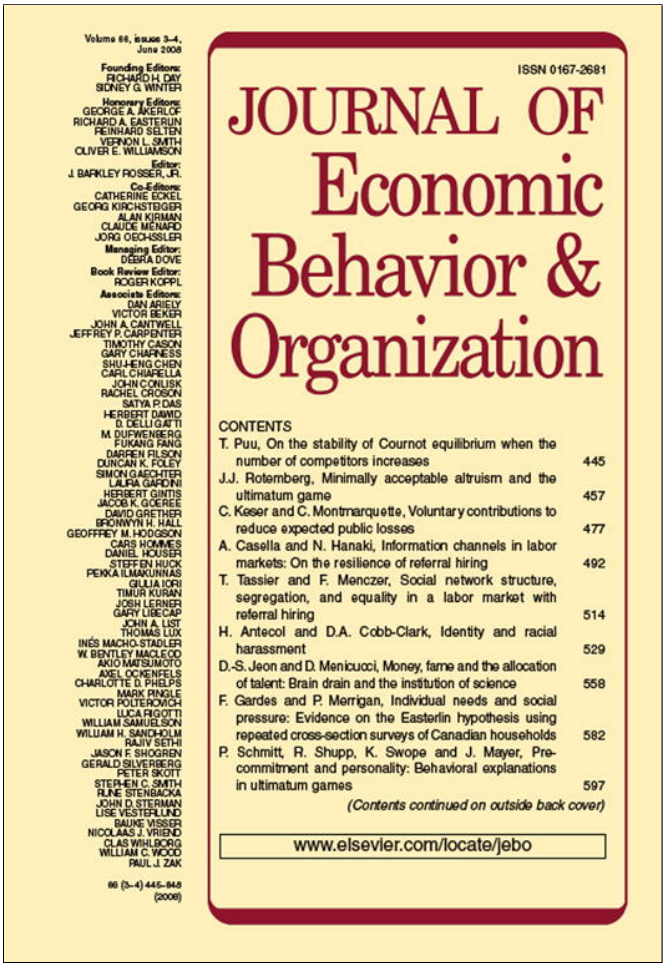
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Individual needs and social pressure: Evidence on the Easterlin hypothesis using repeated cross-section surveys of Canadian households

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Abstract

This paper provides additional evidence, using time-series and cross-sectional Canadian survey data, for the Easterlin hypothesis of an important income elasticity of individual needs. Our analysis is based on the regression of a minimum income to satisfy needs equation derived from a simple utility maximization framework. Moreover, our specification allows computing the Arrow-Pratt relative risk-aversion index and the Intertemporal Rate of Substitution. Our results are robust to different estimation methods dealing with the endogenous nature of income. We also compute poverty rates using our estimated equation parameters and standard OECD measures of poverty and find that some subjective measures are relatively close to the OECD measures.

JEL classification: C31; C32; I32; Z13

Keywords: Standard of living; Subjective measures of well-being; Needs and aspirations; Econometric analysis

1. Introduction

Easterlin (1973, 1974, 1995, 2001) discusses the "fallacy of composition" between the change of individual well-being, which increases with income when estimated with cross-sectional data,

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and its stability over time for the whole population or particular birth cohorts, even as aggregate income for the whole population or cohorts increases from year to year. The change in individual well-being with respect to income is generally estimated with cross-sectional surveys that compare different households at the same point in time, thus referring to a relative effect over the income distribution because the variation in income that causes changes in well-being occurs between individuals. This fallacy could be caused by the mix of a possible aggregation bias within the aggregate time-series and an endogeneity bias in the cross-section or the time-series estimates.

Well-being depends first on the household's resources (in absolute or relative levels) and its socio-economic characteristics (such as the head's age and education level, family structure, and geographic location), and second on the household's perceived needs or aspirations, which themselves depend on its socio-economic situation. Economists generally try to endogenize preferences and needs by supposing they change according to some auto-regressive scheme that can be recovered through the estimation of a reduced form equation for consumption. For instance, needs may be measured by estimating the minimal level of consumption for each good as in the linear expenditure system, but these estimations are rarely reliable. We propose using a question on the minimum income level necessary to satisfy basic needs[1] from two repeated Canadian household surveys as a subjective quantification of households' perceived needs and relating this minimal income to socio-economic determinants of the household, in order to answer questions such as,

(i) When appropriately estimated, are needs indexed on the household level of well-being or are they absolute, meaning that they do not change with income?[2]
(ii) Are needs related to the relative position of the household within a reference population?
(iii) Is the relationship between perceived needs and income different when estimated with cross-sectional rather than with time-series data?
(iv) Does the change of the income elasticity of needs over the income distribution correspond to some pattern of the marginal utility of income, such as the Friedman–Savage (1948) increase of the marginal utility for median income households?
(v) What are the relations of perceived needs with such variables as age of the head, mortgage payments, and so on?
(vi) Is the direction of causality from income to needs or vice-versa?

These important concerns have not yet been fully analyzed, but can be when data addressing both time-series and cross-sectional issues are used for the empirical analysis.

