

The distribution of financial well-being and income within the household

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Abstract In this paper we consider the issue of the intra-household distribution of welfare directly using a survey measure of self-perceived economic well-being. We develop a theoretical model of satisfaction within the household for couples. In the empirical analysis we find that husbands and wives often report different levels of financial satisfaction. The most important correlate of relative satisfaction within the household is found to be relative income. This is a direct confirmation of the previously implicit findings and is predicted by our theoretical model.

Keywords Relative income · Well-being · Happiness · Intra-household allocation · Unitary models

JEL Classifications D13 · D60 · D63 · I31

1 Introduction

The past four decades have seen a strong increase in women's participation in the labor force with a consequent increase in women's share of income within married households (see, for example, Mulligan and Rubinstein 2002). In a unitary model with income pooling this shift in the distribution of income within the household should not have any impact on most household decisions nor on the relative levels

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of welfare of the two members of the household. Several papers in the literature on intra-household allocation have suggested that various ‘outcomes’ (such as demands and child health) do, in fact, depend on the distribution of income within the household (see, for example, Thomas 1990; Browning et al. 1994; Lundberg et al. 1996; Phipps and Burton 1998). Implicit in these analyses is that a higher share of household income for one partner leads to a higher welfare for that person, see Bonke and Uldall-Poulsen (2007) for a short survey of the relevant literature. In this paper we consider this consequence directly using a survey measure of self-perceived economic well-being and information on household economic factors.

We develop a simple model of the responses to satisfaction questions by married individuals and their economic position within the household (see the arguments of Hamermesh 2004 for the need of more theoretical statistical modelling when examining the objective determinants of subjective outcomes). In the associated empirical work we find that there are differences between the responses of wives and husbands. Although a number of factors are correlated with these within-household differences, the most important statistically and substantively is the distribution of income within the household. This reproduces the rejection of income pooling and provides direct evidence that the distribution of income within the household does impact on the within-household distribution of welfare (see, for example, Rogers and DeBoer 2001).

In the next section we present some details about our data source, the Danish component of the European Community Household Panel (ECHP) for 1994. In Sect. 3 we develop a simple (and short) theoretical model of satisfaction that allows for intra-household differences. Section 4 is a short summary of our methods. In Sect. 5 we present the results for the levels of satisfaction expressed by married or cohabiting individuals. In Sect. 6 we present an analysis of the differences *between* responses by married or cohabiting individuals.

2 Data and methods

The data used are the Danish 1994-wave of the European Community Household Panel (ECHP). This includes a Household Register, a Household Questionnaire and an Individual Questionnaire (Eurostat 1996) asking questions of all adult family members. We focus on married (or cohabiting) couples with no one else in the household. This gives a sample of 916 married couples with no children present in the household. It is worth noting that in Denmark there is very little distinction between marriage and cohabitation. The presence of children within the household leads to theoretical complications that we prefer to side-step. In our empirical analysis we do condition on whether older couples have had children and whether they have been previously married. Details of the sample selection and sample statistics are given in Table A1 in Appendix. We do *not* use the panel aspect of the data; our justification for this is given below, once we have developed the theoretical model.

Besides questions on income, labor market behavior, housing situation, etc., the ECHP also includes questions on different aspects of subjective well-being.¹ In the following analyses we use responses to the question:

How satisfied are you with your present financial situation?

Responses are categorised in six groups ranging from “not satisfied at all” to “fully satisfied”. Obviously, this information relies on comparability across individuals, which is not necessarily the case as respondents may use the scale differently. However, satisfaction questions have been repeatedly validated by psychologists and sociologists for many years (see Clark 1997).

Our analysis largely follows the tradition in the literature that deals with other sources of satisfaction. Specifically, we use an ordered Probit to analyse the responses with the ‘usual’ right-hand-side variables. These include household disposable income, age, education, sex, labor force status (‘employed’, ‘unemployed’, and ‘out of the labor force’) and the income of a reference group. Details of the construction of the latter are given below. We also include a measure of the within-household distribution of net income.

Since the survey for satisfaction are ordered, we use an ordered Probit to analyse the responses. Further details are given after the theoretical model.

3 A theoretical model of within-household satisfaction

In our theory of individual satisfaction in two person households we assume that individuals base their responses on satisfaction with their financial position on their level of material well-being generally, and their consumption of goods in particular.² For two-person households we distinguish between private goods and public goods. We assume that the household members decide cooperatively on the market purchases of public and private goods and on the distribution of the latter between the two partners. Thus we assume the existence of some mechanism which always leads to efficient outcomes (the ‘collective’ assumption). A special case of this is when the household has a consensus utility function that governs their behavior so that they behave like a single ‘rational’ individual (the ‘unitary’ hypothesis).

