

Session Number: 7A  
Session Title: Time use and inequality  
Paper Number: 2  
Session Organizer: Joachim Merz and Andrew Harvey  
Discussant:

*Paper Prepared for the 28<sup>th</sup> General Conference of  
The International Association for Research in Income and Wealth  
Cork, Ireland, August 22 – 28, 2004*

**TIME AND MONEY - ARE THEY SUBSTITUTES?**

**JENS BONKE, METTE DEDING AND METTE LAUSTEN**

For additional information please contact:

Jens Bonke  
The Danish National Institute of Social Research  
Herluf Trolles Gade 11  
DK-1052 Copenhagen K  
Denmark  
E-Mail: [jeb@sfi.dk](mailto:jeb@sfi.dk)  
FAX: +45 33 48 08 33  
Telephone: +45 33 48 08 86

This paper is posted on the following websites: <http://www.iariw.org>  
<http://www.econ.nyu.edu/iariw>  
<http://www.cso.ie/iariw/iariwhome.html>

# **Time and Money**

## **- Are they Substitutes?**

Jens Bonke, Mette Deding and Mette Lausten<sup>1</sup>

*Draft version: June 2004*

**Abstract:** This paper investigates the distribution of time and money for Danish individuals, where time is leisure time and money is income from both paid work and unpaid housework. We analyse whether there is a trade-off between income and leisure time as predicted by economic theory for Danish wage earners. The data are from the Danish Time-Use Surveys 1987 and 2001 as well as register information for the period 1980-2001.

*Keywords:* Income distribution, Leisure, Value of household production, Welfare.

*JEL-codes:* D13, D31, I31, J22

---

<sup>1</sup> The Danish National Institute of Social Research, Herluf Trolles Gade 11, DK-1052, Copenhagen K, Denmark, e-mail: jeb@sfi.dk

## 1. Introduction

Income and leisure time are the main sources of utility in the traditional model of economic well-being. Individuals choose between spending their time working or on leisure time activities subject to the time budget constraint. The negative trade-off between income and leisure time is thus one of the fundamentals of economic theory. Traditionally economists use monetary welfare as proxy for overall welfare. But if individuals can choose between being time-rich and money-poor or vice versa, our concept of welfare must take this into account.

However, although the trade-off between time and money is evident in theory, it is possible that empirical findings do not support the expected result. There are several reasons for this; one being that individuals' choices are restricted so that the trade-off is not possible in practice. The purpose of this paper is to investigate the relationship between income and leisure for Danish wage earners. Based on two time use surveys from 1987 and 2001, we analyse the distribution of time and money as well as the relationship between the two. Furthermore, possible differences between the two years are of interest. Time is defined as leisure time, and money is defined as the sum of personal disposable income and the estimated value of household production.

Previously, there has been limited focus on the issues addressed in this paper. Thus, studies have dealt with either the distribution of income or with time allocation issues. We go a step further by studying time and money simultaneously and by discussing the implications for our perception of welfare. Furthermore, we extend the discussion by including the individuals' perceived satisfaction with both leisure time and income to analyse if satisfaction measures utility differently from the ordinary - objective - measures of the money and time resources.

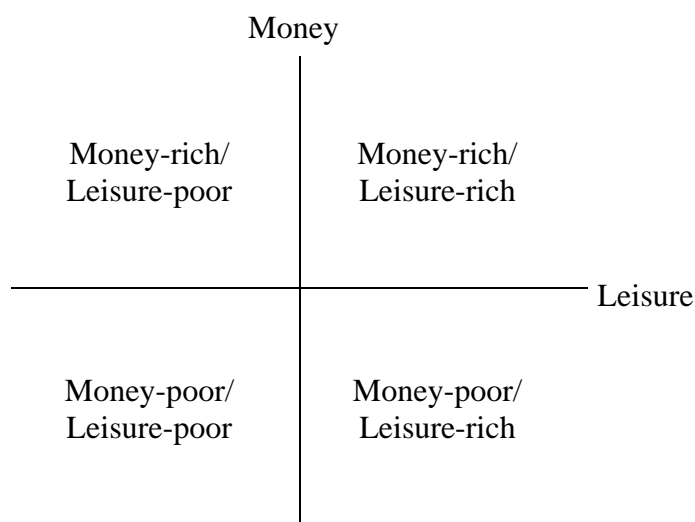
The paper is organised as follows. In section 2, we discuss the background for the issues addressed in the paper. In section 3, data are presented, and in section 4 the distributions of leisure time, income, and money value of household production are discussed. In section 5, we present our findings concerning the simultaneous distribution of time and money, and in section 6 we present the findings concerning the satisfaction measures. Finally, we conclude in section 7.

## 2. Background

Time and money are among the most valuable assets in modern life. Money is necessary in order to buy goods, and leisure time is necessary in order to enjoy the goods, and both are scarce resources. In terms of money as well as in terms of leisure time, some people are richer and others are poorer. Income inequality has been the topic of many research papers (for instance, Atkinson, 1997, and Gottschalk and Smeeding, 1997), whereas the inequality of the distribution of leisure time has been less studied (although examples are Bittman and Wajcman, 1999).

The question that we raise in this paper concerns the relationship between the two. Is there a trade-off between time and money, so that individuals being rich in terms of money are poor in terms of leisure time and vice versa? Or are some individuals rich both in terms of money and leisure time, while others are poor in both dimensions? The possible answers to the questions are visualised in figure 1.1. Basically, what we ask is then whether the correlation in figure 1.1 is negative or positive.

**Figure 1.1. Time and Money**



The substitution between time and money is fundamental in economic theory. The theoretical foundation for our analysis is a model of time allocation. Becker (1965) and Gronau (1977) assumes that individuals maximise a basic utility function with two arguments, consumption,  $C$ , and leisure,  $L$ , where the consumption good is secured either by home production or by buying in the market:

$$(1) \quad U = U(C, L)$$

where  $C = C_H + C_M$ ,  $C_H$  = home produced goods and services, and  $C_M$  = market produced goods and services.

Home produced goods and services are subject to the household production function,  $f$ , while market goods are subject to the budget constraint. In addition, there is a total time constraint. The three constraints can be written as:

$$(2) \quad \begin{aligned} C_H &= f(H_H) \\ C_M &= wH_w + y \\ H_H + H_w + L &= T \end{aligned}$$

where  $H_H$  = housework,  $H_w$  = market work,  $w$  = hourly wage rate (prices for market goods have been normalised),  $y$  = non-earned income, and  $T$  = total time available.

Solving this maximisation problem and assuming positive market work, the first order condition is

$$(3) \quad \frac{U_L}{U_C} = \frac{df}{dH_H} = w$$

The first order condition states that in optimum the marginal rate of substitution between leisure and consumption ( $U_L/U_C$ ) will equal both the shadow price of housework and the wage rate. Since both leisure and consumption are generating utility, for each individual there is a trade-off between the optimal amount of leisure and the optimal amount of consumption. However, individuals are not identical, and thus the optimal allocation of time and consumption will not be identical across individuals.

An optimal allocation of time and money based on (3) assumes that individuals are unrestricted in their choice of hours. However, especially concerning market work this might not be the case. Jobs are often offered with a certain number of hours and it may be difficult to find a job where actual hours matches desired hours. Furthermore, some individuals may not be able to find a job at all, i.e. they are involuntary unemployed. Although a basic result of the theoretical model is the substitution between time and money, this may not be an option for many individuals.