The rest of the paper is structured as follows. Section 2 discusses the Easterlin hypothesis. Section 3 presents the model and estimation methodology, Section 4 the data, and Section 5 the results. Section 6 presents a discussion on poverty rates while a short conclusion ends the paper.

2. The Easterlin hypothesis

In a series of contributions that have given rise to numerous critical discussions, Easterlin remarked that well-being cannot be confused with the pursuit of material comfort; he has observed

[1] The question asked to the household head is, "To meet the expense you consider necessary, what do you think is the minimum income a family like yours needs, on a yearly basis, to make ends meet?" Two more surveys included a question of this type, but the phrasing being different, we chose not to use them for the analysis.

[2] This question corresponds to the difference between the absolute and the relative concept of subjective poverty.

no correlation between measures of both outcomes when comparing well-being subjective indicators among nations with different economic development. On the contrary, within a society, richer households declare greater well-being than poorer ones; in all societies, more money for the individual typically means more happiness.[3] However, increasing the income of all does not increase the happiness of all. Easterlin (1995, p. 36) explains this fallacy of composition by the dependency of the subjective satisfaction of the individual to the average level of well-being of the whole population: "If living levels increase generally, subjective living level norms rise. The individual whose income is unchanged will feel poorer, even though his or her objective circumstances are the same as before". This assessment is mainly a relative income argument. It may also reflect the idea of endogenous individual needs as concerns the general wealth in the society, if perceived needs increase with growth of average income.

In recent work, Easterlin (2001) demonstrates empirically that the mean happiness level of 10-year birth cohorts is invariant over the life-cycle despite an increasing mean income over time. He reconciles this finding with cross-sectional correlations between income and happiness by hypothesizing that unfulfilled aspirations (new needs) increase over time with income, negating any possible increase in happiness due to increased income.[4]

Various objections have been made to the Easterlin thesis. Lane (1993), for instance, considers in an interesting (but with rather unconvincing empirical evidence) article that new studies have completely reversed Easterlin's conclusions, since richer societies seem to be happier than the poor, while the average satisfaction level is the same in all social classes.[5] He explains this difference by the supply of public goods, which may be correlated with economic growth and be more satisfactory for the poor, but leave the rich in the same subjective situation; thus, economic growth increases the satisfaction for the poor, but leaves the rich in the same subjective economic environment. Easterlin (1995) contests these empirical findings and maintains his early evidence after considering trends in nine European countries from 1973 to 1989 and in Japan and in the United States since the Second World War.

Besides the income level, cohort effects, income variance, "social stress", or individual capacities are also related by various authors to satisfaction and subjective needs. Reference is generally made only to macro facts or a rather descriptive analysis of micro-data. However, an interpretation of the relationship between income and subjective needs as a causal relationship in a linear regression setting introduces the problem of the possible endogeneity of income when used as a regressor. We address this issue in this paper using a two-stage procedure as well as a grouping estimator within a repeated cross-section framework.

3. Specification and econometrics

An equation relating the minimum income to satisfy basic needs, declared by households, to various socio-economic characteristics can be obtained optimizing a log-normal indirect utility function such as shown by Hagenaars and van Praag (1985). This cardinal specification has been criticized despite valuable justifications given by the authors of this paper. More-

[3] Note that a reverse implication may exist, happiness making the individual more productive on the labor market.

[4] More precisely, Easterlin (2001, p. 473) assumes that people project current aspirations to be the same throughout the life cycle when income grows, while material aspirations actually rise with income. Consequently, they evaluate their past situation according to increased aspirations, which lowers their subjective well-being and cancels the rise in utility due to increased income.

[5] According to other studies, only among the poor does more money buy happiness.

over, it does not allow relating the estimated parameters of the minimum income equation to parameters of risk aversion or to the intertemporal elasticity of substitution. Therefore, we propose a new model to define the minimum income for necessities function.The household income is supposed to be allocated between the *necessities*, as measured by the minimum income to satisfy basic needs declared by the household, *discretionary consumption* (consumption above the minimum level), and *savings*, with s the savings rate. Discretionary consumption is $C_{\rm d} = (1 - s)Y - Y^{\min}$, with Y being household income and $Y^{\min}$ for necessities. Expenditures are measured by unit of minimum income: $C/Y^{\min}$ ($C = C_{\rm d} + Y^{\min}$) and cost π per unit. π could be measured as a price index for the bundle containing all goods. Consider an additive indirect utility function equal to the direct utility provided by the necessities and discretionary expenditures:

$$V(\pi, y) = U_1\left(\frac{C}{Y^{\min}}\right) + U_2(Y^{\min}),$$

with $U_2(Y^{\min}) = V_0$, a constant, the level of satisfaction corresponding to subsistence supposed to be the same for all households.

