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35 hours and female labor supply:

A discrete women labor supply model with family allocation, fixed costs and taxation [1]

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Abstract:

The purpose of this paper is to develop and estimate a decision model of French single and married women labor supply in order to predict the impact of 35-hour working time reduction policy on females' professional choice. The estimation of the direct utility function takes into account taxation and discretisation of working hours.

We allow for hours restrictions and random preferences by using simulated mixed logit model. Results are based upon French Labor Force survey from the years 1997 and 2000. Elasticities and the impact of working time reduction experiment are simulated. We pointed out spouse's working time reduction can affect married women in different ways. Firstly through preferences (spouses leisure complementarity or substitution) and second, through the sharing rule (allocation process of household income).

Key words: **Labor supply, Intrahousehold allocation, Taxation, Simulated likelihood**
J.E.L. codes : **C35, D13, J22**

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1 Introduction

Some European Countries had recently experimented the reduction of full time employees initiated by government or by unions in order to reduced unemployment. In the 90's Germany, Italy, Netherlands, Belgium, Finland, Denmark had adopted different forms of work-sharing experiments (Hunt, 1998).

Since 1996, French governments have adopted various incentive measures to stimulate the reduction of working time in firms, with the view of creating new jobs. A rebate in social contributions has been awarded to firms that reduced voluntarily their working time. The law of January 19th 2000, called Aubry's law, Minister's name who initiated it, generalized the working time reduction (WTR) by fixing the legal weekly working time at 35 hours. This reduction applied first to firms with more than 20 employees and then to the others firms.

Almost all studies on standard working time reduction deal with demand side and analyzed the employment effect of such policy. Few studies outline the supply side effect of 35 hour experiment (Hunt, 1998 ; Bunel, 2005).

The present generalization of the 35 hours working week does not affect full time employees' welfare. Indeed, within a family labor supply framework, the 35 hours process affects both spouses. The increase of the nonemployed spouse's time can be used for domestic production and encourage the other spouse to increase his (her) employed working time (substitution effect). Moreover, if working time reduction affects negatively the worker's global revenue the household wealth fall, stimulating the reduction of all its members' consumption and leisure (income effect). Hunt (1998) by using a German panel found a negative relationship between wife's working hours and the husband working time reduction. Bunel (2005) analysed successively the effect of the 35 hour process on spouse's labour supply reduced form model. In a static specification he found that working time reduction reduces the spouse's working hours when he (she) works. In a dynamic specification, he found that it increases the spouse's probability to join the labour force when he (she) was outside of the labour market in the previous period.

Some recent empirical studies used French data to estimate the females professionnal choice. Blundell and Laisney (1988) and Lechene (1991) used Labor Force Survey from the year 1985, Lanot and Robin (1997) used the French Household Budget Survey from the year 1997 and Moreaux and Donni (2002) by using the wage of the year 1994 of the French part of European Household Panel. All of those papers used a continuous approaches by integrating taxes.

The purpose of this paper is to develop and estimate a decision model of French single and married women labor supply in order to predict the impact of 35-hour working time reduction policy on females' professional choice. The estimation takes into account taxation and discretisation of working hours. It is known that family composition, family status and political environment affect the female's labour supply more than men's. Moreover, in the majority of developped countries, male labor supply is fixed and defined by legal and socio-cultural norms. This differences in spouses' behivior has been analysed by Blundell et al. (2001), Donni (2002) and Donni and Moreau (2005). So we decide to focus only on female labour supply behavior. We assumed that only wife's hours of work can vary freely and the husband professional situation is fully constrained by the demand side and gives no information about the household decision process.

In the estimations a direct utility function is used. In the first part we deal with an individual specification. We allow for hours restrictions and random preferences by using simulated mixed logit model. Then as proposed by Vermeulen (2003) and Lise and Seitz (2004), we proposed a collective approach by introducing a sharing rule. Finally to take into account for unobserved heterogeneity of preferences we used the simulated mixed logit version (Train, 1998 ; 2003). Results are based upon French Labor Force survey from the years 1997 and 2000. Elasticities and the impact of working time reduction experiment are simulated. We pointed out spouse's working time reduction can affect married women in three different ways. Firstly through preferences (spouses leisure complementarity or substitution), second, through the sharing rule (allocation process of household income). The remainder of this paper is organized as follows. Section I describes the 35-hour working time reduction experiment. Section II presents the economic model and the French income tax system. Section III describes the empirical specification and the data used in the analysis. In Section IV we present the results, while Section V concludes the paper.