We analyse the possible substitution between time and money using a sub sample of wage earners from the two Danish time-use surveys from 1987 and 2001. By using a sub sample of wage earners, we discard the possibility of unemployment, whether voluntary or involuntary. This allows us to focus more clearly on the possible deviation between actual hours and desired hours.

As the theoretical model points out, consumption not only arises from money income but also from household production. In this paper, we therefore apply the concept of “extended income” (Becker, 1965), which is the sum of money income (earnings as well as non-earned income) plus the predicted money value of household production. By analysing the relationship between this extended income measure and leisure, we get closer to the theoretically based substitution than if using only money income. Furthermore, we are able to analyse the relationship at two different points in time, 1987 and 2001. Thus, we can identify whether the relationship and trade-off between time and money is stable over time.

Economists often use income as a proxy for individuals’ well-being, the argument being that money can always be substituted for goods. However, this does not hold for leisure time, at least not for the majority of the population, who has to earn their income. Evidently, if individuals choose between different allocations of time and money according to preferences, this has consequences for our understanding of welfare (Scitovsky, 1976). For instance, we can question the relevance of classifying people as poor, if in fact they are poor on money but rich on time. In fact, taking the complete allocation of both time and money into account, it may turn out that the wrong people are classified as poor using the money definition.

Although we do not attempt to calculate the overall utility distribution including leisure and consumption – we do not have the data for that – we discuss the implications for our understanding of welfare by studying the simultaneous distributions of leisure time and extended income.

In the analysis, we assume that preferences are revealed through actual allocations. This revealed preferences approach is standard in empirical economics. However, in our data for 2001 we have information on satisfaction with income as well as satisfaction with leisure. We therefore supplement the analysis by discussing these domain satisfaction measures (Schyns, 2001). Looking at the individuals' own perception of satisfaction/utility, it is exposed whether actual allocations do reveal preferences. The assumption is that if an individual is poor in terms of either time or money but declares to be perfectly satisfied with the situation then the observed allocation is expressing the individual's own choice.

### **3. Data**

#### ***3.1 The Time-Use Survey***

The data used are the Danish time-use surveys from 1987 and 2001, supplemented with register information for the interviewees. The 1987 survey includes approximately 3,600 16-74 year olds, being representative for the Danish population. Based on the respondents from the 1987 time-use survey, and supplemented by a representative sample of 16-30 year olds, approximately 2,600 16-74 year olds completed time-use diaries as well as a questionnaire in 2001. The design of the 2001 survey follows the guidelines developed by an expert group on time use surveys in Eurostat (2000).

In 2001, each person was given two diaries – one for a weekday and one for a weekend day, while in 1987 a diary was completed for either a weekday or a weekend day. In the analyses, observations have been weighted according to this sampling scheme. The data here include only wage earners aged 20 years or more and consist of 2116 individuals in 1987 and 1247 individuals in 2001. All individuals in the sample completed time-use diaries, noting the main and secondary activity for each 10-minute interval during the actual day (15-minute interval in 1987).

The time-use diaries give us information on leisure time and housework during the observed day. In addition, we have information on typical working hours from the questionnaire and on annual income from register data.

### **3.2 Leisure**

The time spent on leisure is defined from the main activities stated in the time use diaries and includes pure leisure activities as well as eating and personal care.<sup>2</sup> In other words, leisure is the time during a day not being used for work (either paid or unpaid) or sleep.

There are several borderline cases, where it is difficult to distinguish between leisure and housework. One example is food preparation; another is gardening. Child-related work can also be difficult to place correctly, as having children certainly involves housework but also leisure time spent with children. In this analysis, time-use categorised as direct child-care is defined as housework, whereas other time spent with children is defined as leisure time.

### **3.3 Income**

The income concept used in this paper is personal annual disposable income. This income includes earnings as well as private and public transfers, net of taxes, and is the relevant measure of utility to be applied here. As the individuals in the analyses are working they have all positive earnings, which in some cases is supplemented by transfers (e.g. child support), thus constituting a non-earned basic money income.

The unit of analysis is the individual, which requires that taxes can be divided between spouses. Split taxation schemes in Denmark meet this criterion (see Smith, Dex, Callan and Vlasblom, 2003).

---

<sup>2</sup> The time-use categories applied in 2001 follow the Eurostat-guidelines (Eurostat, 2000). For the purpose of this study leisure is defined as: leisure time (being activity codes 41, 42, 43, 51, 52, 53, 61, 62, 63, 71, 72, 73, 81, 82, and 83, using the activity code at 2-digit level), eating (activity code 02), personal care (activity code 03), and all transportation connected with leisure activities (activity codes 900, 941, 942, 943, 951, 952, 961, 971, 982, 995, 998, and 999 at the 3-digit activity code level). Whereas sleep (activity code 01) and household work (activity codes 31, 32, 33, 34, 35, 36, 37, 38, and 39) are excluded.



### ***3.4 Value of housework***

In order to get a better measure of individuals' access to economic resources, we estimate the value of unpaid housework and add this to the money income. This extended income follows Becker's (1965) "full income" and the "earnings capacity" developed by Garfinkel and Haveman (1977).

The value of housework is calculated as the product of time spent on housework and the shadow price of housework. Following Becker (1965) and Garfinkel and Haveman (1977), the shadow price of housework is approximated by the hourly wage rate<sup>3</sup>. This measure relies on two critical assumptions: The one is that time spent at home and time spent in paid work are complete substitutes implying that the market wage rate is an appropriate measure for the opportunity cost of an hour at home. The other assumption is that the opportunity cost of every hour is the same for all paid working hours as well as for all unpaid hours.

As our sample only consists of wage earners, the substitution assumption is generally valid here, as stated from solving of the maximisation problem in (3), where the shadow price of housework equals the wage rate. The other assumption about homogeneity of unpaid time is also partly met, at least for housework. Bonke (1992) and Jenkins and O'Leary (1996) thus distinguish between household work and leisure time activities arguing that the former fulfils the so-called third person criteria, as this work can be delegated to other persons without decreasing the utility, whereas leisure time activities requires the presence of oneself.

The personal shadow wage is here defined as the annual disposable income divided by annual working hours.<sup>4</sup> To match our net money income, we thus apply a net shadow price of housework. The value of housework for each individual is then calculated as the product of number of housework hours during a day, 365 days a year, and the shadow price of housework<sup>5</sup>.

In Table 3.1, we present averages of the time and money variables along with age and the share of women in the sample. Gender is expected to be of great importance for the substitution between time and money, and averages by gender are therefore also presented.

---

<sup>3</sup> Besides this opportunity cost of time approach housekeepers wage rates are sometimes multiplied by the working time, i.e. a market alternative housekeeper cost method (Chadeau, 1985).

<sup>4</sup> Annual working hours are calculated by multiplying weekly working hours by 45 weeks.

<sup>5</sup> The shadow price of housework should be the actual disposable wage rate, but as we only observe the disposable income, including all disposable transfers, we have to use this measure.