The price of consumption π depends on household characteristics Z, a vector of K variables, z_k, $k = 1$ to K, and $\pi = pZ^{\gamma}$ with $Z^{\gamma} = \Pi z^{\gamma_k}$. We also assume that the price index p is identical for all households and that U_1 is additively separable in price and income, hence indirect utility is written as

$$V(p, Z, Y) = \frac{bY^{\beta}}{\beta} - \frac{aZ^{\gamma}p^{\alpha}}{\alpha} + V_0. \tag{1}$$

By Roy's identity,

$$\frac{C}{Y^{\min}} = \frac{(1-s)Y}{Y^{\min}} = -\left(\frac{\partial V/\partial \pi}{\partial V/\partial Y}\right) = \frac{aZ^{\gamma(\alpha-1)}p^{\alpha-1}}{bY^{\beta-1}},$$

which implies

$$\ln Y^{\min} = \beta \ln Y + (1-\alpha)\ln\, p + \ln(1-s) + (1-\alpha)\sum_k \gamma_k \ln z_k + \ln\left(\frac{b}{a}\right) + \varepsilon. \tag{2}$$

ε is added to reflect measurement error or unobserved heterogeneity of preferences. According to this specification, whatever its cost, the minimum level of consumption affords a certain minimum satisfaction corresponding to survival. The supplementary consumption is evaluated according to its cost. Two additional assumptions are that this cost depends on the household's socio-economic characteristics and that the savings rate is constant.

This logarithmic specification is similar to the equation specified by van Praag et al. (1982), except for the term depending on the savings rate. Moreover, it allows computing the Arrow-Pratt relative risk aversion index,[6] $-Y(\partial^2 V/\partial Y^2)/(\partial V/\partial Y) = 1 - \beta$, and the Intertemporal Substitution Rate σ, that is (under some assumptions) the inverse of this relative risk aversion. This model yields a new way to estimate these two parameters for various sub-samples and periods. In the empirical analysis, we will consider $\ln Y$ to be the logarithm of permanent income that we will estimate as the expected value of the current value of $\ln Y$ based on a regression of $\ln Y$ on variables

[6] This is also the income elasticity of the marginal utility.

that determine permanent income. We will consider the residual of this regression as a variable of the Z vector. It should have a smaller effect than our measure of permanent income given its transitory nature.

The marginal income elasticity of needs is

$$\frac{\partial \ln Y^{\min}}{\partial \ln Y} = \beta + \frac{\partial \ln C}{\partial \ln Y} - 1,$$

so that its changes over the income distribution can be related to the changes of the income elasticities of consumption and savings. We will suppose thereafter that the permanent income elasticity of total expenditures is unitary, so that β indicates the income elasticity of subjective needs.

Note that the relative income position of the household normally affects utility (1). By substituting b in the indirect utility function by a function $b(X, Y) = b_0[Y/m_Y]^{\lambda_1} \Pi_{k>1} x_k^{\lambda_k}$, with m_Y the mean for the whole population, x_k representing exogenous variables and $b_{0,}$ a constant, the OLS cross-section estimate of the income elasticity converges towards $\beta + \lambda_1$. On the contrary, the effect of income changes with repeated cross-sections may not influence the utility through $b(X, Y)$, so that the estimation of β as the coefficient of ln Y in Eq. (2) is unbiased if the relative position of the household is unchanged over time, which is approximately the case given the grouping criteria chosen in the empirical part of the analysis (see Appendix A).

3.1. Econometric methods

We will regress the log of minimum income to satisfy basic needs on the predicted log of income, the residual of the equation used to predict income, the mean income of the reference group (implying that utility is relative), and the standard deviation of the log of income in the reference group and a host of socio-economic indicators.

In related work by van de Stadt et al. (1985), the hypothesis of relative utility is tested using a subjective measure of well-being, namely, individuals are asked to construct intervals of income that correspond to different levels of satisfaction as specified by the interviewer. Assuming that preferences are a log normal distribution function of income, the authors compute for each individual, from their answers in the survey and the log normal assumption for preferences, the mean value of the log normal distribution of income (μ). Given that this distribution function is equal to what individuals presently perceive as the actual income distribution in the economy, they show that μ will depend on the mean income of the individual's reference group, therefore that utility is relative. The argument relies on a cardinal theory of utility. The authors' empirical work cannot reject the hypothesis of a relative theory of utility.

McBride (2001) regresses a discrete measure of subjective well-being on income, on the mean income of a reference group, called an external norm by which households measure the utility of consumption or income, and an internal norm, proxied by the standard of living of parents. In some sense, in our work, minimum income necessary to satisfy basic needs is a norm by which utility is measured by households. Contrary to McBride, in this paper, it is endogenous and explained by income and the mean income of a reference group. The aim of McBride's paper is similar to ours as it seeks to explain the stability of mean satisfaction despite growing mean aggregate income. Using the estimates of a subjective well-being equation with 1994 GSS United States micro level data, he replicates the time-series of mean aggregate satisfaction in the United States for the years 1972–1996.

Finally, Rainwater (1994) also estimates a minimum income equation with United States data and income and family size as covariates, using the results to construct equivalence scales and poverty rates. These three papers do not address the endogeneity of the income effect nor the effect of mean income of a reference group on the minimum income necessary to satisfy basic needs.