2 35-hour working time reduction

In France, during the last two decade the standard working time has changed twice. This evolution contrast with previous period from 1936 to 1982 where the standard working time has been constant and fixed at 40 hours per week. In 1982 the standard working time passed from 40 to 39 hours and in 2000 this threshold is reduced strongly from 39 to 35 hours.

In fact, in June 1998 in order to reduced unemployment the French government proposed a two-stage legislation process. The first Aubry law, Minister's name who initiated it, was passed to reduce the standard working time in the private sector on January 2000 for firms with more than 20 employees and on January 2002 for the remainders. To promote voluntary and decentralized working time reduction before these deadlines huge financial incentives were given to firms who reduce their actual working time by at least 10% and to increase their staff by at least 6%.

On January 2000, the second Aubry law imposed the 35 hours new standard working time for firms with more than 20 employees. It also fixed procedures of implementation such as overtime, annualized working time, minimum wage evolution, comptabilisation of working time of managerial and professional staff. In order to facilitate production costs control, a structural aid was proposed to firms that adopted 35 hours workweek. However, such an aid was unrelated to job creations. Firms who decided to stay at 39 hours per week did not receive the aid and has to pay overtime for 36th to 39th hour.

In this centralized working time reduction process, employees do not really bought the supplement of leisure. Unions involve in work-sharing have campaigned for maintain the monthly wage. This increased the hourly wage to compensate the lost hours.

In spite of public financial support, wage restraint and pay freeze were bargained to control the labor costs of the firms. In most of 35-hour firms, employees have maintained their monthly wage (more than 90% of the cases). But most of the 35-hour agreements include wage restraint clauses and the lose of some bonuses (around 70% of the cases). Moreover, reorganization and working time based on year allow to reduce sharply overtime premium.

The law of January 2003 relaxes the implementation of 35 hours working time reduction but not the principle. The standard working time is kept at 35 hours but the overtime regime is relaxed: the quota for overtime rose and the overtime premium rate decreased.

Note, in the French Labor legislation, the standard working time does not correspond to the maximum weekly working time but it is used to determine employee's overtime. Every working hour up to 35 hours should be paid from 25 % to 50 % more than the agreed hourly wage[2]. Moreover, firms have the possibility to figure out employee's overtime on a weekly base or the yearly basis. They can also counterpart overtime monetary or in kind (attribution of extra free days).

The evolution of the actual working time is not fixed by the standard working time. Empirical studies outlined the effect of working time reduction on actual hours is positive but in general the elasticity is less than 1 (Hunt, 1999). The actual working time depends on desired hours of workers and firms and on working time reduction bargaining process. Then is influenced by income effect, the share of part time workers, the overtime premiums, fixed costs per worker, the relation between productivity and workweek. At the end of the year 2001, 56% of full time employees worked in a 35 hour firm. We observe a huge difference between those who worked in a 35 hour firm with more than 20 employees (76%) and the others (21%).

3 The model

In this section we present different specifications of French females' professional choices. In this paper we consider a static neo-classical structural labor supply model. The data used in the empirical specification do not contain information on the individual allocation between saving and consumption. Then it is not possible do deal with a dynamic life cycle framework. In the first part, females are assumed to take their decision disregarded the intra household allocation of resources. Then a collective model is proposed to deal with this process. In the latter specification women are assumed to be the only decision-maker in the couple. The labor supply of married females is analysed conditional on hours worked by their husband.

3.1 Discretisation, standard working time and hours restrictions

An important feature in the French Labor market, since the end of the 70's, is the actual full time employee working hours is strongly linked to standard working time. Then, like in several European economy the available working hours are not continuous (Soest, 1995). Unlike the classical labor supply model, women are assumed have a finite number of professional alternatives.