**Table 3.1 Sample characteristics**

	1987		2001	
	Mean	Std. Dev.	Mean	Std. Dev.
<b>All individuals</b>				
Leisure time (min/day)	500.00	(230.84)	545.42	(226.39)
Disposable income (2001-prices)	132,990	(64,043)	160,160	(87,002)
Value of housework production (2001-prices)	65,526	(76,298)	127,407	(136,837)
Time-use for housework (min/day)	137.28	(134.27)	212.70	(168.63)
Extended income (2001-prices)	198,516	(106,985)	287,567	(182,467)
Share of women	0.467	(0.499)	0.523	(0.550)
Age	40.00	(11.43)	42.06	(12.26)
Number of individuals	2,116		1,247	
<b>Men</b>				
Leisure time (average min/day)	507.58	(248.28)	564.25	(236.66)
Disposable income (2001-prices)	144,766	(77,257)	170,552	(112,853)
Housework production (2001-prices)	45,228	(62,233)	111,120	(149,178)
Time-use for housework (min/day)	97.27	(118.93)	183.94	(171.20)
Extended income (2001-prices)	189,994	(112,732)	281,672	(212,889)
Age	40.96	(11.98)	42.47	(12.71)
Number of individuals	1,127		598	
<b>Women</b>				
Leisure time (average min/day)	491.38	(209.01)	528.23	(214.87)
Disposable income (2001-prices)	119,572	(40,488)	150,671	(51,023)
Housework production (2001-prices)	88,656	(83,918)	142,279	(122,208)
Time-use for housework (min/day)	182.88	(136.25)	238.96	(160.93)
Extended income (2001-prices)	208,228	(99,202)	292,950	(149,019)
Age	38.90	(10.67)	41.68	(11.82)
Number of individuals	989		649	

#### 4. The distributions of leisure, income, and value of housework

In the following, we portray the distributions of leisure, income, and value of housework in the sample. These distributions represent the starting point of the analysis by offering a view of the allocation of time, money income (inclusive of transfers!), and the money value of housework of the Danish wage earners.

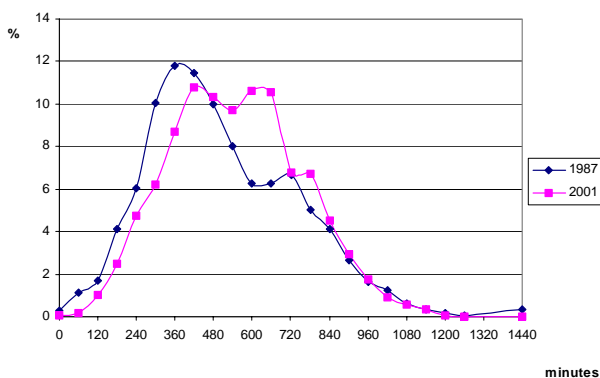
#### 4.1. Distribution of leisure time

The distribution of leisure in 1987 and 2001 is presented in Figure 4.1. In 1987, the distribution is skewed to the right with the mode at about 360 minutes. This may seem a high figure, but remember that the results are weighted weekday and weekend day observations. Furthermore, a lesser mode is found at app. 720 minutes. Very few report no leisure at all, and a minority reports an excessive amount of leisure (the limit being 24 hours).

In 2001, the distribution of leisure has shifted to the right and appears bimodal with a narrower interval between the peaks at about 400 minutes and 650 minutes. In general, individuals thus have more leisure in 2001 than they had in 1987. This is consistent to the trend in official working hours for full-time occupied people. In 1987, a fulltime working week was 39 hours, while this number in 2001 had been reduced to 37 hours a week<sup>6</sup>.

Looking at the Gini coefficients of the leisure distributions in 1987 and 2001 (Table 4.1), we find that inequality has decreased between the two time-use surveys. Leisure is now more equally distributed among the Danish wage earners.

**Figure 4.1. Distribution of leisure, 1987 and 2001**



**Table 4.1. Inequality of the leisure distribution**

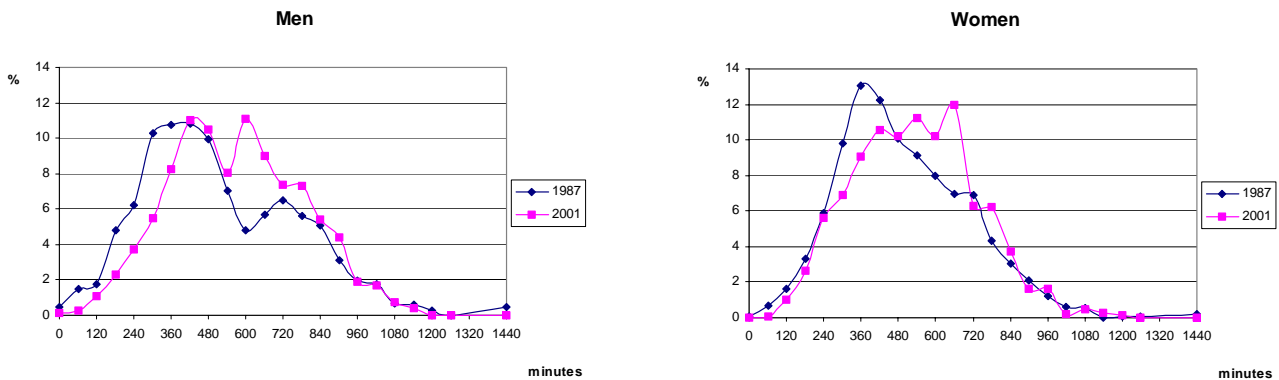
Gini coefficients	1987	2001
All observations	0.257	0.229
Men	0.273	0.232
Women	0.236	0.224

<sup>6</sup> The weekly working hours have gradually been reduced from 40 hours per week in 1986 to 37 hours per week in 1991.

We know from other studies, that there are gender differences in time use (see Aliaga and Winqvist, 2003, for a European version, or Lausten, 2003, for a Danish version). In Figure 4.2, we depict the leisure distribution by gender and major differences are found. In 1987, the female leisure distribution is more compressed than the male distribution, although the modes show approximately the same number of minutes. In 2001 the male and the female distributions have shifted to the right, and appear more similar.

The gender-specific Gini-coefficients in Table 4.1 confirm this finding. In 1987, the male leisure distribution was more unequal than the female leisure distribution, while the difference between the genders is small in 2001. For both men and women, inequality is lower in the 2001 leisure distribution than in the 1987 distribution, but the decrease is small for the women compared to that for the men. The decrease in overall inequality between the years thus appears to stem mainly from the fall in male inequality of leisure.

**Figure 4.2 Distribution of leisure 1987 and 2001, by gender**

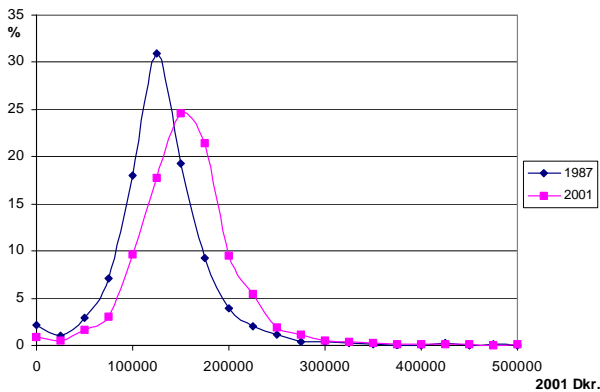


#### **4.2. Distribution of income**

The distribution of annual disposable income deflated (2001-prices) is presented in Figure 4.3. The mode in 1987 is 125,000 Dkr. and the mode in 2001 is 150,000 Dkr., indicating an increase in real-income during the period.