In this paper, the reference groups' exogenous characteristics are based on the age of the head, family structure, the province of residence and the education of the household head. Since some of the regressors are group means (for example, the mean logarithm of income of the reference groups), the error terms within each of these groups should display within group correlation, and the standard errors of the OLS estimates must be computed as specified by Moulton (1986, 1990). Second, some of our regressors are generated regressors: the predicted logarithm of income, some measure of permanent income, and the residual of the equation used to predict the logarithm of income, a measure of transitory income. Again, standard errors of the OLS estimates must be adjusted for the presence of these generated regressors. To implement this we apply the method of Murphy and Topel (1985). This latter adjustment made little difference as the standard errors of the parameters in the predicted logarithm of income equation were very small given the size of our sample. Hence, the equation we estimated is

$$\ln Y_t^{\min} = \beta_1' x_{1t} + \mu d^{*'} x_{2t} + \theta(\ln Y_t - d^{*'} x_{2t}) + \varepsilon_t, \tag{3}$$

where $Y^{\min}$ is the minimum income necessary to satisfy basic needs, β_1 the column vector of dimension k, x_1 the vector of explanatory variables that includes the mean logarithm of income of the reference category and the standard deviation of this logarithm of income for the reference category, d^* the vector of estimated parameters from a linear regression of the logarithm of income on $x_{2,}$ μ is the parameter that multiplies permanent income, and θ multiplies the residual of the regression of the logarithm of income on x_{2t}.

In the general case

$$y = \beta_1' x_1 + \sum_{j=1}^{k} \theta_j F_j(h^{*'} z) + \varepsilon_t, \tag{4}$$

were h^* is a vector of estimated parameters with known variance and distribution and z is a vector of explanatory variables, while F_j is a known function for all j. In this case the variance–covariance matrix for the vector (β_1, θ) where θ is the vector of parameters multiplying the F functions, is given by, without considering within group correlation,

$$\sigma^2 (W'W)^{-1} + (W'W)^{-1} W' F^* V(h^*) F^{*'} W (W'W)^{-1}, \tag{5}$$

where F^* is the matrix of derivatives of the F functions with respect to h^* and $V(h^*)$ is the variance–covariance matrix of h^*, while W includes all the regressors of Eq. (4). But we also take into consideration the fact that some regressors are group means that create within group correlation of the error terms. The variance-covariance matrix we compute for the OLS regression of Eq. (3) is given by

$$\sigma^{2*}(1 + (m-1)\rho^*)(W'W) + (1 + (m-1)\rho^*)(W'W) W' F^* V(h) F^{*'} W (W'W) \tag{6}$$

where ρ* is the estimated within group correlation and m is given by the number of observations divided by the number of group means.[7] The standard errors using this formula are approximately twice as large as the OLS standard errors. Notice that with large m a small correlation can make a very large difference.

4. The Canadian surveys[8]

To perform the estimations we used the 1982 and 1985 Survey of Consumer Finances, a yearly nationally representative survey of over 30,000 Canadian households with over 100 socio-economic variables. The survey, as its name suggests, concentrates on income and types of income, but such variables as age of head and age of spouse, age and number of children, labor market status and family structure, province of residence, and size of the city of residence are also present. In fact, this survey is quite similar to the American March Current Population Survey. We use data for 1982 and 1985 because the question on minimum income necessary to satisfy basic needs appears only for these 2 years in publicly accessible files. Only observations with no missing values for the dependent and independent variables were used in the regression. Finally, estimations are also done screening the population to eliminate those who declare a very high minimum income compared to their actual income.

4.1. Pseudo-panel data

One hundred and eighty cells have been defined according to four characteristics supposed to be constant through time: five age cohorts for the head, three education levels, four regions and three family types. The average size of these cells is more than 200 households, with only four cells containing less than 10 households and which are deleted in all the estimations. Moreover, for screened data estimations, we delete cells with less than 50 households so that the measurement errors due to the pseudo-panel structure are likely small.[9] As the estimation is made on grouped data, income can be considered as already instrumented by the grouping criteria. The heteroskedasticity that arises from the grouping (with the root of cell sizes as a multiplicative factor) depends on time, which renders correcting it by the usual methods impossible (indeed the within and first-difference operators would not cancel the specific effects, as they are multiplied by the inverse of the heteroskedasticity factor, and the possible endogeneity biases due to a correlation between these effects and the permanent component of the explanatory variables would remain or even increase in the within and first-difference dimensions, see Gurgand and Gardes, 1997). We correct it approximately by weighting all observations by the root of the average cell size over the two periods. After this weighting, between and within estimators remain orthogonal so that the comparison between cross-section and time-series estimates can be performed by the usual Hausman test.

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[7] An Appendix B is available from the authors for the computation of ρ^* and σ^{2*}.

[8] Morissette and Poulin (1991) used these surveys to address similar issues.

[9] Households are different between the two surveys so that the second survey can be considered as a second answer of the households surveyed in 1982, but with measurement errors. Le Pellec and Roux (2002) show that the method proposed by Deaton (1985) to remove these measurement errors, in the context of aggregation, does not always maximize the likehood function because the second order conditions are not empirically fulfilled. Verbeek and Nijman (1992) consider that defining cells with more than one hundred households is sufficient to cancel the biases due to these measurement errors, a method used in this article.