Denote the public goods in the household by Q and let x_h and x_w denote the expenditure on private goods for the husband and wife, respectively, i.e. cohabiting partners are here also referred to as husbands and wives. Total expenditure on private goods is denoted $x_t = x_h + x_w$. The wife’s share in total expenditure

$$\theta = \frac{x_w}{x_t} \quad (1)$$

¹ The satisfaction measure chosen here is assumed to be a valid proxy for economic well-being. This is legitimised by Schyns (2001), who shows that a bottom-up phenomenon saying that domains satisfactions constitute the overall satisfaction is present.

² In an earlier version of this paper we presented an analysis of singles which motivates this assumption.

is known as the *sharing rule* (see, for example, Browning et al. 1994). Note that the husband's expenditure on private goods is given by $x_h = (1 - \theta)x_t$. In any model, unitary or non-unitary, the sharing rule may depend on household income which we denote Y , so that $\theta = \theta(Y)$. For example, it may be that the goods the husband buys are more luxurious (in the purely technical sense) than the goods that the wife buys, so that $\theta'(Y) < 0$. In a unitary model, income is the only argument in the sharing rule (holding prices constant). In a non-unitary framework the share θ may also depend on other factors. These are called *distribution factors* by Browning et al. (1994) (or *extra environmental parameters*, in McElroy 1990), and are denoted. Accordingly, we posit $\theta = \theta(Y, z)$. The most widely used distribution factors in the literature are relative wages or the within-household distribution of income (or spouse's 'income share' for short). Collective models that follow Chiappori (1988) and Apps and Rees (1988) do not provide a theoretical rationale for the income share being a distribution factor. Other models are more structured and do provide a rationale; see, for example, McElroy (1990) or Grossbard-Shechtman and Neuman (1988). A test of whether the spouse's income share affects the outcome of interest is known as a test of *income pooling*. All tests of income pooling in the literature reject it.

To provide a framework to develop the link between individual income share and reports of financial satisfaction, suppose that the two partners have 'egoistic' preferences represented by the conditional indirect utility functions $v^h(x_h, Q)$ and $v^w(x_w, Q)$, respectively, with each function being strictly increasing in both arguments.³ In our data set we do not observe anything about consumption, so we need to relate all of our responses to income and the income share. We assume that the level of the public good is a function of income, and we take total expenditure on all goods to be equal to income⁴ so that:

$$Q = Y - x_h - x_w = Y - x_t \quad (2)$$

We assume that the marginal propensity to consume private goods is bounded between zero and unity: $0 < x'_t(Y) < 1$. We define the latent level of satisfaction for the wife and husband, s_w^* and s_h^* , respectively, as their respective utility levels⁵ so that:

$$\begin{aligned} s_w^* &= v^w(x_w, Q(Y)) = v^w(\theta(Y, z)x_t(Y), Y - x_t(Y)) \\ s_h^* &= v^h(x_h, Q(Y)) = v^h(1 - \theta(Y, z)x_t(Y), Y - x_t(Y)) \end{aligned} \quad (3)$$

Given these relationships we can now provide interpretations of the correlation between satisfaction responses and income, Y , and the income share, z . To do this, take derivatives with respect to the two variables:

³ Here we are implicitly assuming that preferences are egoistic and that the two partners do not care for each other. All of the results developed here go through with a caring assumption so long as each person cares more for themselves than they do for their partner. This is a standard assumption in the intra-household literature.

⁴ We could replace this with an assumption about saving behavior at the cost of extra notation and no gain in empirical applicability.

⁵ We should strictly take an increasing function of the utility function but this is irrelevant since we only observe a categorical response.

$$\begin{aligned}
 \frac{\partial s_w^*}{\partial z} &= v_x^w \theta_z x_t > 0 \\
 \frac{\partial s_w^*}{\partial Y} &= v_x^w (\theta_y x_t + \theta x'_t) + v_Q^w (1 - x'_t) > 0 \\
 \frac{\partial s_h^*}{\partial z} &= -v_x^h \theta_z x_t < 0 \\
 \frac{\partial s_h^*}{\partial Y} &= v_x^h (-\theta_y x_t + (1 - \theta)x'_t) + v_Q^h (1 - x'_t) > 0
 \end{aligned}
 \tag{4}$$

Thus wives will be more satisfied if household income or their income share goes up. Also husbands will be less satisfied if household income goes down, or, her income share goes up. None of these predictions are surprising given that the wife’s share of private expenditure is an increasing function of her income share ($\theta_z > 0$) and the restriction that the marginal propensity to spend on private goods is bounded between zero and unity.

