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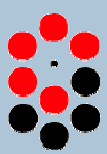

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Time and Money - Are they Substitutes?

Abstract: In this paper, we analyse the distribution of time and money for Danish wage earner couples, where time is defined as leisure time and money as extended income, i.e. the sum of disposable income and the value of housework. The hypothesis is that individuals being rich in one dimension are more likely to be poor in the other dimension, such that individuals can be classified as either money-poor/time-rich or money-rich/time-poor. We analyse two different distributions of income, where the first assumes no sharing and the second complete sharing of income between spouses. The data are from the Danish Time-Use Survey 2001, merged with register data. Results show that the substitution of money for time is more prominent for women than for men, because they have a larger income share of time-intensive value of housework, while men have the larger share of disposable income. Furthermore, when the spouses share income resources the women give up more value of housework than they get disposable income in return.

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

JEL-codes: D13, D31, I31, J22

1. Introduction

Income and leisure time are the main sources of utility in the traditional models of economic well-being. In theory, individuals choose between spending their time working in order to generate consumption or spending their time 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, se e.g. Wolff and Zacharias (2003). But if individuals can choose between time-richness and money-poverty or vice versa, our understanding of welfare must take this into account (Scitovsky, 1976).

However, although the trade-off between time and money exists in theory, the empirical findings may not support the theory. The reason for this is primarily that individual choices are constrained so that the trade-off is not possible in practice. In addition, the levels of individuals may differ considerably. For some individuals, the trade-off between time and money may thus be at a very low level, while others have considerable amounts of both goods. The purpose of this paper is to investigate the relationship between income and leisure for Danish wage earner couples in order to get new insight into the mechanisms of trading time for money or the other way around.

Previous studies have been limited to either distribution of income or time allocation issues. We go a step further by studying time and money simultaneously, distinguishing between two different sharing rules within the couples. The analysis is based on the Danish time use survey from 2001, where time is defined as pure leisure and money is defined as extended income, i.e. the sum of personal disposable income and the estimated value of housework. Although men and women do not differ much with respect to average extended income, the composition of income does. Men earn more money than women in the labour market, while women do the major share of the

household production. Consequently, it is important to study gender differences. In addition, we analyse two sharing rules within couples: A private regime where the income of each spouse is treated as an individual good; and a public regime, where each spouse gets half of the pooled income. These two sharing rules that can be thought of as extreme cases of intra-household bargaining, provides the limits for the individuals' money resources.

The paper is organised as follows. In section 2, we discuss the theoretical background for the substitution hypothesis. In section 3, data are presented, and in section 4 the separate distributions of time and money are presented. In section 5, we discuss our findings on the simultaneous distribution of time and money, and in section 6 we present the simultaneous distribution of time and money within couples. Finally, concluding remarks are found in section 7.

2. Background

Time and money must be regarded as the most valuable assets in modern life. Money is necessary to buy goods, and time is necessary to enjoy the goods. Furthermore, both goods are unequally distributed. Both in terms of money and leisure time, some are richer and others are poorer. Income inequality has been the topic of many studies (for instance Atkinson, 1997, and Gottschalk and Smeeding, 1997), whereas the inequality of the distribution of leisure time has been less studied (an example is Bittman and Wajcman, 1999).

In this paper, we study the systematic relationship between the two goods in terms of distributions. We ask whether the individual trade-off between time and money is evident in the aggregate distributions, such that individuals being "money-rich" are "leisure-poor" or vice versa? Or is the

"level-effect" dominant such that some individuals are both "money-rich" and "time-rich", while others are poor in both dimensions? The questions are visualised in Figure 2.1, where the "trade-off" effect corresponds to a negative correlation, while the "level" effect corresponds to a positive correlation.

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Figure 2.1 around here

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The substitution between time and money is fundamental in economic theory. The theoretical foundation for our analysis is a model of individual time allocation (Becker, 1965, and Gronau, 1977). Assume 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) $$U = U(C, L)$$

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:

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

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

$$(3) \qquad \frac{U_L}{U_c} = \frac{df}{dH_H} = w$$

This 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, df/dH_H, and the wage rate, w. Since both leisure and consumption generate utility, for each individual there is a trade-off between the optimal amount of leisure and the optimal amount of consumption. However, individual preferences are not identical, and thus the optimal split between time and consumption differ across individuals. In addition, endowments as well as productivity differ, implying that some people have a higher level of utility than others.

A problem with the model above, however, is the assumption of unrestricted choice of hours. This assumption may fail both concerning market work – because jobs where actual hours matches desired hours may not be offered – and housework – where for instance childcare is not optional given children in the house. Furthermore, the simple model does not take the interaction between spouses into account. The model above can thus be interpreted as the extreme case of absolutely no

sharing between the spouses – in this paper termed the private income regime. Couples in this regime are most likely either very new couples or couples about to break up. However, for the typical couple we expect some sharing of resources – towards the other extreme of complete pooling of resources, termed the public income regime (see Pahl, 1989, and Bonke and Uldall-Poulsen, 2004, for further discussions and empirical findings on different allocation regimes).

Although income resources are shared more or less between spouses, in this analysis leisure is always assumed to be a private good. Thus, we do not take possible interrelationships between spouses' leisure into account.

3. Data

3.1 The time-use survey

The data used are the Danish time-use survey from 2001, supplemented with register information from Statistics Denmark. This survey includes approximately 2,600 16-74-year olds completed time-use diaries as well as questionnaires. The design of the survey follows the guidelines developed by an expert group on time use surveys in Eurostat (2000). For interviewees in couples, the spouse was also asked to fill out time-use diaries. The time-use diaries include the main and secondary activity for each 10-minute interval during a weekday as well as during a weekend day.