The increase in real-income is accompanied by a small decrease in inequality (Table 4.2). The Gini coefficient has decreased from 0.21 in 1987 to 0.19 in 2001.

**Figure 4.3. Distribution of income, 1987 and 2001**



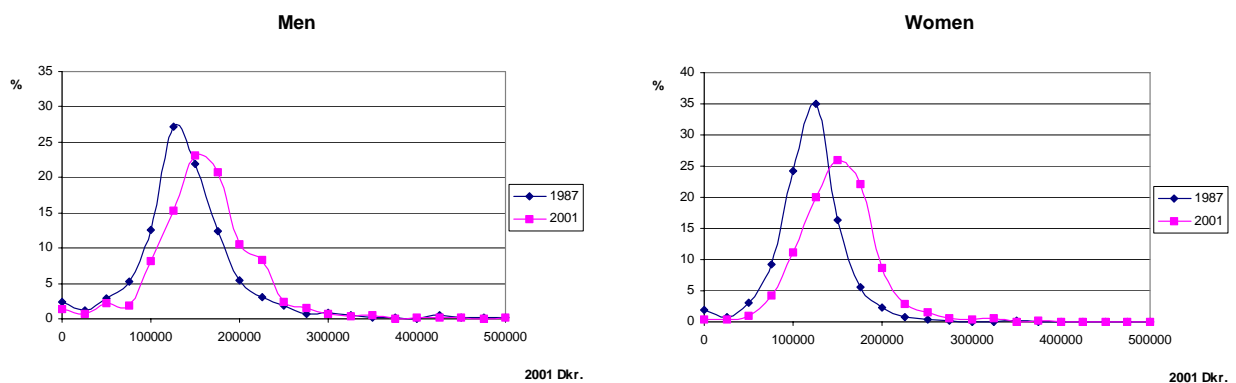
**Table 4.2. Inequality of the income distribution**

Gini coefficients	1987	2001
All observations	0.211	0.193
Men	0.229	0.220
Women	0.168	0.159

Comparing male and female disposable income, we see that the distribution of female income is more compressed than the male income distribution (Figure 4.4). The modes of the distributions are quite similar, but the male income distribution has a thicker tail to the right. This is reflected in the Gini coefficients that are 6% lower for women than for men in both years.

Contrary to the distribution of leisure, the decrease in income inequality appears for both men and women, resulting in a decrease in overall inequality.

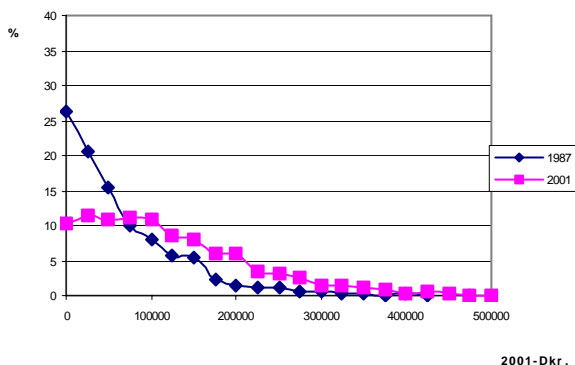
**Figure 4.4. Distribution of income 1987 and 2001, by gender**



### 4.3 Distribution of value of housework

The calculated value of housework, based on number of housework hours and a net shadow wage, is presented in Figure 4.5. This distribution is very different from the previous distributions due to the large amount of zeros. Especially in 1987, close to 30% of the individuals have no household production. In 2001, in number has fallen to app. 11%. The inequality of the distribution of the value of housework is consequently relatively unequal, although the Gini coefficient decreases from 0.57 in 1987 to 0.47 in 2001 (Table 4.3). Just like the distribution of leisure and the distribution of income, the distribution of the value of housework has thus become more equal between 1987 and 2001.

**Figure 4.5. Distribution of value of housework, 1987 and 2001**

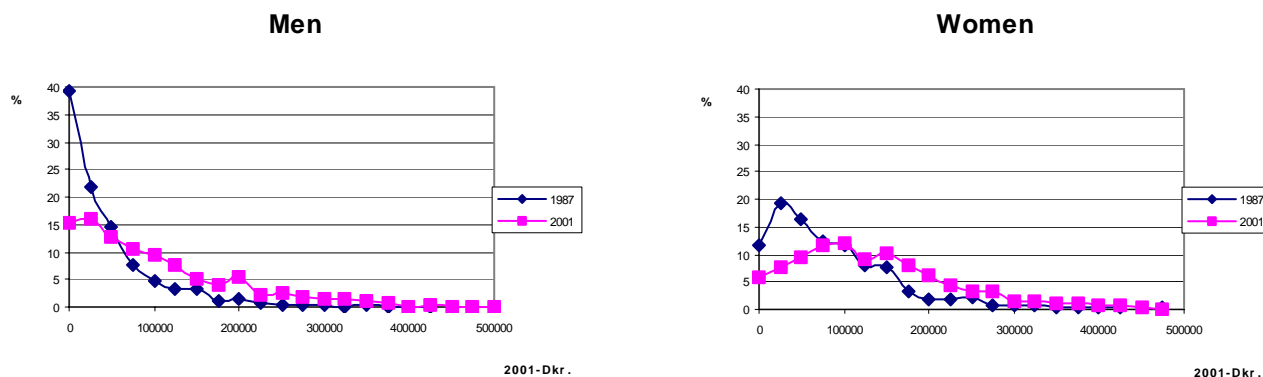


**Table 4.3 Inequality of the value of housework distribution**

Gini coefficients	1987	2001
All observations	0.568	0.473
Men	0.637	0.537
Women	0.472	0.408

Looking at gender, we find that mainly men have no value of housework. In 1987 40% of the men have no value of housework compared to 12% of the women, while the corresponding numbers in 2001 are 16% of the men and 6% of the women. The share of men without any value of housework has thus decreased dramatically between the two surveys, although women make up the main share of the housework value in both years. Consequently, inequality measured by the Gini coefficient is larger in the male distribution of value of housework than in the female distribution as indicated in Table 4.3.

**Figure 4.6. Distribution of household production 1987 and 2001, by gender**

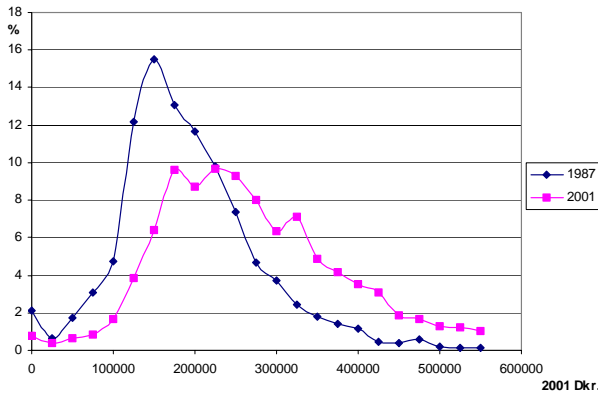


#### **4.4 Distribution of extended income**

The sum of the two income measures – money income and money value of housework – gives us the distribution of extended income (Figure 4.7). We find that this income varies more than the distribution of money income. Although the mode has only increased by app. 30,000 Dkr., a considerable larger proportion of individuals are distributed to the right of the mode. In 2001, this difference is more pronounced, as the distribution of extended income is flatter than the distribution of money income. It therefore makes a considerable difference whether money income or extended income is analysed.