This paper deals with a discrete choice approach to this institutional characteristic (Soest, 1995 ; Soest et al., 2002). We assume that each female can choose among a finite number of combinations of working hours. Define some set S that includes all potential female's choices and define J to be the number of elements in it including no participation. Let U_{ij} the female utility i chooses professional situation j. U_{ij} depends on expected utility V_{ij} and a random disturbance η_{ij}.

$$U_{ij} = V_{ij}\left(1 - h_{ij}, C_{ij}\right) + \eta_{ij} \quad (1)$$

[2]Note, since January 2002, firms with less than 20 employees have to pay a 10% over-time for 36th to 39th hour.

Female is assumed to consume only Hicksian private goods denoted C. The time endowment is normalized at 1. Preferences of females depend on own consumption and normalized leisure $(1 - h_{ij})$. h_{ij} is the working time corresponding to the choice j. Then the direct utility functions of a female i are:

$$V_{ij} = V\left(1 - h_{ji}, C_{ij}\right) \tag{2}$$

Functions V_{ij} are assumed to be increasing with consumption and leisure and strictly quasi-concave.

The stochastic error terms η_{nj} are i.i.d. according to the standard type I extreme value distribution. The probability that any female i chooses an element j in S_n is given by (Ben-Akiva and Lerman, 1985):

$$P_{ni}(j) = Pr(U_{nij} \geq U_{nik}, \forall k = 1, ..., J_n, k \neq j) \tag{3}$$

The consumption corresponding to the choice j depends on the net disposal income y_{ij}^d. This income is function of the family income other than the female's own earnings y_i, the gross hourly wage rate, w_i, assumed exogenous and independent of hours of work, and fiscal tax-benefit system. Because tax schedule depends on socio-demografic characteristics and total income, the budget constraint is no linear and take the following form:

$$y_{ij}^d = w_i h_i + y_i + T_i\left(Z_i, w_i h_i, y_i\right) \geq C_{ij} \tag{4}$$

3.2 Available job restrictions

Individuals are often restricted in choosing their working hours among all the available alternatives. Some firms for fixed cost considerations do not propose part time job, making for their employees such a working time infeasible. Others, like 35 hour firms, do not propose to their employees the possibility to make overtime by working over 35 hours. Actually, by taking into account demand side restrictions on working hours, each individual has a feasible choice set denoted by S_i and characterized by J_i feasible choices, with $J_i \leq J$. If it is possible to observe J according to the overall distribution of actual hours per week, but J_i is generally unknown.

However, empirical studies showed that model assuming unconstrained choice, $J_i = J \ \nabla i$, strongly overpredicte the number of part-time jobs (Dickens and Lundberg, 1993 ; Soest, 1995). The overprediction of part-time jobs may be due to a lack of jobs offering reduced hours. Given a lack of part time jobs searching for such a rare job causes higher costs for employees. An other interpretation is that in France a large part of part-time is not desired and imposed. To control such effect, we introduce like Soest (1995) an alternative-specific constant terms in the utility function (PT)[3].

We have already note that in France, the contractual working hours of full time employees are strongly linked to the standard working time. To take into account this institutional characteristic,

[3]However, as notice by Wolf (1998) the drawback of this specification is to assume that hour restrictions are the same for all individuals in labor force. She proposed an alternative specification to identify those part-time employees who do not work their desired hours. In fact, some people accept part-time job even if it is not utility maximizing because full-time job is not available. Then, she test the impact of an alternative-specific constant for those part-time employees. However, the problem it is she do not observe part-time constraint for non part-time employees. So we do not used this specification.

we must consider the lack of available jobs which working hours differ from standard hour. Then a dummy variable LD is introduced. This variable take the value 1 if an agreement of working time exists in the employee's firm. This term is introduced as a fixed cost may vary across individuals. ϕ_0^i linked to their firms characteristics mainly the size of the firm. In fact, in 2000, 35-hour firms are strongly concentrated in firms with more than 20 employees. In section 1, we outline that the working time reduction legislation is not the same according to the size of the firm. The new 35-hour standard working time is postponed at January 2002 for those with less than 20 employees. Then in 2000, few of them decided to anticipate this deadline. Less than 10% employees in firm with less than 20 employees are working in a 35-hour firm. More than 50% for those employed in firm with a staff over than 20.