For the analyses in this paper, we use a sub-sample of wage earner couples aged 20 years or more. Focusing on wage earners and not discarding non-employed individuals allows us to focus on the possible substitution between time and money for a more homogenous group. An additional selection criterion is that couples have four completed time use diaries – one for each spouse for a

weekday and one for each spouse for a weekend day. For each individual, the average daily time use on leisure and housework is then the weighted average of the weekday diary and the weekend day diary. The reason for doing this is the gender bias in housework – because men's housework is more concentrated on weekends, while women's housework is spread out over the week, only using the time use diary for one of the days would clearly bias the results.

Imposing these restrictions on the data leaves us with a sample including 535 couples - 535 men and 535 women.

3.2 Leisure

Leisure time is defined from the main activities in the time use diaries and includes pure leisure activities as well as eating and personal care.[1] In other words, leisure is the time during a day not working (either paid or unpaid) or sleeping.

Several borderline cases between housework and leisure can always be discussed. One example is food preparation; another is gardening. Child-related work is also difficult, as having children certainly implies 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

[1] The time-use categories 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). Sleep (activity code 01) and household work (activity codes 31, 32, 33, 34, 35, 36, 37, 38, and 39) are excluded.

The income concept used in this paper is extended income, which is defined as the sum of personal annual disposable income and the value of annual household production. The reason for using the concept of extended income is that we want "money" to proxy consumption opportunities, and as pointed out in the theoretical model, these depend on money income as well as household production. Thus, by analysing the relationship between extended income and leisure we get closer to the theoretically based substitution than if using only money income. The extended income idea follows Becker's (1965) "full income" and the "earnings capacity" developed by Garfinkel and Haveman (1977).

The personal disposable income comes from register data and includes earnings as well as private and public transfers, net of taxes. This net income measure is directly linked to the individual's purchasing power and is thus the relevant measure here. A potential problem, however, is the taxation of income. If the taxation scheme is characterised by joint taxation, then disposable income cannot be interpreted as "private". However, as pointed out by Smith, Dex, Callan and Vlasblom (2003) the Danish system can primarily be characterised as a split taxation scheme, which makes it appropriate to analyse individual incomes.

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[2]. This measure relies on two critical assumptions: One that time spent working at home and time spent in paid work are complete substitutes such that the market wage rate is an appropriate measure for the opportunity cost of an

[2] Instead of this opportunity cost approach, the housekeepers' wage rates are sometimes multiplied by the working time, i.e. a market alternative housekeeper cost method (Chadeau, 1985; Mattila-Wiro, 2004).

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.

Because 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.

Following these considerations, we calculate the value of housework for each individual as the product of number of housework hours during a day, 365 days a year, times the shadow price of housework. To match our net money income, we apply a net shadow price of housework, which is thus defined as the annual disposable income divided by annual working hours.[3,4]

As mentioned, it may be wrong to categorise childcare as housework. Deding and Lausten (2004) thus find that the determination of childcare as time use activity is very different from the determination of other housework activities. In the analyses, we have thus tried to exclude direct childcare from the household production, but the result of this analysis does not differ significantly.

3.4 Sample means

[3] Annual working hours are calculated by multiplying weekly working hours by 45 weeks.
[4] The shadow price of housework should be the actual disposable wage rate, but as we only observe the disposable income, including transfers, we have to use this measure.

In Table 3.1, we present sample means of the variables. The average husband is 2½ years older than his wife and gets a higher hourly wage than she does (100 DKK versus 94 DKK). Leisure is also distributed in favour of men having 457 minutes of leisure a day as opposed to 439 minutes for women. On the contrary, the wives spend much more time on housework than the husbands (244 minutes and 169 minutes a day) – one of the reasons being that child-care is a gendered housework task. The gender-differential in the money value of housework is smaller, however, because of the applied opportunity cost principle, which gives men a higher shadow price of time than women. Adding the value of housework and disposable income, where the latter is bigger for men than for women, we end up with nearly the same extended income for both genders (293,132 DKK for men and 287,153 DKK for women in the private income regime).

When defining the income components as public, each spouse is assigned half of the aggregate disposable income as well as half of the aggregated value of housework. This levels out the differences in the private regime, redistributing disposable income from the man to the woman and value of housework from the woman to the man. The redistribution of value of housework is bigger than that of disposable income, such that the women have lower average extended income in the public regime than in the private regime, and visa versa for the men.

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Table 3.1 around here

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

One way of looking at the gender differences in time and money is through the averages in Table 3.1. In this section, we go a step further and present the distributions of leisure, disposable income, the money value of housework, and extended income for women and men, respectively.

In Figure 4.1, we see that the male distribution of leisure lies to the right of the female distribution of leisure, reflecting the higher average male leisure time. Furthermore, the distribution for men is somewhat more equal than for women (Gini coefficients of 0.143 and 0.154).

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Figure 4.1 around here

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When turning to the income distributions, the figures include three graphs: one for female private income, one for male private income, and one for public income that is identical for both men and women. As for leisure time the male distribution of disposable income lies to the right of the female distribution, see Figure 4.2. Because men typically earn more than women, going from the private income regime to the public income regime implies a shift to the left for the male distribution and a shift to the right of the female distribution. The distribution of public income thus lies in between the two private income distributions. Furthermore, the inequality of the public income distribution is lower than the inequality of the two private income distributions. Especially for men, the decrease in inequality is large, the reason being that there are more men with very high incomes such that the sharing with the wife matters more.

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Figure 4.2 around here

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The distribution of the value of housework is presented in Figure 4.3. The value of housework is much more heterogeneous than disposable income, and so this distribution is more skew than the distribution of disposable income and more unequal. Also contrary to the distribution of disposable income, the female distribution lies to the right of the male distribution and especially for men we find quite a few zeroes. However in the public regime where the spouses share the value of housework, the proportion of zero's decreases, as at least one spouse usually does some housework during an average day.