The relatively large difference between the distributions is also evident in the Gini coefficients (Table 4.4). In general, extended income is distributed more unequal than money income (table 4.2). In fact, the Gini coefficient is very similar in the two years (0.26) despite the differences in the observed distributions of extended income. Contrary to the other distributions in this analysis, the distribution of extended income does not become more equal between 1987 and 2001.

**Figure 4.7. Distribution of extended income, 1987 and 2001**



**Table 4.4. Inequality of the extended income distribution**

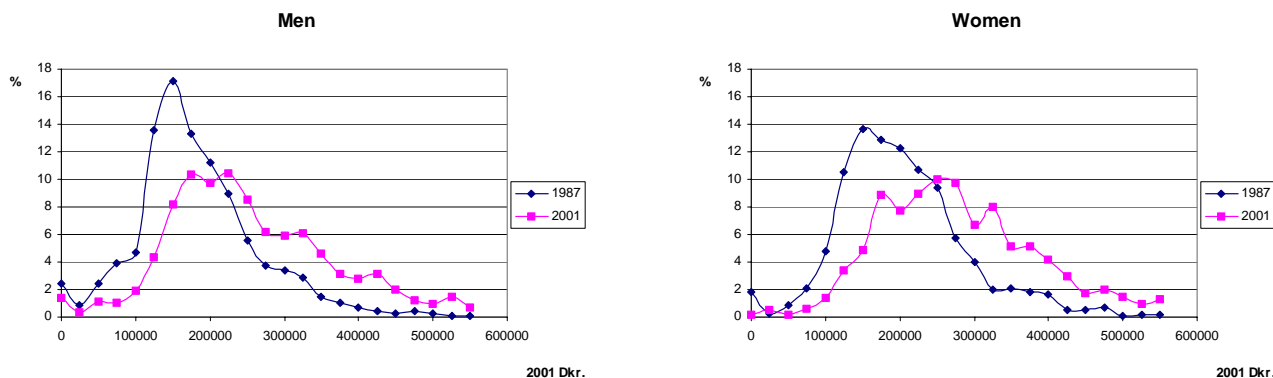
Gini coefficients	1987	2001
All observations	0.262	0.266
Men	0.273	0.291
Women	0.245	0.239

The observations regarding the overall distribution of extended income also hold when looking at men and women separately. Compared to the distributions of money income, the distributions of extended income are shifted to the right and vary more. For women, this tendency is more pronounced than for men, because their value of housework is larger than men's. In fact, the average of female extended income exceeds the average of male extended income in both years.

The Gini coefficients for men and women (Table 4.4) are relatively similar in 1987: 0.27 for men and 0.25 for women. However, between 1987 and 2001 inequality of the male extended income distribution increases while inequality of the female extended income distribution decreases slightly. Thus, the difference in 2001 is 5 percentage-points (0.29 for men and 0.24 for women). This larger inequality for men is surprising, as more men participating in household production implying positive values of housework is expected to decrease inequality. The only reasonable explanation is that the variation in active men's household work has become larger in the period.



**Figure 4.8. Distribution of extended income 1987 and 2001, by gender**



## 5. The distribution of time and money

From the previous section it is obvious that allocations of time and money differ between individuals. However, focusing on the distributions one at the time does not tell us anything about the substitution between the two. In this section, we thus study the simultaneous distribution of time and money, where money from now on is analogous to extended income.

The first view of the relationship between time and money is brought by the raw correlation coefficients in Table 5.1. In both 1987 and 2001, we find a negative correlation between leisure and extended income, although the correlation in 1987 is relatively small. However, when looking at men and women separately, we find that this is due to a small, but positive, correlation for men in 1987. The correlation coefficient is negative for women in both 1987 and 2001, and likewise for men in 2001. Except for men in 1987, the overall figures thus indicate a substitution effect, although not very large.

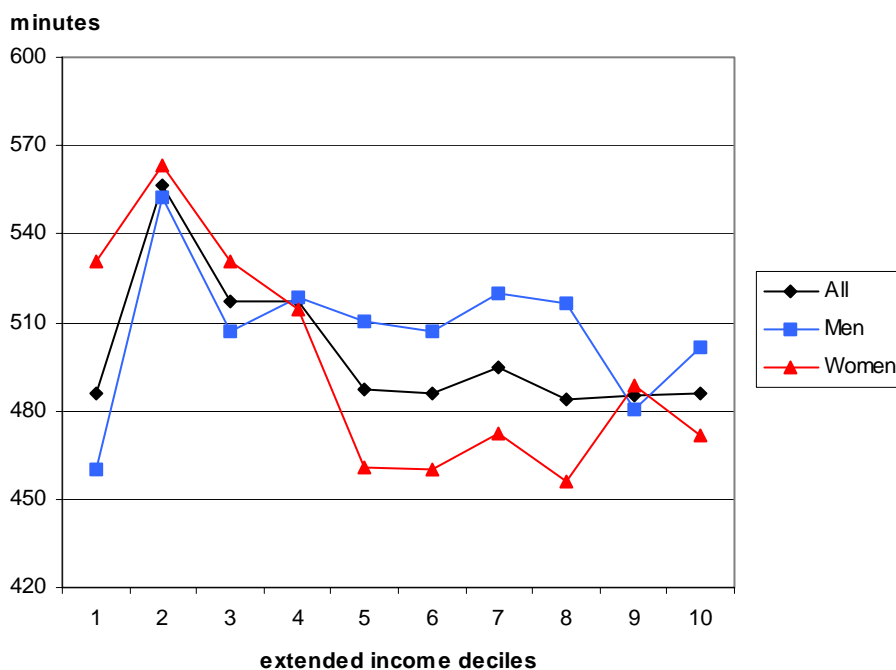
**Table 5.1. Correlation between extended income and leisure time, 1987 and 2001**

	Leisure time					
	All		Women		Men	
Extended income	1987	2001	1987	2001	1987	2001
1987	-0.034	-	-0.114	-	0.022	-
2001	-	-0.126	-	-0.155	-	-0.104

To get a closer look at the simultaneous distribution of time and money, we have calculated average leisure time depending on extended income decile.<sup>7</sup> These figures are presented in Figure 5.1 for 1987 and Figure 5.2 for 2001. Looking at all individuals in 1987, average leisure is at a higher level for the income deciles 2, 3, and 4 than for the following deciles, suggesting some substitution between time and money. However, average leisure is lower for individuals in income decile 1 and is in fact at the same level as average leisure in income deciles 5-10. As suggested by the correlation figures in Table 5.1, however, there are differences between men and women. Average leisure for women in the first income decile is relatively high, such that average leisure for women in the first 4 income deciles is higher than average leisure for women in income deciles 5-10. For men, leisure averages appear more volatile, with the lowest averages found in income decile 1 and 9.