5. Empirical results

The estimation results are presented in Table 1. The top of the table presents estimates computed with the full sample. Approximately 7 percent of the population declares a minimum income greater than two times their actual income, which could be due to measurement error or very

Table 1
Minimum income equation estimates

	Equation				
	(1) 1982	(1) 1985	(2a) Pooled C.S.	(2b) Between	(2c) Within
Sample: not screened					
Predicted ln Y	0.522 (0.030)	0.576 (0.042)	0.580 (0.034)	0.524 (0.041)	0.599 (0.060)
Res Y	0.323 (0.006)	0.330 (0.008)			
Mean ln Y	0.114 (0.022)	0.082 (0.025)			
S.E. ln Y	0.316 (0.034)	0.038 (0.085)	0.243 (0.030)	0.336 (0.039)	0.112 (0.050)
ln age	1.540 (0.328)	1.330 (0.462)	2.594 (0.362)	1.951 (0.433)	−2.418 (1.533)
ln age^2	−0.229 (0.044)	−0.200 (0.051)	−0.362 (0.050)	−0.272 (0.060)	0.197 (0.221)
Mortgage	0.029 (0.013)	0.015 (0.013)	0.095 (0.072)	0.379 (0.095)	−0.201 (0.138)
No mortgage	−0.007 (0.011)	−0.025 (0.013)	−0.197 (0.059)	−0.232 (0.068)	−0.173 (0.123)
Intercept					
(1982)	0.600 (0.426)		−0.583 (0.580)	0.946 (0.813)	−0.023 (0.013)
(1985)		1.283 (0.589)	−0.617 (0.601)		
N	37553	35966	281	176	176
Adjusted R^2	0.487	0.513	0.999	0.999	0.579
Sample: screened					
Predicted ln Y	O.642 (0.020)	0.686 (0.032)	0.625 (0.031)	0.620 (0.044)	0.657 (0.062)
Res Y	0.502 (0.005)	0.508 (0.007)			
Mean ln Y	0.063 (0.017)	−0.018 (0.024)			
S.E. ln Y	0.134 (0.027)	0.040 (0.020)	−0.065 (0.043)	0.067 (0.061)	−0.120 (0.082)
ln age	1.704 (0.276)	1.514 (0.344)	3.004 (0.358)	2.147 (0.453)	−1.706 (1.571)
ln age^2	−0.242 (0.037)	−0.123 (0.047)	−0.412 (0.050)	−0.294 (0.064)	0.154 (0.221)
Mortgage	0.020 (0.009)	0.010 (0.010)	−0.022(0.063)	0.173 (0.101)	−0.058 (0.131)
No mortgage	−0.020 (0.007)	−0.040 (0.011)	−0.181 (0.049)	−0.215 (0.064)	−0.241 (0.120)
Intercept					
(1982)	−0.203 (0.351)		−1.708 (0.541)	−0.195 (0.738)	−0.035 (0.012)
(1985)		0.088 (0.424)	−1.960 (0.540)		
N	34839	33575	275	129	129
Adjusted R^2	0.572	0.577	0.984	0.991	0.556

Eq. (1) Individual data. *Explanatory variables:* instrumented log-income, residual income, average income and its standard error in the reference population, dummy for a positive financial investment, woman is head of family, owner with mortgage, owner without mortgage, logarithmic age of the head, city size, province, education level of the head, number of children for different age groups (nine dummies) and number of adults. *Variables used to predict log-income:* dummy for a positive financial investment, woman is head of family, owner with mortgage, owner without mortgage, logarithmic age of the head, city size, province, education level of the head, number of children for different age groups (nine dummies), number of adults and occupational dummies. (2) Grouped data according to 3 education levels of the head, 5 age cohorts, 4 provinces, and 3 family types. *Explanatory variables:* log-income and its standard error in the reference population, positive financial investment, owner with mortgage, owner without mortgage, logarithmic age of the head, type of city, logarithmic equivalence scale, proportion of children. Eq. (2a): pooled cross-section estimates (2b) Between estimates (2c) Within estimates. Filter: all households for which the minimum income is greater than two times their actual income are deleted. All cells containing less than 50 households for columns 2b and 2c (51 cells were deleted, representing 5 percent of the observations of the full data set).

particular households. The bottom part of the table presents estimates computed with a sample of households that excludes these households, called the screened sample.

The estimation on the whole population produces estimates of the permanent income elasticity of the poverty line around 0.5, while the estimates of the effect of transitory income is approximately 0.3, somewhat lower than the effects of permanent income since we would expect new basic needs should emerge only if permanent income increases. We also find a positive effect of the mean income of the reference group of the individual. This can be interpreted as the result of peer pressure on the individual to be as similar as possible to individuals in his reference group.