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Figure 4.3 around here

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Finally, the distribution of extended income is presented in Figure 4.4. In contrast to Figure 4.2 and 4.3, the male and female distributions of extended income are more similar to each other. This is a consequence of the findings above, that male disposable income is typically higher than female disposable income and that female value of housework is typically higher than male value of housework. The calculated Gini-coefficients for women and men are 0.210 and 0.245, respectively, which is a much smaller gender-differential in absolute terms than the differentials found for the value of housework and disposable income, respectively.

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Figure 4.4 around here

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5. The simultaneous distribution of time and money

The overall question of whether time and money are substitutes requires analyses of the simultaneous distribution of the two. Thus, if individuals are mainly money-poor/time-rich or money-rich/time-poor, as sketched in Figure 2.1, this is interpreted as a confirmation of the substitution hypothesis. On the other hand, if relatively many women and men are either rich or poor in both dimensions, we see this as a rejection of the substitution hypothesis, implying that the level effect is dominant.

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Table 5.1 around here

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The first indication of a trade-off between time and money is given though the correlation coefficients in Table 5.1. Looking at extended income, we see that the correlation between extended income and leisure time is significantly negative for both women and men, in the public as well as in the private regime. Interestingly, the correlation is less negative for women in the public regime than in the private regime, while it is the other way around for men[5]. A possible interpretation of this result is that women gain from being in a public income regime compared to a

private income regime, because they have to give up less leisure for a given level of income (or vice versa). Men, on the other hand, loose from being in the public income regime compared to the private income regime, as they have to give up more income for a certain level of leisure (or vice versa).

A second image of the relationship between money and time is illustrated in Figure 5.1, where the average leisure time is plotted against deciles in the extended income distribution.[6] The substitution of time for money is evident, as the curves are downwards sloping. When illustrated in this manner, the difference between men and women seems only minor. The male curves lies slightly above the female curves, but the differences are not significant. Moreover, the difference between the public and the private income regime is small, as the slopes of the curves are nearly the same.

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Figure 5.1 around here

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The trade-off between time and money in Table 5.1 and Figure 5.1 is at a very aggregated level. In the following, we return to the classification in Figure 2.1 and calculate the share of women and men in the four quadrants (money-rich/time-rich, money-rich/time-poor, money-poor/time-poor, and money-poor/time-rich). If individuals were evenly distributed over the quadrants, each cell would contain 25 percent of the observations. If, however, individuals are able to substitute, we

[5] If direct childcare is excluded from housework, the correlation coefficients are much smaller and non-significant for women in the public regime. This indicates that childcare is very time-intensive work.
[6] The deciles are defined from the aggregate income distribution and are thus the same for both women and men.

expect a negative correlation between time and money and thus more than 25 percent in the 2nd and 4th quadrant of Figure 2.1, the “substitution”-quadrants.

As we see in Table 5.2, there are more than or close to 25 percent in the “substitution”-quadrants and less than 25 percent in the other quadrants. This indicates that money is indeed substituted by leisure among both men and women. Looking at the private income regime, we find about the same share of men and women along the “substitution-axis” (quadrant 2 and 4) – 62.24 pct. of the women and 60.19 pct. of the men. There are marked differences, however, in where each gender is typically placed. Women are thus more likely to be money-rich/time-poor than money-poor/time-rich while it is the other way around for men. Keep in mind, that the reason so many women are placed in the money-rich category is the income measure. Using the extended income measure that includes the value of housework thus makes the women relative richer in money terms.

Looking at the public income regime, again we find that most individuals are placed along the substitution axis, and again women are more likely to be money-rich/time-poor and men are more likely to be money-poor/time-rich. When comparing the two income regimes, it should be kept in mind that men and women cannot change from time-poor to time-rich or visa versa. Because leisure is always a private good, being time-rich or time-poor is defined independent of income regime. Therefore, the change from private to public regimes shifts women down (towards lower extended income) and shifts men up (towards higher extended income).

Using the extended income measure allows us to interpret “money” in terms of consumption opportunities. Especially due to housework, the consumption opportunities are larger for women than for men, and thus women are generally more “money-rich” in terms of extended income than

men when looking at the private income regime. The “price” being paid for this richness, however, is clear as the women are more likely than men to be time-poor – naturally because they spend the time on more housework chores than do the men.

Then, when considering the public income regime, what happens is that the excess consumption opportunities that the women have are shared with the men, but without the men being able to “pay back” with time. We thus find that in terms of the trade-off between time and money, men seem to gain from the sharing between spouses while women loose.

To get more insight into the differences between women and men, we have also calculated the rich/poor-shares for disposable income and the value of housework; see Table 5.3 and Table 5.4. The findings in these tables confirm the results above. Looking at the disposable income in Table 5.3, women are more likely to be poor and men are more likely to be rich, when looking at the private income regime, while the finding for the value of housework in Table 5.4 is the other way around. The main difference between the two, however, lies in the share of individuals along the substitution-axis. This share is only slightly above 50 pct. for private disposable income, while it is above 60 pct. for the private value of housework. This illustrates that the trade-off between time and money is much stronger concerning “value-of-housework-money” than concerning “disposable-income-money”, which explains why the trade-off seems to be larger for women.

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Table 5.2 around here

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Table 5.3 around here

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Table 5.4 around here

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5.1. Characteristics of the different groups

An interesting question is whether certain types of individuals are placed in different categories. This is likely to be the case, if certain life-stages are more or less time-intensive or money-intensive. In Table 5.5 and 5.6, some characteristics of the four quadrant groups are thus presented for the private income regime and the public income regime, respectively.

With respect to age, we find that time-rich women and men are older than time-poor women and men. We also find that among the time-rich women, the money-rich are older than the money–poor, while there is no such difference found for men. Looking at money, the richer are again the oldest among the time-poor men and among the time-rich women. This means that being older is associated with being richer in both dimensions, which is as expected. The exception is time-rich men, where the difference in age between the money-rich and the money-poor is very small. This pattern is the same for the private regime and for the public regime.