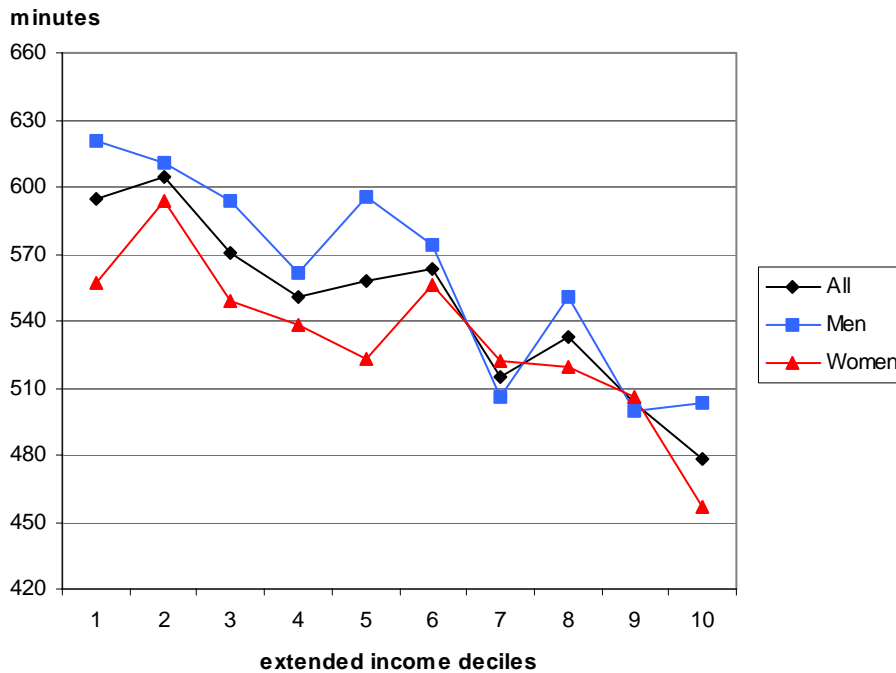
For 2001, a substitution effect is apparent for both men and women (Figure 5.2) with higher average leisure levels for lower income deciles and lower for higher income deciles. This is of course also reflected in the overall leisure averages that decrease from app. 600 minutes in income decile 1 and 2 to app. 480 minutes in income decile 10.

**Figure 5.2. Average leisure by extended income decile, 1987**



<sup>7</sup> Obviously, this could also have been the opposite – average extended income depending on leisure deciles. However, the conclusions from the two are identical.

**Figure 5.3. Average leisure by extended income decile, 2001**



In Figure 1.1 above, we divided all individuals into 4 categories: time-poor/money-poor, time-rich/money-poor, time-poor/money-rich, and time-rich/money-rich. Applying median leisure (time-rich or time-poor) and median extended income (money-rich or money poor) individuals are placed such that 50% are rich and 50% are poor in each dimension. If both money and time is allocated randomly, this division places 25% of the individuals in each quadrant. However, if substitution between time and money takes place, we expect to find relatively many individuals in the first and third quadrant (time-rich/money-poor and time-poor/money-rich).

In Table 5.2, we see that individuals in 1987 are placed with app. 25% in each quadrant. Thus, contrary to the expectation, the evidence does not suggest that substitution is taking place. Looking at men and women separately, we even find the exact opposite for men – more than 25% in the second and fourth quadrant.

In 2001, (Table 5.3) for women, close to 25% is found in each quadrant once more, while the tendency for men – as well as for the combined sample of men and women – supports the hypothesis of substitution between time and money, as more than 25% is found in the time-

rich/money-poor and time-poor/money-rich quadrants. However, evidence is little more than suggestive, as deviations from the 25% are not large.

**Table 5.2. Share of individuals being time/money-rich/poor, 1987. Extended income**

	Time poor	Time rich
<b>All</b>		
Money poor	24.91	25.09
Money rich	24.67	25.33
<b>Men</b>		
Money poor	26.18	23.78
Money rich	23.25	26.80
<b>Women</b>		
Money poor	24.47	25.48
Money rich	25.28	24.77

**Table 5.3. Share of individuals being time/money-rich/poor, 2001. Extended income**

	Time poor	Time rich
<b>All</b>		
Money poor	22.77	27.20
Money rich	26.50	23.53
<b>Men</b>		
Money poor	23.50	26.45
Money rich	26.45	23.59
<b>Women</b>		
Money poor	24.76	25.24
Money rich	24.60	25.40

A possible reason for the rather weak substitution between time and money that we find in Table 5.2 and Table 5.3 could be that we use the concept of extended income. Thus, it could be argued that individuals do not consider home-produced goods as part of the consumption-possibility set because most of these goods are not buyable. Consequently, a better distinction would be between

leisure and money income, disregarding the value of housework. However, as documented in Table 5.4 and 5.5 the difference between using the two different income concepts is very limited. The major difference between the two measures concerns men in 1987 – where the “twisted” result regarding extended income is turned around when looking at the money income. Concerning money income, all samples – except women in 2001 – have relatively more observations in the time-rich/money-poor and time-poor/money-rich quadrants.

**Table 5.4. Share of individuals being time/money-rich/poor, 1987. Money income**

	Time poor	Time rich
All		
Money poor	23.49	26.51
Money rich	26.09	23.91
Men		
Money poor	23.16	26.80
Money rich	26.26	23.78
Women		
Money poor	23.36	26.59
Money rich	26.39	23.66

**Table 5.5. Share of individuals being time/money-rich/poor, 2001. Money income**

	Time poor	Time rich
All		
Money poor	23.93	26.05
Money rich	25.34	24.68
Men		
Money poor	23.85	26.02
Money rich	26.11	24.02
Women		
Money poor	24.12	25.88
Money rich	25.24	24.76

The findings indicate that looking at the relationship between income – extended or not – and leisure time shows no major substitution between these two resources. The important question therefore is, if the perceived satisfaction with income and leisure supports the idea of having either time or money.

## 6. Satisfaction

In the analyses so far, we have focused on the actual distribution of time and money. According to the theory of revealed preferences, the observed allocation reveals the preferences of the individuals. However, if choices are restricted – for instance if it is not possible to work the desired amount of working hours - the observed allocation does not reveal preferences. Instead, the observed allocation exposes the choice set.

In order to investigate whether individuals are satisfied with their allocation of time and money, we use responses to the following satisfaction questions in the time-use questionnaire:

*How satisfied are you with your present financial situation?*

*How satisfied are you with your amount of leisure time?*

The first question is similar to the one formulated in the European Community Household Survey and close to the question in Schyns (2001). For both questions, the responses are categorised in six groups ranging from “not satisfied at all” to “fully satisfied”. Psychologists and sociologists have repeatedly validated this ordinal structure (see Clark, 1997).

Although the question concerning income does not include housework, we use answers to these questions as indicators for the revealed preferences concerning time and money. Thus, if an individual has only little leisure time but state full satisfaction with the amount of leisure time, we assume that the individual voluntarily chose the amount of leisure time. Unfortunately, the satisfaction questions were not asked in the 1987 time-use survey, and thus we are only able to extend the analysis in this respect for 2001.