Finally, we take it that the categorical response for satisfaction (which is all we observe) is derived from the (continuous) latent variable used here in the obvious way so that increases in household income or the wife’s share will increase the probability of her reporting a higher level of satisfaction.

We can also use the derivatives in Eq. 4 to obtain some predictions regarding the differences in responses. Denote the difference as $\Delta = s_h^* - s_w^*$. If the marginal utilities of the two partners are not too different (strictly, if within-household differences in marginal utilities are small compared to between-household variations) then we can take $v_x^h \approx v_x^w$ and $v_Q^h \approx v_Q^w$ then we have:

$$\begin{aligned}
 \frac{\partial \Delta}{\partial z} &\approx -2v_x^w \theta_z x_t < 0 \\
 \frac{\partial \Delta}{\partial Y} &\approx -v_x^w (2\theta_y x_t + (2\theta - 1)x'_t)
 \end{aligned}
 \tag{5}$$

We would usually expect the value of θ to be close to one half (between, say, 0.45 and 0.55) so that $(2\theta - 1) \approx 0$ and the difference in satisfaction is governed solely by the effect of income on the sharing rule. This is, however, an empirical matter. We start with an analysis of the individual responses that is based on the model developed here and then we present an analysis of the within-household differences in satisfaction.

The panel aspect of the data is not used, because we find it unlikely that transitory changes in the distribution of within-household income would lead to significant contemporaneous changes in the distribution of private expenditures. Rather we regard the relationship as being one between long run income shares and long run shares of private expenditures. A ‘within’ panel data analysis would sweep out these (‘fixed’) differences across households and reduce substantially our ability to detect the effects we are interested in. Consequently, we concentrate on cross-sectional variation rather than ‘within’ variation. Finally, we use only the first wave of the data since this gives us a larger sample and also because we do not wish to deal with different values of the satisfaction response over time. We note here that we have also run our empirical model with ‘time means’ for continuous variables and the

modal value over time for the satisfaction response and the results are qualitatively similar.

4 Empirical analysis for couples

We consider married (or cohabiting) couples with no children or other adults in the household. Table A1 in the appendix presents the sample selection and some summary statistics. As can be seen, our sample of 943 households consists of relatively older couples due to the ‘no children’ selection. Almost all of the men who are reported as ‘out of the labor force’ are retired.

In Table 1 we present the numbers for reported financial satisfaction for married men and women, where the satisfaction question “How satisfied are you with your present financial situation?” includes only five categories as the first two categories—categories 1 (“not satisfied at all”) and 2 (“not very satisfied”)—are merged, because there are very few respondents who locate themselves in the first category. As found in other studies, women tend to report somewhat higher levels of satisfaction than do men. We postpone an investigation of the within-household differences between the responses of husband and wife until the next section.

Table 2 shows the results from ordered Probits of economic satisfaction for married men and married women separately. For age, labor force status (two dummies) and education (two dummies), the variables are for the individual concerned. The common variables are household income and the wife’s share of household income. Columns 1 and 3 of Table 2 present the estimates for an unrestricted model. This includes quadratics in log household income and the wife’s share of income as well as a spline that takes the value 5 (age is measured in decades) up to age 50 and is linear thereafter. We then take the estimates and sequentially remove the ‘least significant’ variable until all remaining variables have a probability value of above 20%. The end result of this mechanical specification search is shown in columns 2 and 4.

Comparing the estimates for the parsimonious specifications, we see that there are some commonalities between men and women but also some marked differences. The main common feature is that satisfaction is strongly increasing in household income, albeit more strongly for men. The age and labor force are quite different, with men negatively affected by being unemployed whereas women are negatively affected by being out of the labor force.

Table 1 Reported levels of satisfaction for married/cohabiting individuals (6 = “very satisfied”)

	Married men (%)	Married women (%)
Satisfaction = 1,2	5.2	4.8
Satisfaction = 3	9.0	8.0
Satisfaction = 4	19.3	19.5
Satisfaction = 5	27.0	23.1
Satisfaction = 6	39.6	44.6
Mean level	4.87	4.95

Table 2 Regressions of satisfaction for married/cohabitating individuals. Ordered Probits