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Table 5.5 around here

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As mentioned above, children imply restrictions on leisure. The expectation is that especially younger children are demanding in terms of time and, thus, we expect individuals with pre-school children (0-6 years) to be more time-poor on average. On the other hand, school-aged children at (7-17 years) are not expected to have a large time effect.

For both income regimes, results are as expected. For women and men, and for money-rich and money-poor, the time-rich always have fewer pre-school children than the time-poor. In addition, the money-rich on average have more pre-school children than the money-poor, especially when looking at the public income regime and the women in the private income regime. The reason for this is of course that children generate extended income through housework

Concerning the number of school-aged children, the difference between the time-poor and the time-rich is small and, furthermore, the difference between the money-poor and the money-rich is much smaller than when looking at the pre-school children. Thus, while extended income is also generally higher for individuals with school-aged children, the presence of these children is not very important for the distribution of leisure.

Also the educational level varies somewhat between the different combinations of time and money. Looking at the money-rich women and men, we find that relatively many of the time-poor have a long academic education and relatively few of the time-poor have no education, compared to the time-rich. In addition, we find that women with no qualifying degree are over-represented among the time-rich compared to the time-poor. This is found both for the private and the public

income regime. Among the money-poor, however, no close relationship between time and educational level is found.

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Table 5.6 around here

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6. The simultaneous distribution of time and money – within couples

In the previous section, we analysed the substitution of money and time separately for women and men. In this section, however, we address the simultaneous distribution of these resources *within* couples, or more specifically, how leisure is distributed in couples with different combinations of extended incomes. Thus, if spouses are money-rich, we study the probability of both being time-poor, and likewise if spouses are money-poor, we study whether they are both time-rich. Moreover, if he is money-rich and she is money-poor or the other way around, we might expect to find the same deviation in their leisure.

Again, we distinguish between the private and the public income regime. However, as the spouses by definition have the same income in the public regime, the cross-combinations (e.g. he is money-rich and she is money-poor) do not exist in this case.

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Table 6.1 around here

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Table 6.1 shows for the private income regime that within a large share of the money-rich/money-rich couples (quadrant 1) both spouses are time-poor (45.86 pct.), indicating that the spouses substitute time and money. The same finding appears for money-poor/money-poor couples (quadrant 3), where 47.13 pct. are time-rich/time-rich. Looking at the distribution of time and money within couples, these results thus do point at a substantial substitution of time and money.

Looking at the cross-combination couples, where one spouse is rich and the other one is poor in terms of money, the picture is less clear (quadrant 2 and 4). The bold figures indicate the cell in which the couple should be found, if they were both independently substituting time for money. In quadrant 2 (where he is money-rich and she is money-poor), only 24.71 pct. of the couples are found in the expected substitution-cell., while this is the case for 29.41 pct. of the couples in quadrant 4 (where he is money-poor and she is money-rich). In these cases, the intra-household allocation mechanisms are too complex to be illustrated in this simple framework.

The last result to be discussed is the distribution of leisure in couples using the public income definition; see Table 6.2. As mentioned, the public regime implies that couples can only be in quadrant 1 and 3. The combination couples in Table 6.1's quadrant 2 and 4 are thus redistributed to either the rich or the poor couples in Table 6.2 depending on average income. The findings of the two tables are similar, although fewer couples are found in the "right" substitution cells in the public regime. The conclusion must thus be that when couples share, the intra-household distribution of time and money becomes more difficult to entangle.

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Table 6.2 around here

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7. Concluding remarks

In this paper, we have explored the relationship between the distribution of income and leisure for wage earners in couples. Previously studies have primarily been occupied with either the distribution of income or with time allocation issues. Here however, we have made an attempt at studying the very complex simultaneous relationship between the two, based on a sub-sample from the Danish time-use survey from 2001 merged with register data from Statistics Denmark.

The money measure that we utilise in the analysis is extended income, i.e. the sum of personal disposable income and the estimated value of housework, whereas time is leisure exclusive of housework and sleep. The concept of extended income deviates considerably from pure money income, but is implemented because we want to proxy consumption opportunities. Thus, the aim is to study the possible aggregate trade-off between leisure and consumption opportunities, and not between leisure and earnings. A consequence of using extended income is that women on average are richer than men in terms of "money". This happens because the women's excess value of housework exceeds the men's excess disposable income.

Although the analysis is individually based, we do take possible intra-household allocation into account. We thus consider two different income-sharing regimes. The first is a private regime where the income of each spouse is treated as an individual good, and the other is a public regime,

where each spouse gets half of the pooled income. These regimes can be interpreted as the extreme cases that pose the limits of intra-household sharing.

The main substitution hypothesis that we analyse is that the trade-off between time and money is evident in the aggregate distributions. We illustrate the hypothesis by classifying every individual as either poor or rich in both the money-dimension and the time-dimension. Thus, if relatively many are found along the "substitution-axis", being money-poor/time-rich or money-rich/time-poor, this result confirms the substitution hypothesis. The other possibility is that some people are richer in both dimensions, while others are poorer. If this "level-effect" is dominant, the major share of individuals will be placed outside the substitution-axis.

In both income regimes, the data supports the substitution hypothesis as the major share of both women and men are found along the "substitution-axis". There is a large difference, however, in where women and men are generally found. Women are thus more likely to be money-rich/time-poor, while men are more likely to be money-poor/time-rich. This pattern is especially obvious in the private income regime, while the differences are somewhat levelled out in the public income regime. Furthermore, the trade-off between time and money is considerably larger for women than for men in the private income regime.