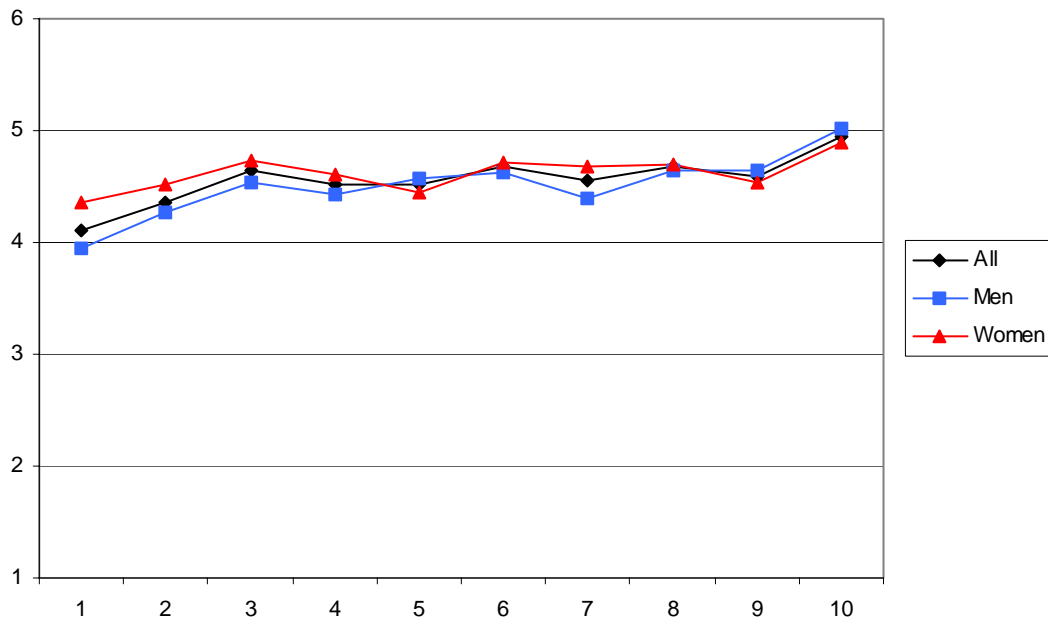
The individuals' perception of satisfaction with income is shown in Table 6.1. Satisfaction is divided into six categories, where '1' is not satisfied at all and '6' is fully satisfied. In general, individuals seem very satisfied with their income. Only few indicate satisfaction in the low end of the scale (2% and 5%), while the majority of individuals are found in the satisfaction categories 4, 5 and 6 (22%, 37%, and 22%). Concerning gender, the variation is not large. Women seem to be a little bit more satisfied (more women than men state satisfaction category 5 and 6), but the difference is not great.

**Table 6.1. Share of observations across the income satisfaction categories, 2001**

	All	Men	Women
1	1.78	1.59	1.94
2	4.70	5.37	4.09
3	11.54	12.51	10.65
4	22.31	24.24	20.55
5	36.59	35.28	37.80
6	23.08	21.01	24.97

In Figure 6.1, satisfaction with income depending on income decile is depicted. Average satisfaction increases across the income distribution, such that the average is around 4 for individuals in the bottom income decile, while the average is around 5 for individuals in the top income decile. Thus, we do find a tendency for higher income implying higher satisfaction. This tendency is stronger for men than for women. In fact, the male average increases from 3.94 to 5.02 while the female average only increases from 4.35 to 4.89. Men are thus more sensitive than women to the actual income level when recording satisfaction with their income.

**Figure 6.1. Average satisfaction with income across the income deciles, 2001**



Turning to satisfaction with leisure, again individuals seem to be quite satisfied as the majority of individuals are found in satisfaction categories 4, 5, and 6 (Table 6.2). However, the answers are more spread out than the answers regarding income satisfaction: 24.7% state leisure satisfaction below 4, while 18.0% state income satisfaction below 4. Concerning gender, women less often than men answer 5 to the question of leisure satisfaction, and consequently they are overrepresented in the other categories. Thus, the direction of any gender-difference is not clear.

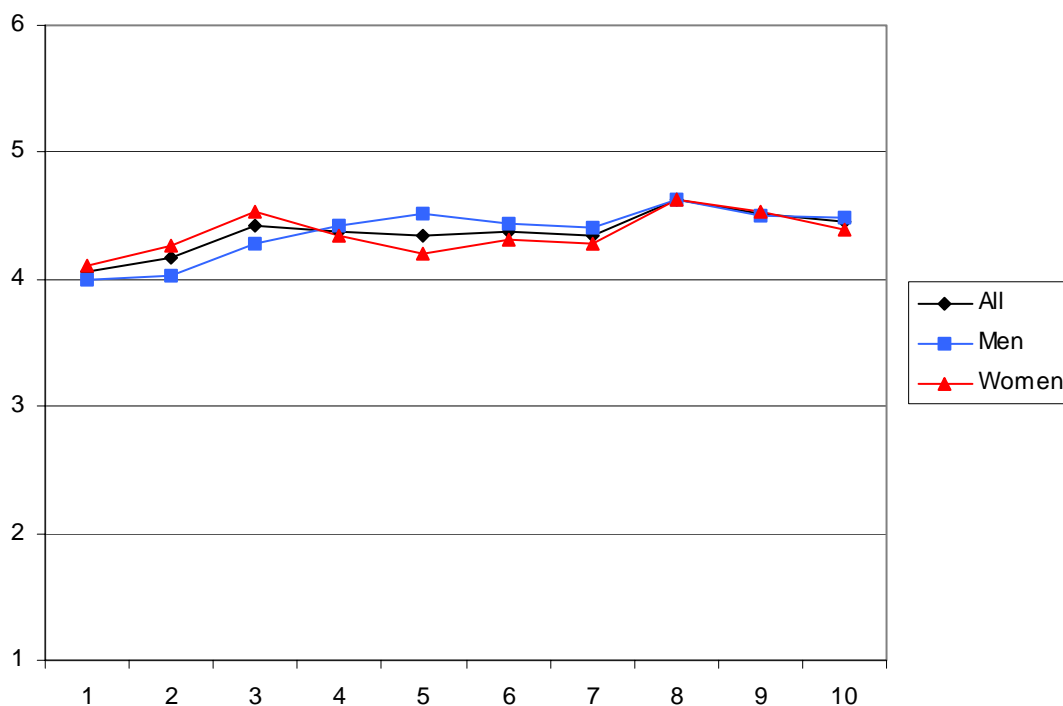
**Table 6.2. Share of observations across the leisure satisfaction categories, 2001**

	All	Men	Women
1	2.03	1.96	2.09
2	7.46	7.18	7.71
3	15.23	14.81	15.60
4	23.36	23.12	23.58
5	28.20	29.67	26.86
6	23.73	23.26	24.16



Looking at satisfaction with leisure across the leisure distribution, the correlation is fragile (Figure 6.2). Across the lowest three income deciles, satisfaction increases for both men and women, but across the remaining leisure distribution the satisfaction curve flattens out. Compared to satisfaction with income, the relationship between the distribution of leisure and satisfaction with leisure is weaker.