When screening the population to eliminate those who declare a very high minimum income compared to their actual income, the elasticities with respect to permanent income are approximately 0.65 for both years and the effect of the transitory income is 0.5, still smaller but much greater than for the whole population. These estimates are very similar for both surveys. The effect of the mean income of the reference group is no longer significant, which shows that the peer effects concern very particular households. Therefore, screening seems to be important to correct for all measurement errors, even after instrumenting income. Along the income distribution, the income elasticity (estimated with quadratic and cubic specifications on individual cross-sectional data) decreases from 0.96 for the first decile to 0.32 for the last. It seems normal that the pressure of needs diminishes as income increases. This conforms with the Friedman–Savage hypothesis concerning changing attitudes towards risk along the income distribution, but not exactly (according to them, risk aversion would be important for the rich and smaller for median income households).[10]

The influence of the other explanatory variables is not surprising. Over the life cycle, perceived needs, as indicated by the minimum income, increase until 35 years of age, then decrease. The inverse U shaped pattern of the effect of age is, logically, the inverse of the U shape pattern found in studies on satisfaction as in Oswald (1997) (all things equal, in our model, higher needs will reduce satisfaction). The presence of a mortgage increases the minimum income by 4.5 percent when compared with households with no mortgage.

On *grouped data*, the income elasticity of minimum income is very similar to the individual data estimate. Note that the instrumentation by grouping the data according to four criteria may be less efficient than the instrumentation used for individual data to eliminate the errors of measurement, which tends to bias the elasticity if errors of measurement have not been largely removed by screening the population. Thus, screening the individual data before grouping it seems again crucial to eliminate measurement errors.

These pseudo-panel data allow the comparison of cross-section and time-series effects of income changes by estimating the income elasticity on the between and within dimension (which is here equivalent to the first-difference estimator). For the screened population,[11] the cross-section income effect is slightly smaller but not significantly different from the time-series estimate[12]; the value of the Hausman statistic, comparing within and between estimates of the log income

[10] According to these authors, poor and rich households are more likely to present risk-aversion. This implies a decreasing marginal utility of income, which corresponds to a progressive satiation. On the contrary, middle class households are supposed to be risk lovers and have an increasing marginal utility.

[11] On the contrary, within estimates are significantly greater before filtering, that indicates that endogeneity biases may exist for the sub-population that is eliminated.

[12] Despite the fact that errors of measurement may be larger in the within transforms, the results show no endogeneity bias for the cross-section estimations, which make possible their use for the comparison of income elasticities across different sub-samples or periods.

Table 2
Estimates of the income elasticity of the minimum income by quartile and estimation method (grouped data)

Population	Pooled cross-section	Between	Within	Hausman stat.		RRA
				a	b	
Quartile 1	0.624 (0.044)	0.632 (0.046)	0.532 (0.109)	1.20	3.22	0.47
Quartile 2	0.568 (0.083)	0.599 (0.122)	0.584 (0.110)	1.20	3.22	0.42
Quartile 3	0.476 (0.083)	0.485 (0.118)	0.394 (0.103)	0.38	4.85	0.61
Quartile 4	0.765 (0.064)	0.682 (0.097)	0.677 (0.084)	0.02	16.86	0.32

Notes: The estimates are computed using a pseudo-panel estimation method with the filtered population, each cell has more than 50 observations, deleting 22 cells. ITSR: inter-temporal substitution rate, RRA: Arrow-Pratt relative risk aversion index, (a) the null hypothesis is that the income elasticity of the within and between estimators are identical. (b) The null hypothesis is that the coefficients on log income, family structure, age of head, and the standard error of the log income of the reference population of the within and between estimators are identical.

effect, is only 0.40, which is far below critical values of standard significance levels.[13] This shows that the Easterlin hypothesis (of a unit income elasticity of needs over time variations) is almost consistent both with cross-section and time series evidence; filtering the data and instrumenting seems to afford unbiased cross-section estimates that are comparable to those obtained for time variations.[14] Our results also shed some light on the results and hypotheses in Easterlin (2001). In this paper, he finds the correlation between income and satisfaction for 1994 United States data to be low at 0.20. If “basic” needs grow with income and consumption is measured with respect to income necessary to satisfy these needs, then the additional utility acquired from more consumption will be tempered by the increase in needs, explaining this “low” correlation. The effect of the mean income of the reference group on minimum income can partly explain the stability of mean aggregate satisfaction levels. As mean aggregate income grows, needs grow, and satisfaction remains constant. Finally, Easterlin explains why individuals, despite unchanging satisfaction levels perceive their actual standard of living as superior to their past levels by the effect of higher income on aspirations, but changing needs may also partly explain this fact. For example, if individuals evaluate their former economic conditions with lenses colored by higher needs, they can systematically underestimate their former satisfaction levels as their income grows.

The same estimation is performed for samples defined by the quartiles of the income (per unit of consumption) distribution (Table 2).[15] On the whole, the cross-section elasticities are greater than the time-series elasticities, but again the differences are not significant. The evolution of income elasticities is slightly different from that found with individual data with differences for the upper quartile as the elasticity is very high for grouped data. The income elasticity is much greater for the rich, which indicates that their risk aversion is lower than for the rest of the population.

The inter-temporal substitution rate is positive and estimated to be around 2 for the whole population and between 1.6 and 3.1 for the different quartiles. These figures compare favorably

[13] A quadratic estimation with respect to log income on grouped data gives a between estimate of the income elasticity of 0.526 (with a standard error of .049) and a within estimate of 0.666 (.062). The Hausman statistic is 5.72, significant at the 5% level. There could be a small negative endogeneity bias for the cross-section estimate, which could be due to an important non-linearity of log-income effects in the cross-section dimension.