The reason for this finding becomes clear, when we consider the composition of male and female income. Women have the largest share of the value of housework, which is very time demanding, while men have the largest share of disposable income, which only to a lesser extent is determined by the use of time. In the private income regime, we thus find that women have a larger average extended income than men – and thus are more likely to be money-rich - but consequently they are

also time-poor more often than men. When moving from the private to the public income regime, the women give up more value of housework than they receive disposable income in return; but because leisure is a private good, they remain time-poorer than the men. In this respect, the women must be considered the losers of intra-household sharing: They give up consumption opportunities without getting leisure in return.

References

Atkinson, Anthony B., "Bringing the Income Distribution in from the Cold," *The Economic Journal*, 107(441), 297-321, 1997.

Becker, Gary S., "A Theory of the Allocation of Time," *Economic Journal*, 75, 493-517, 1965.

Bittman, Michael and James Wajcman, *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, 1999.

Bonke, Jens, "Distribution of Economic Resources: Implications of Including Household Production," *Review of Income and Wealth*, 38(3), 281-293, 1992.

Bonke, Jens and Hans Uldall-Poulsen, *Income Pooling within Families: Survey Evidence of Denmark*, The Danish National Institute of Social Research, Working Paper No. …., 2004.

Chadeau, Ann, "Measuring Household Activities: Some International Comparisons," *The Review of Income and Wealth*, 31(3), 237-53, 1985.

Clark, Andrew E., "Job Satisfaction and Gender: Why are Women so Happy at Work?," *Labour Economics*, 4, 341-372, 1997.

Deding, Mette and Mette Lausten, *Choosing between his time and her time? Market work and housework of Danish Couples,* The Danish National Institute of Social Research, Working Paper No. 4:2004, 2004.

Eurostat, *Guidelines on harmonised European time use surveys*. Eurostat, Luxembourg, 2000.

Garfinkel, Irwin and Robert Haveman, "Earnings Capacity, Economic Status, and Power," *The Journal of Human Resources*, 12, 49-70, 1977.

Gottschalk, Peter and Timothy M. Smeeding, "Cross-National Comparisons of Earnings and Income Inequality," *Journal of Economic Literature,* 35(2), 633-687, 1997.

Gronau, Reuben, "Leisure, Home Production, and Work – the Theory of the Allocation of Time Revisited," *The Journal of Political Economy*, 85(6), 1099-1124, 1997.

Jenkins, Stephen P. and Nigel C. O'Leary, "Household Income plus Household Production: The Distribution of Extended Income in the U.K," *Review of Income and Wealth*, 42(4), 401-419, 1996.

Mattila-Wiro, Päivi, *Changes in the Inequality of Income and the Value of Housework Time in Finland in 1979-2000,* Paper presented at the 28th General Conference of The International Association for Research in Income and Wealth, Cork, 2004.

Pahl, Jan, *Money and Marriage*, MacMillan Education Ltd, London, 1989.

Scitovsky, Tibor, *The Joyless Economy. An Inquiry into Human Satisfaction and Consumer Dissatisfaction*, Oxford University Press, New York, 1976.

Smith, Nina, Shirley Dex, Tim Callan and Jan D. Vlasblom, "Taxation of Spouses: A Cross Country Study of the Effects on Married Women's Labour Supply," *Oxford Economic Papers,* 55(3), 417-439, 2003.

Wolf, Edward N. and Ajit Zacharias, *The Levy Institute Measure of Economic Well-being*. The Levy Economics Institute of Bard College, Working Paper No. 372, 2003.

Figure 2.1
Time and Money

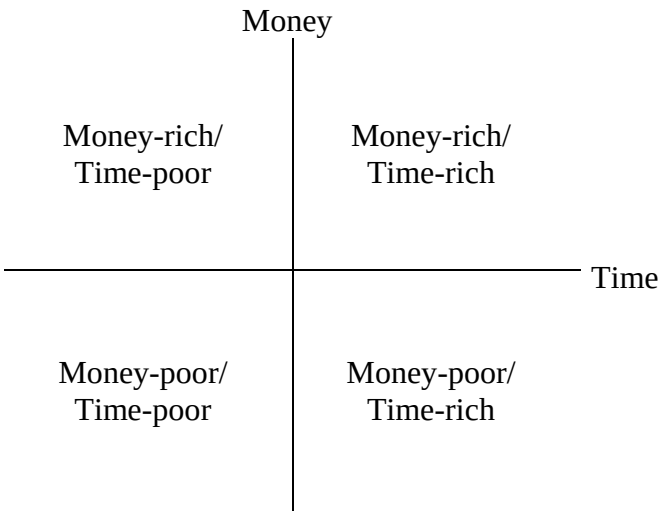


Table 3.1

Sample characteristics of individuals

	Women		Men	
	Mean	(Std.dev.)	Mean	(Std.dev.)
Couples				
Age (years)	41.87	(9.53)	44.23	(9.92)
Wage (DKK/hour)	94.47	(32.78)	100.14	(60.44)
Youngest child 0-6 years (pct.)	0.28	(0.45)	0.28	(0.45)
Youngest child 7-17 years (pct.)	0.28	(0.45)	0.28	(0.45)
No qualifying education (pct.)	0.22	(0.42)	0.21	(0.41)
Vocational education (pct.)	0.36	(0.48)	0.46	(0.50)
Short academic education (pct.)	0.07	(0.25)	0.06	(0.24)
Medium academic education (pct.)	0.23	(0.42)	0.17	(0.37)
Long academic education (pct.)	0.12	(0.32)	0.11	(0.31)
Leisure time (min/day)	438.57	(126.59)	456.96	(120.87)
Time-use for housework (min/day)	244.07	(128.87)	168.85	(117.87)
Of this time-use for childcare	52.33	(83.29)	28.20	(50.62)
Couples – private regime				
Disposable income	150,719	(46,739)	181,904	(93,102)
Value of housework production	142,413	(98,426)	105,249	(148,540)
Of this value of childcare	31,464	(53,350)	19,774	(95,113)
Extended income	293,132	(123,390)	287,153	(189,531)
Couples – public regime				
Disposable income	166,312	(53,646)	166,312	(53,646)
Value of housework production	123,831	(92,492)	123,831	(92,492)
Of this value of childcare	25,619	(57,567)	25,619	(57,567)
Extended income	290,143	(118,086)	290,143	(118,086)
Number of individuals	535		535	