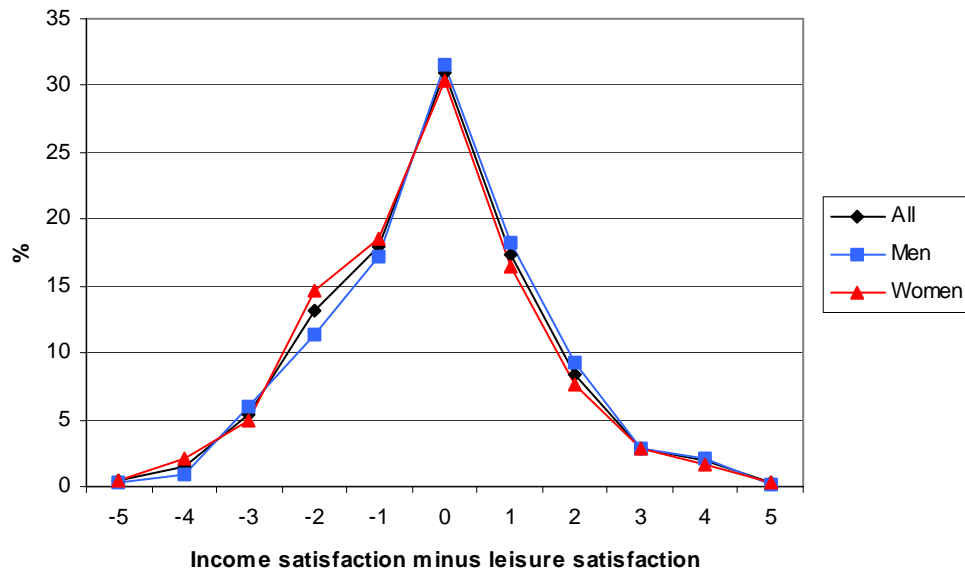
**Figure 6.2. Average satisfaction with leisure across the leisure deciles, 2001**



The final evidence to be presented in this section concerns the simultaneous satisfaction with income and satisfaction with leisure. If there is a trade-off between time and money and if there is a positive relationship between the level of income/leisure and the satisfaction with income/leisure, then we would expect to find some individuals being more satisfied with income than with leisure and vice versa for others. In Table 6.3, the difference between the two satisfaction measures is presented. The majority of individuals are equally satisfied with both income and leisure or with a difference of only a single category (66%). However, for the remaining individuals about 14% are more satisfied with their income than with their leisure while about 20% are more satisfied with

their leisure than with their income. This indicates that for a significant minority of individuals, there is a trade-off between satisfaction with income and satisfaction with leisure.

**Table 6.3. Income/leisure satisfaction distribution, 2001**



## **7. Concluding remarks**

The purpose of this paper has been to investigate the relationship between income and leisure for Danish wage earners. Is there a trade-off between time and money, so that individuals being rich in terms of money are poor in terms of leisure time and vice versa? Or are some individuals rich both in terms of money and leisure time, while others are poor in both dimensions?

Previously, most studies have dealt with either the distribution of income or with time allocation issues. Here we study time and money simultaneously and discuss the implications for our perception of welfare.

The data used are from two Danish time-use surveys from 1987 and 2001. Besides income information the data allow us to estimate the money value of housework, and thereby extended income as the sum of money income plus the predicted money value of household production.

By dividing all individuals into 4 categories: time-poor/money-poor, time-rich/money-poor, time-poor/money-rich, and time-rich/money-rich, and applying median leisure (time-rich or time-poor) and median extended income (money-rich or money poor) we find no evidence that substitution is taking place. Looking at men and women separately, only men are distributed with more than 25% in the time-rich/money-poor and time-poor/money-rich quadrants. However, evidence is little more than suggestive, as deviations from the 25% are not large.

The findings indicate that looking at the relationship between income – extended or not – and leisure time shows no major substitution between these two resources. The important question therefore is, if the perceived satisfaction with income and leisure supports the idea of having either time or money.

In general, the individuals seem very satisfied with their income. Relatively few indicate satisfaction in the low end of the scale, independent of income. The majority of individuals are found in the higher satisfaction categories. The variation in means show the same pattern with only minor differentials between the income deciles, the exceptions being the first and the last deciles with low and high scores, respectively.

Looking at men and women separately does not change the result – both men and women appear to be very satisfied with their income, independent of actual income decile. However, women are generally more satisfied than men in most income deciles.

The distribution of satisfaction in both dimensions – satisfaction with income and satisfaction with leisure, shows an interesting thing, namely that most wage-earners are equally satisfied with their income and leisure. The implication is that there seems to be no large substitution effect found about the perception of the two major well-fare components – income and time.

In this version of the paper, the empirical analyses are preliminary. In future work the simultaneity between income and leisure will be explored further, for instance by taking background factors into account. It remains to be seen, whether the conclusions still hold in this framework.

## References

- Aliagi, C. and K. Winqvist (2003) How women and men spend their time, in *Statistics in Focus, Theme 3 – 12/2003*, Eurostat.
- Atkinson, A. B. (1997). Bringing the Income Distribution in from the Cold. *The Economic Journal*, 107(441), 297-321.
- Becker, G.S. (1965). A Theory of the Allocation of Time. *Economic Journal* 75, pp. 493-517.
- Bittman, M. and J. Wajcman (1999). *The Rush Hour. The Quality of Leisure Time and Gender Equity*. SPRC Discussion Paper No. 97, Social Policy Research Centre, University of New South Wales, Sydney.
- Bonke, J. (1992), Distribution of Economic Resources: Implications of Including Household Production. *Review of Income and Wealth*. Series 38, No. 3, pp. 281-293.
- Chadeau, A. (1985). Measuring Household Activities: Some International Comparisons, *The Review of Income and Wealth*. Series 31, No. 3.
- Clark, A.E. (1997). Job Satisfaction and Gender: Why are Women so Happy at Work? *Labour Economics*, 4, 341-372.

- Garfinkel, I and Haveman, R. (1977). Earnings Capacity, Economic Status, and Power. *The Journal of Human Resources*. XII, pp. 49-70.
- Gottschalk, P. and T. M. Smeeding (1997). Cross-National Comparisons of Earnings and Income Inequality. *Journal of Economic Literature*, 35(2), 633-687.
- Gronau, R. (1977). Leisure, Home Production, and Work – the Theory of the Allacation of Time Revisited. *The Journal of Political Economy*, 85(6), 1099-1124.
- Jenkins, S.P. and O’Leary, N.C. (1996). Household Income plus Household Production: The Distribution of Extended Income in the U.K. *Review of Income and Wealth*. Series 42, No. 4, pp. 401-419.
- Lausten, M. (2003). *Hvad kvinder og mænd bruger tiden til – Om ligestilling I danske familier*. [How women and men spec their time – On equality in Danish families] Copenhagen: Socialforskningsinstituttet 03:08.
- Scitovsky, T. (1976). *The Joyless Economy. An Inquiry into Human Satisfaction and Consumer Dissatisfaction*. Oxford University Press. New York.
- Schyns, P. (2001). Income and Satisfaction in Russia. *Journal of Happiness Studies*, 2, 173-204.
- Smith, N., S. Dex, T. Callan and J. D. Vlasblom (2003). Taxation of Spouses: A Cross Country Study of the Effects on Married Women’s Labour Supply. *Oxford Economic Papers*, 55, 417-439.