[14] Eliminating all cells containing less than 50 households affords a within elasticity slightly greater than the between (but not significantly for the filtered population).

[15] Households are classified according to their estimated income, rather than their actual income, in order to suppress any endogenous selection.

with the estimates of the literature. For instance, Attanasio and Weber (1989, Table 2) estimates are around 2, and Hamori (1996) around 1.4.[16]

6. Subjective and objective poverty rates

Poverty rates for year 1985 are indicated by three types of head-count indicators (Table 3): first, the usual OECD poverty line equal to 50 percent of the median income computed for the sample under consideration (relative index I1) or 50 percent of the median income of the whole population (absolute index I2). These OECD indices are computed for household income (a), or household income divided by an equivalence scale (b). Second, subjective poverty lines are computed using the estimates from sub-samples of the 1985 cross-sectional survey (I3)[17] or, for the whole population (I4), substituting regressor values by the whole population. I5 is computed with sub-sample estimates and the whole population mean. I6 is computed using the estimates and means for the whole population. I7 gives the percentage of households with income below the estimated minimum income value computed with household values of regressors (therefore, the estimated value changes for each household while for the four preceding poverty rates, only one poverty index is measured for all individuals). Therefore, I3–I7 are all indicators that are computed using estimated parameters and population means. They show the relative importance of population means and regression parameters for the estimated poverty line. They also reveal that the presence of young children in the household is an important factor as I3–I7 varies little for households without young children and varies considerably when young children are present. I8 is the percentage of individuals below the reported minimum income value.

In related papers on the establishment of poverty lines, using the same cardinal utility approach as in van de Stadt et al. (1985), Goedhart et al. (1977) establish how to compute the poverty line using an estimated equation such as ours. Their idea is to determine the poverty line by finding a value of minimum income that satisfies the equation in footnote 18 with estimated parameters. Therefore, individuals who would be observed with an income equivalent to the income they estimate as being the minimum necessary to satisfy needs are the best judges as to what this income actually should be. Because, in that paper, their estimation includes only the log of family size and the log of income, a poverty line is computed for each family size. As mentioned earlier, Rainwater also estimates a minimum income using the results to construct equivalence scales and poverty rates. Our approach is similar to theirs; however, we choose to compute poverty lines by comparing the household income to the minimum income computed using parameters of the minimum income equation (estimated either by family type or with the full sample) and mean values of the regressors (either by family type or for the full sample). This approach will shed some light to the relativity of minimum needs.

Poverty rates indicated by the OECD indices vary for the whole population from 12 percent to 20 percent, indicating a wide spectrum of poverty. The relative version of the OECD index differs substantially for sub-samples from the absolute version when both are computed using

[16] Note that the RRA and the ITSR can also be related to the income flexibility ϖ defined by R. Frisch to compute, under his want independence hypothesis, cross-price elasticities written as functions of income and own-price elasticities. This parameter ϖ is the inverse of the income elasticity of the marginal indirect utility, which is equal to the Arrow-Pratt RRA index. For Canada, Selvanathan (1993, Table 5.2, p. 313) cites three estimations around 0.6, which corresponds to a ITSR somewhat smaller than the figures we obtain but with the same sign.

[17] Using Eq. (2) and equalizing minimum income $Y^{\min}$ and household income Y, leads to $Y^* = \exp\{[(1-\alpha)\ln p + \ln(1-s) + (1-\alpha) \times \sum_k \gamma_k \ln z_k)]/(1-\beta)\}$, which allows us to define the poor by $Y < Y^* \Leftrightarrow Y < Y^{\min}$.

Table 3
Poverty rates for 1985 (percent)

	N	I1a	I1b	I2a	I2b	I3	I4	I5	I6	I7	I8	β
Single woman	4,854	6.9	6.9	55.8	10.7	53.2	58.0	60.6	59.0	50.5	56.0	0.68
Female head with children	1,323	7.3	7.1	46.7	48.8	72.0	58.5	53.4	50.3	65.3	65.3	0.82
Head woman without young children	6,070	10.0	8.3	48.9	12.2	44.6	45.0	45.1	52.0	42.3	52.0	0.68
Couples, head man with young children	10,931	11.1	12.4	4.9	14.5	15.3	11.7	10.6	6.2	7.3	35.0	0.63
Couples, head man without young children	15,251	17.8	13.3	17.1	7.2	21.3	16.1	24.5	20.5	13.4	35.5	0.61
Single man	3,767	17.9	17.9	39.3	6.7	39.1	41.7	39.3	42.4	43.0	50.5	0.73
All population	33,575	20.1	12.2	20.1	12.2	22.7	22.7	22.7	22.7	20.3	39.5	0.69