Figure 4.1
Distribution of leisure time by gender

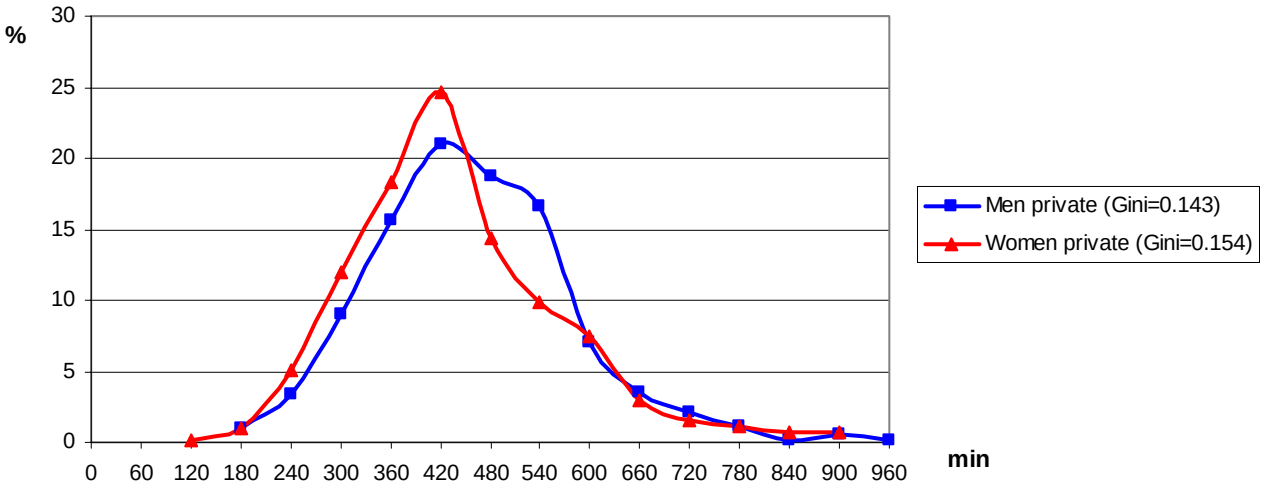


Figure 4.2
Distribution of disposable income by gender

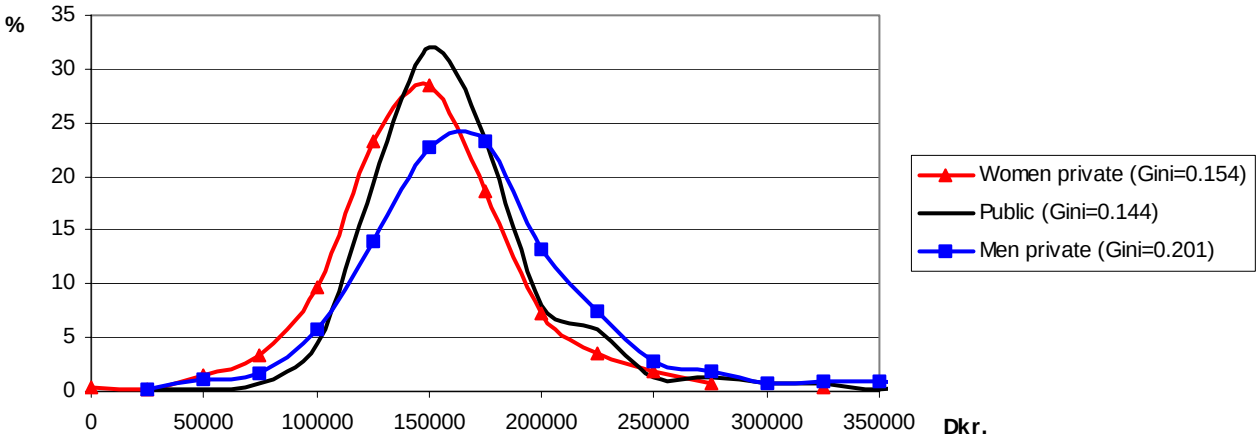


Figure 4.3
Distribution of value of housework by gender

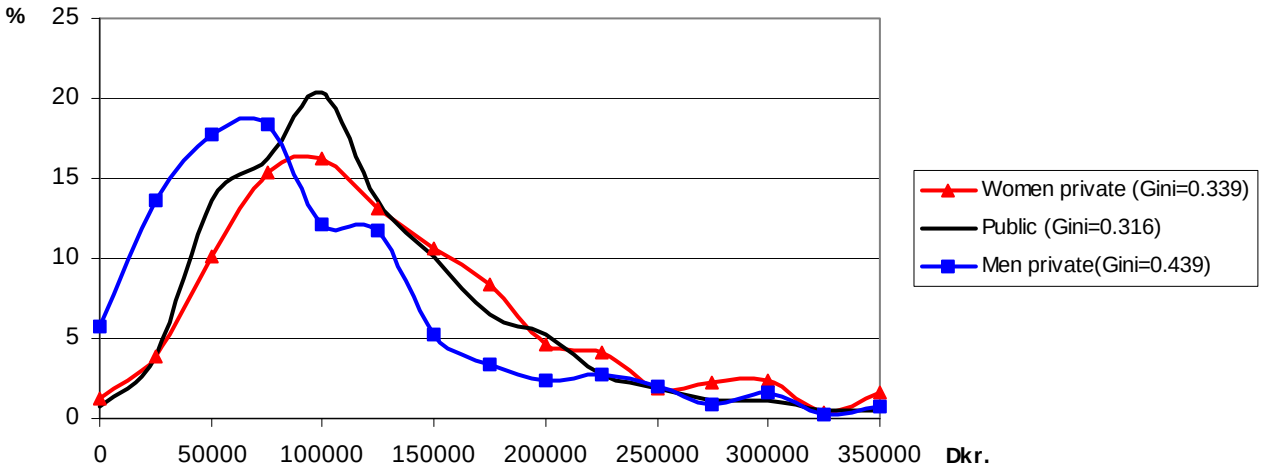


Figure 4.4
Distribution of extended income by gender

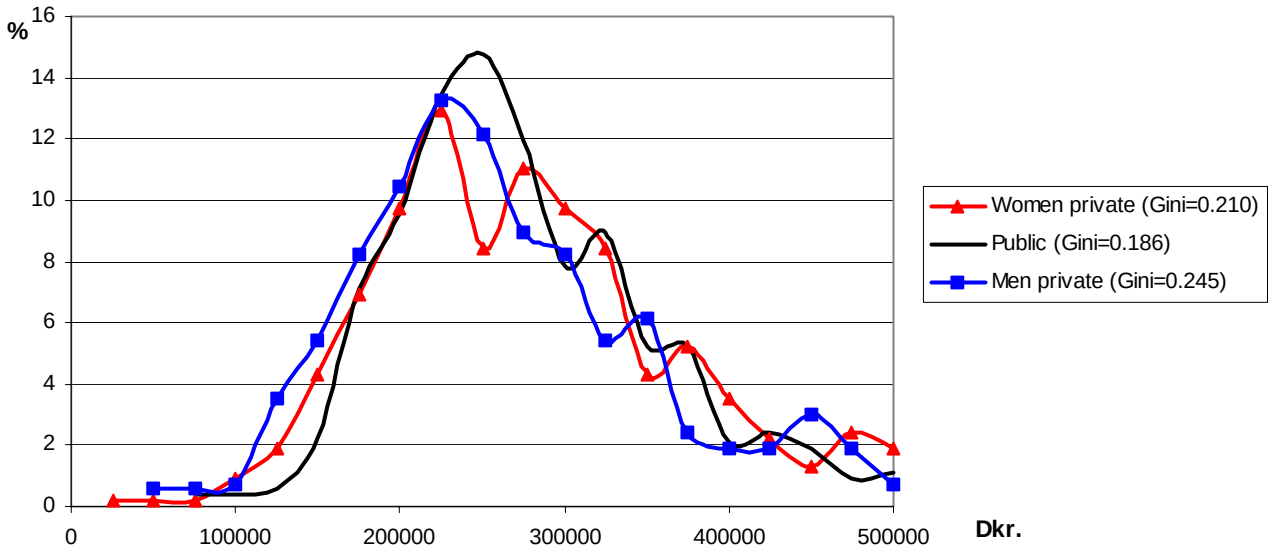
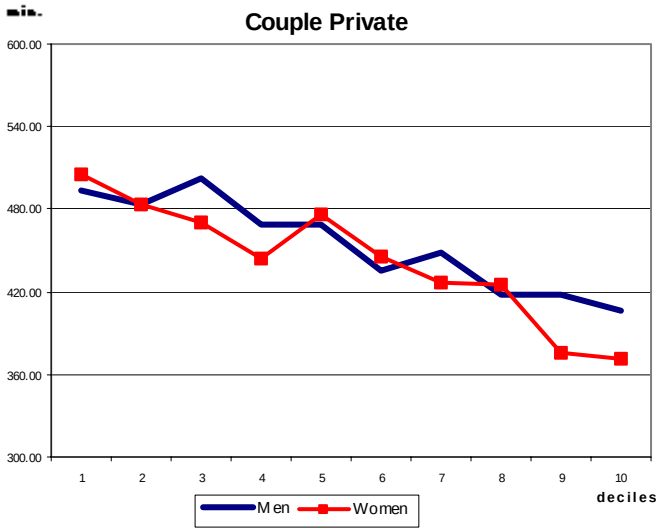


Table 5.1