	Married men		Married women	
	Coefficient (SE)		Coefficient (SE)	
Age (decades)	0.03 (0.05)		0.28 (0.04)	0.26 (0.04)
Spline for over-50	0.44 (0.10)	0.460 (0.04)	0.20 (0.09)	0.21 (0.09)
Unemployed	-0.46 (0.17)	-0.43 (0.17)	-0.16 (0.21)	
Out of labor force	-0.10 (0.11)		-0.31 (0.10)	-0.30 (0.10)
Low education	0.04 (0.09)		-0.12 (0.09)	
High education	-0.02 (.092)		-0.11 (0.10)	
Log household income	7.53 (2.31)	7.48 (2.23)	5.72 (2.32)	5.61 (2.31)
Square of log household income	-0.28 (0.09)	-0.28 (0.09)	-0.21 (0.09)	-0.20 (0.09)
Wife's share of income	-1.61 (0.75)	-1.26 (0.25)	-1.97 (0.76)	-2.00 (0.76)
Square of wife's share of income	0.52 (0.97)		2.31 (1.00)	2.38 (1.00)
Pseudo- R^2	0.063	0.062	0.074	0.073

Standard errors in brackets

As discussed in the introduction and the theory section above, the recent intra-household literature suggests strongly that it is not only the 'size of the pie' that matters but also the share that each person receives and this may be related to the share of income. To test for this, we have included the wife's share of household income and its square in the analysis. The statistics for the wife's share of income for our sample are given in Table A1. As can be seen the median is 43% with about 25% of wives in our sample earning an income that is less than one third (33%) of their husband and another 25% earning at least as much as (50%) their husband. These values reflect the high labor force participation of women in Denmark. The estimates in column 3 of Table 2 imply that the wife's share has a significantly negative, linear impact on the husband's satisfaction. The effect for women is somewhat different. The parameter estimates in column 4 of Table 2 imply that her satisfaction is *decreasing* up to a value of 0.43 (very close to the median) and then increasing. The change in reported satisfaction in going from the median to a share of unity (the wife having all the income) is +0.8. We do not have any structural interpretation for this non-monotone response.

The discussion to this point concerns married men and married women generally. This analysis could have been conducted on samples of married men and married women who were not in the same household. In the next section we exploit the fact

that we have a one-one match between the women and men in our sample and present an analysis of within-household differences.

5 Within-household differences in satisfaction

We now present results that focus on the differences between the responses of husband and wife. Suppose that satisfaction for husband (h) and wife (w) are given by:

$$\begin{aligned} s_h^* &= x_h' \beta_h + y' \gamma_h + u_h \\ s_w^* &= x_w' \beta_w + y' \gamma_w + u_w \end{aligned} \quad (6)$$

where s_h^* is the (latent continuous) satisfaction score for the husband, x_h is a vector of the husband specific variables (such as his age) and y is a vector of common household variables (for example, log household income and the income share of the wife) and β_h and γ_h are coefficients for the husband. If we take differences and re-arrange, we have:

$$\Delta = (x_h - x_w)' \beta_h + x_w' (\beta_h - \beta_w) + y' (\gamma_h - \gamma_w) + e_h \quad (7)$$

This is the basis of our empirical analysis of differences. Some interpretations will be given using Eq. 5.

Turning to the relative responses of satisfaction, a cross-tab of the two sets of responses reveals (unsurprisingly) that in a majority of households the two partners respond in the same way. There are, however, some significant differences. To show this (and to define a central variable for the following analysis) we construct an ordered variable that takes value 2 if the wife is much more satisfied than her husband (her response is at least two points above his); value 1 if she is more satisfied (her response is one point above his), zero if they report the same level of satisfaction and -1 and -2 , respectively, for the wife being less satisfied or much less satisfied than her husband. The proportions for values -2 , -1 , 0 , 1 and 2 are 4.9%, 12.5%, 59.5%, 16.2% and 6.9%, respectively. Thus we see a slight tendency for wives to report more satisfaction than their husbands (23.1% positive as against 17.4% negative). This is consistent with the evidence reported in other contexts (see Clark 1997 on job satisfaction, and Alesina et al. 2004 for general satisfaction).

Of course, these within-household differences could just be noise due to misreporting. If they are simply noise then they will be uncorrelated with other household factors. The central focus of this paper is whether these differences are systematically correlated with household characteristics in general and 'sharing' parameters in particular.