Notes: I1: OECD relative indicator: percent of households under 50 percent of the median (a) total household income of the reference population; (b) income per unit of consumption, of the sample in column 1. I2: OECD absolute indicator: percent of households under 50 percent of the median (a) total household income of the whole population; (b) income per unit of consumption, of the whole population. I3: subjective poverty rate: percent of households with income less than the estimated minimum income computed from the coefficients of Eq. (2) estimated by sub-population and regressors evaluated at the mean of the sample in column 1. I4: subjective poverty rate: percent of households with income less than the estimated minimum income computed from the coefficients of Eq. (2) estimated with the whole population and regressors evaluated at the mean of the sample in column 1 I5: subjective poverty rate: percent of households with income less than the estimated minimum income computed from the coefficients of Eq. (2) estimated by sub-population and regressors evaluated at the mean of the sample in the whole population. I6: subjective poverty rate: percent of households with income less than the estimated minimum income computed from the coefficients of Eq. (2) estimated with the whole population and regressors evaluated at the mean of the whole population. I7: subjective poverty rate: percent of individuals under the estimated minimum income as computed for each individual. I8: subjective poverty rate: percent of households under the declared $\ln Y^{\min}$ for the sample in column 1. *Equivalence scale:* first adult = 1; other adults and children aged more than 16 = 0.7; children under 16 = 0.5, used for I1b and I2b.

total household income. On the contrary, using per unit of consumption income gives similar absolute and relative OECD poverty rates (I1b and I2b) (except for female heads with children, who have mean income substantially lower than the mean income of the whole population). This is a natural phenomenon, as equivalence scale corrects for differences in family structure that are important within the whole population, but minor in the sub-samples defined, among other characteristics, by family size. Thus, the relative OECD index seems to be more robust from this point of view.

The subjective poverty line computed with the estimated parameters and the average of the explanatory variables of sub-samples (I3) is 22.7 percent for the whole population, a figure very similar to the average absolute OECD index (I2a = 20.1) but much greater than the relative OECD index (I1a = 0.12.2). Note that the subjective poverty rate depends on the question asked to the household and would be smaller for instance if the level of well-being considered as sufficient was defined as just maintaining the household's survival (without any expenditure except basic food, shelter, clothing and transportation). The Leyden method thus indicates accurately the usual OECD poverty rate when this indicator is computed for total household income (not divided by the household size). Indexes I4–I8 are also very similar to the absolute OECD index. In a sense, households seem to compare themselves to the household with an income that is 50 percent of the median household of the whole population and not of their reference group when assessing minimum income for essential needs. This is evidence that individuals' needs could be influenced by the average standard of living of a mean household. For example, a bachelor may envy the life style of couples with children, which in turn will influence his own specific needs. The usual absolute version of the OECD index is therefore justified by its proximity to the poverty rate indicated by the subjective method. Note that this subjective poverty line corrects for transitory situations, for instance, unusual needs or a negative shock on income such as illness in the family. This explains why I7 is systematically lower than I8, which overstates the importance of poverty.

Third, as the level of the subjective poverty rates depends on the question asked, it is interesting to compare the order of the sub-samples according to the subjective poverty line and to the objective definitions of poverty. The order of the sub-samples according to the subjective poverty line I3 (as well the levels of the poverty rates) compare better (in its ordering) with I2a than with I2b, except for the couples with children with a male head, for which I2b is similar to I3.[18]

Fourth, the subjective poverty rate is much greater than I2a and b for female heads with children, and equal to three times the average rate for the whole population (in column I4), that indicates probably very special living conditions for this population that are not fully taken into account by the OECD indicators.

Fifth, the relative OECD indicators I1a and b (which are close for all sub-samples) are much smaller than the subjective poverty indicators and present a very different profile across the different sub-samples, in fact, an inverse profile. For example, according to I1a, single men are poorer than single women, while the inverse is true for indicator I4. These indicators seem a priori correct, but it appears that they indicate different situations than those experienced by the households as indicated by the subjective measure.

Finally, the subjective approach promotes the OECD absolute I2a indicator, computed without any equivalence scale and no consideration of the social differentiation between the reference groups. This result is important as most studies tend to value the hypothesis that individual needs

[18] It appears in most studies that the objective equivalence scale computed on budget surveys is greater than the subjective equivalence scales; see Van Den Bosch (1996). Thus, the scale used in the computation of subjective poverty rates may be over-estimated. In spite of this, I3 compares favorably with I2b for families with children and a male head.

are mostly influenced by households that are similar to each other when in fact they can be determined by the standard of living of a representative household of the whole population.

7. Conclusion

Despite the fact that the dependent variable is based on subjective evaluations, the results are very stable from one year to the other, showing the promise of this type of analysis. Given the questions asked in Section 1, we find several possible answers well-founded on rigorous econometric analysis. Indeed, needs are indexed on household income both on cross-section and time-series data. Also, needs are related to the relative position of the household within its reference population, but with screened data this relationship does not hold. When estimated for the whole population after screening for measurement errors, the income elasticity of needs is not significantly different when estimated with repeated cross-sections of data; thus no endogeneity bias appears: cross-section estimates of the income elasticity are reliable to measure the expected change in the poverty line when income increases. Both the time-series and the cross-section results partially support the Easterlin hypothesis of an important income elasticity of individual needs. The estimated risk aversion index and ITSR compare favorably to those indicated in the literature, and the hypothesis made more than 50 years ago by Friedman and Savage is partially supported by the data. Finally, computing subjective poverty rates provides interesting insights to interpret “objective” poverty indicators. In one case, our computed subjective poverty rate matches a well-known OECD absolute measure.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.jebo.2006.06.009

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