Correlation between extended income, disposable income and housework, and leisure time

	Extended Income	
Leisure Time	Private regime	Public regime
Women	-0.265*	-0.191*
Men	-0.145*	-0.221*

* Significantly different from zero at 5 pct. level

Figure 5.1
Average leisure by extended income deciles and gender



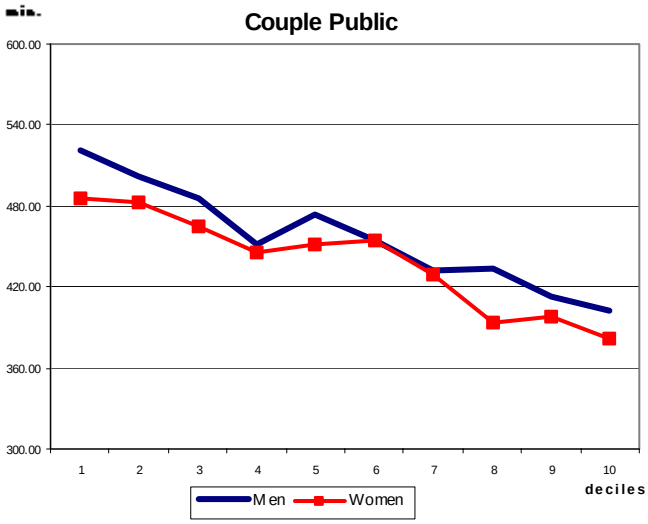


Table 5.2
Share of individuals being time/money-rich/poor
Extended income and leisure time.