We now present an analysis of the differences in reported values of husbands and wives' satisfaction. To do this, we take the ordered 'difference' variable described in the previous paragraph as our dependent variable in an ordered Probit. We begin with a general specification and then 'test down' to a more parsimonious preferred specification. The most general specification includes all of the variables in the individual analyses presented in Table 2. The only change we make is that we

Table 3 Results for differences in satisfaction for couples (+2 indicates she is much more satisfied than him, -2 indicates he is much more satisfied than her)

Variable	Coefficient (SE)
Wife's age	0.23 (0.04)
$\Delta(\text{Age})$	0.28 (0.08)
Wife's spline for over 50	-0.27 (0.08)
$\Delta(\text{Unemployment})$	-0.24 (0.13)
$\Delta(\text{Out of labor force})$	-0.15 (0.09)
$\Delta(\text{Low education})$	-0.17 (0.07)
(Wife's share of income) squared	1.49 (0.32)

Standard errors in brackets
 $\Delta(\text{Variable})$ denotes the difference between hers and his value of the variable

include the individual variables for the wives and differences (hers minus his) of all the individual specific variables. For example, we include a dummy for the wife having high education and a tri-variate variable for the difference between this dummy for the two partners. This is, of course, formally equivalent to including the individual specific values for men and women separately.

The results for the preferred parsimonious specification are reported in Table 3. One important result is that within-household satisfaction does not depend on household income. The age estimates suggest that the wife's satisfaction relative to her husband is increasing with the age of the couple and increasing in her relative age. In other words, the younger she is relatively to him, the less she is satisfied. This is consistent with evidence indicating that older husbands who earn more than their wife/compensate their younger wives financially by being more likely to agree to completely pool income (see Bonke and Grossbard 2008).

Differences in labor force status both impact negatively on the wife's relative satisfaction. This implies that if the wife is out of the labor force or unemployed and her husband is in employment then she reports lower satisfaction with a converse effect if she is the one who is employed.

If the wife has low education and her husband has medium or high education then she is significantly more likely to report lower satisfaction. This is consistent with earlier results in the literature in other contexts that suggest that low education relative to one's partner lowers bargaining power.

The principal focus of our analysis is on the impact of wives' differing income shares. In the individual analysis the impact was negative for men and non-monotone (in fact, convex) for women. For the within effect these translate into a positive and convex effect since the linear effect is not significant (and is dropped) and only the quadratic effect is significant. To give some idea of the impact of the parameter on satisfaction, in Table 4 we report the predicted probabilities of each

Table 4 Predicted proportions of women more satisfied than their husbands (in %) as a function of the wife's share of net income

Difference in satisfaction level	Wife's share of income at 1st decile (0.20)	Wife's share of income at the median (0.43)	Wife's share of Income at 9th decile (0.55)
-2	7.2	4.5	3.0
-1	16.6	12.7	9.8
0	59.8	60.0	58.2
+1	12.2	16.0	19.3
+2	4.2	6.8	9.6

level of satisfaction for three values of the share: the first decile, the median, and the ninth decile; in all cases the other variables are left at their sample values and mean probabilities are reported.⁶ The estimates suggest that the proportion of women who are more satisfied than their husband rises from 16.4% to 28.9% as their share increases from the first decile to the ninth decile. Conversely, the proportion of wives who are less satisfied than their husbands falls from 23.8% to 12.8%. Although slightly different, these values suggest that the effect of an increase in her income share is largely symmetric in the sense that his loss of satisfaction is largely balanced by her gain. The most important implication, however, is that for about 60% of our sample, a large change in her income share would not lead to any change in relative satisfaction.

6 Conclusion

In this paper we investigate the determinants of respondents' self-reported satisfaction with their financial situation. Our most important finding for the individual analysis is that the wife's share of household income impacts negatively on the reported satisfaction of the husband. The reported satisfaction of wives is first decreasing and then increasing in her income share. As regards the within-household differences in responses, the intra-household distribution of income is seen to be a major and highly significant (nonlinear) factor. The higher women's share of household income the more they are likely to report a high level of satisfaction compared to their husbands. We also find that factors such as differences in age, education, and labor force status are significant determinants of satisfaction. These results reinforce the widespread perception that who brings in income matters for the distribution of welfare within the household.

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⁶ Note that in this discussion the stronger effect of the share at the top end of the share values (due to convexity) is offset by the fact that the ninth percentile is closer to the median than is the first percentile.

Data appendix

We begin with 1,032 households comprising two adults with no children. We drop 84 observations that have unusable satisfaction responses; two households with unusable education information, and three households with low net household income (less than 50,000 DKK). This leaves us with 943 households.

Table A1 Descriptive statistics for couples

	Husband	Wife
Age	55.2	52.0
Low education	0.32	0.45
High education	0.28	0.23
Unemployed	0.044	0.03
Out of labor force	0.388	0.47
Annual net income (DKK)	138,600	86,100
No annual income	0.2%	3.1%
Wife's share of income	First, second and third quartile = 0.33, 0.43, 0.50	

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