	Women		Men	
Couples – private[1, 4]	Time-poor	Time-rich	Time-poor	Time-rich
Money-rich	**35.70**	19.07	25.05	20.19
Money-poor	18.69	26.54	19.63	**35.14**
Couples – public[3,4]	Time-poor	Time-rich	Time-poor	Time-rich
Money-rich	**31.96**	18.13	**27.48**	22.62
Money-poor	22.43	**27.48**	17.20	**32.71**

[1] Money threshold: 261,400 DKK. [3]Money threshold: 265,500 DKK.[4]Time threshold: 433 min/day

Table 5.3
Share of individuals being time/money-rich/poor
Disposable income and leisure time.

	Women		Men	
Couples – private[1, 4]	Time-poor	Time-rich	Time-poor	Time-rich
Money-rich	24.30	16.07	**28.04**	**31.59**
Money-poor	**30.09**	**29.53**	16.64	23.74
Couples – public[3,4]	Time-poor	Time-rich	Time-poor	Time-rich
Money-rich	**29.53**	20.56	25.05	25.05
Money-poor	24.86	25.05	19.63	**30.28**

[1] Money threshold: 156,550 DKK. [3]Money threshold: 156,700 DKK.[4]Time threshold: 433 min/day

Table 5.4
Share of individuals being time/money-rich/poor
Value of housework and leisure time.

	Women		Men	
Couples – private[1, 4]	Time-poor	Time-rich	Time-poor	Time-rich
Money-rich	**39.07**	22.80	22.43	15.70
Money-poor	15.33	22.80	22.24	**39.63**
Couples – public[3,4]	Time-poor	Time-rich	Time-poor	Time-rich
Money-rich	**31.78**	18.32	**28.22**	21.87
Money-poor	22.62	**27.29**	16.45	**33.46**

[1] Money threshold: 98,800 DKK. [3]Money threshold: 105,200 DKK.[4]Time threshold: 433 min/day

Table 5.5
Time and money – group characteristics. Private extended income regime

	Women		Men	
	Time-poor	Time-rich	Time-poor	Time-rich
	Money-rich		Money-rich	
Age (years)	40.77	44.39	43.85	45.13
Youngest child 0-6 years (pct.)	0.45	0.23	0.37	0.28
Youngest child 7-17 years (pct.)	0.34	0.33	0.28	0.31
No qualifying education (pct.)	0.15	0.23	0.14	0.15
Vocational education (pct.)	0.32	0.28	0.41	0.38
Short academic education (pct.)	0.09	0.07	0.07	0.06
Medium academic education (pct.)	0.25	0.32	0.16	0.31
Long academic education (pct.)	0.19	0.10	0.22	0.11
N:	191	102	134	108
	Money-poor		Money-poor	
Age (years)	40.10	42.80	41.33	45.60
Youngest child 0-6 years (pct.)	0.19	0.14	0.42	0.13
Youngest child 7-17 years (pct.)	0.20	0.21	0.26	0.27
No qualifying education (pct.)	0.31	0.26	0.28	0.26
Vocational education (pct.)	0.42	0.44	0.52	0.50
Short academic education (pct.)	0.05	0.05	0.06	0.05
Medium academic education (pct.)	0.15	0.19	0.09	0.14
Long academic education (pct.)	0.07	0.06	0.06	0.05
N:	100	142	105	188

Table 5.6
Time and money – group characteristics. Public extended income regime

	Women		Men	
	Time-poor	Time-rich	Time-poor	Time-rich
	Money-rich		Money-rich	
Age (years)	40.73	44.92	43.51	45.17
Youngest child 0-6 years (pct.)	0.45	0.28	0.45	0.31
Youngest child 7-17 years (pct.)	0.33	0.31	0.29	0.36
No qualifying education (pct.)	0.15	0.23	0.16	0.18
Vocational education (pct.)	0.31	0.31	0.43	0.38
Short academic education (pct.)	0.08	0.06	0.06	0.05
Medium academic education (pct.)	0.24	0.33	0.14	0.30
Long academic education (pct.)	0.22	0.07	0.21	0.09
N:	171	97	147	121
	Money-poor		Money-poor	
Age (years)	40.27	42.50	41.52	45.61
Youngest child 0-6 years (pct.)	0.23	0.11	0.29	0.10
Youngest child 7-17 years (pct.)	0.23	0.23	0.24	0.23
No qualifying education (pct.)	0.29	0.26	0.27	0.24
Vocational education (pct.)	0.42	0.42	0.51	0.51
Short academic education (pct.)	0.07	0.05	0.08	0.06
Medium academic education (pct.)	0.18	0.19	0.10	0.13
Long academic education (pct.)	0.05	0.07	0.04	0.06
N:	120	147	92	175

Table 6.1
Distribution of leisure time dependent on the spouse's income regimes – private income

Male income		Female income				
	Money-poor			Money-rich		
Money-rich		Female leisure			Female leisure	
	Male leisure	Poor	Rich	Male leisure	Poor	Rich
	Poor	23.53	**24.71**	Poor	**45.86**	13.38
	Rich	20.00	31.76	Rich	22.29	18.47
Money-poor		Female leisure			Female leisure	
	Male leisure	Poor	Rich	Male leisure	Poor	Rich
	Poor	17.2	12.74	Poor	32.35	10.29
	Rich	22.93	**47.13**	Rich	**29.41**	27.94

Table 6.2
Distribution of leisure time dependent on the spouse's income regimes – public income

Male income		Female income	
	Money-poor	Money-rich	
Money-rich			Female leisure
		Male leisure	Poor Rich
		Poor	**39.57** 14.03
		Rich	23.74 22.66

Money-poor	Female leisure	
Male leisure	Poor	Rich
Poor	20.62	14.4
Rich	24.12	**40.86**