So to control this huge difference, we introduce a dummy variable that show if the individual work in a less than 20 employees firm. This variable is noted $s20$. However such variable is observed only for working people of the sample. For the remainders, we have to estimate their firm size if they decided to inter in the labor market. A probit model with selection corrected is used (De Ven and Pragg, 1981).

$$LD = \pi_0^i LD \tag{5}$$

with

$$\pi_0^i = \pi_0 + \pi_1 s20$$

Two specifications are tested. Specification I assume $\pi_1 = 0$, Specification II has no restriction.

3.3 The French Tax and Benefit System

The women participation decision and wage elasticities are affected by tax-benefit system. In a model where taxation is ignored the predictions should be biased. So we incorporate it in our framework. The French tax-benefit system is quite complex and this section presents only the main features taking into account in our model. The household net income is determined by labor earnings, non-labor income and French tax and benefit system. The most important element in social benefit are child benefits (Allocations familiales, Allocation de parent isolé, Allocation pour jeune enfant, Allocation de rentrée scolaire, Complément familial), housing benefit (Allocation pour le logement, Allocation pour le logement familial) and welfare assistance (Revenu minimum d'insertion). Let present a short overview of these benefits (Bourguignon and Magnac, 1990). The child benefits depend on the number and the age of the children and on household's total income. The amount transferred to the household is progressively reduced. This causes a nonconvexity in the budget curve. The housing benefit is also a nonconvexity source. This benefits depends simultaneously on the rent paid by the household, is total income, and the family size. The welfare assistance is received by households whose income is below a certain limit. Its level depends on the number and the age of the household members, their earned and unearned incomes. To obtain the net earnings we have to take into account the social insurance premiums (Cotisations sociales, CSG et CRDS). A fixed percentage of gross earnings determined the contribution to health insurance, unemployment insurance and old-age pension.

In France couples have the choice between joint and separate filing of their income. But the "*quotient familial*" system give a strong incentive for joint filing. If TI is the household's taxable income, the income tax T is calculated as:

$$T = Nf(\frac{TI}{N}) \tag{6}$$

where $f(.)$ is the basic tax schedule and N is the number of adult-equivalents then children account for half (Note that for fertility incentive policy reasons, the third child accounts for a full adult). As in all country the French income tax schedule is progressive. Taxable labor income is the full income of the household minus deductions for work expenses and others deductions In order to determine the exact budget set for the different working hours alternatives various calculations are necessary. Only the features presented above where considered. We also assume that all married couples choose to split their income.

3.4 Collective specification

The preceding basic model does not take into account the intrahousehold bargaining process. The married women are assumed to take their decision disregarded the share of total household income they can used for private consumption. In this section, we relax this assumption. Spouses are involved in an intrahousehold bargaining process that determines the observed professional choices. However, we do not need any specific assumptions up to Pareto efficiency allocation about the precise way that couple share resources (Chiappori, 1988 ; 1992). In this paper we focus on female labor supply so as assumed by Vermeulen (2003), the labor supply of the husband, noted $\overline{1 - h_i^m}$, is fixed. Then, the household's program maximisation is:

$$\max_{c_i, h_i} \mu V^m \left(\overline{1 - h_i^m}, C_i^m\right) + (1 - \mu) V^f \left(1 - h_i^f, C_i^f\right) \tag{7}$$

with V^m and V^f egoist utility functions of spouses. C_i^m and C_i^f are private consumption. The budget constraint is:

$$C_i^f + C_i^m \leq w^f h^f + w^m \overline{h^m} + y_i + T_i \left(Z_i, w^f h^f, w^m \overline{h^m}, y_i\right) \tag{8}$$

By using the second welfare theorem, Chiappori (1988, 1992) showed that the intra household allocation problem can be simplified if spouses preferences are egoistic type, assuming the Pareto efficiency, by a two stage decision process. In the first stage, spouses share the non-labor income. In the second stage, each household's member chooses his or her own private consumption and leisure under the budget constraint fixed in the first stage.
However, we have to consider the share of the taxes between spouses. We noted in a previous section that French tax schedule is not individualized. So we must consider the intra household repartition of taxes. For that purpose we assumed that spouses share in a specific way the total amount of taxes. We consider spouses share the taxes related to the case where the wife do not participate to the labor market. We note $\overline{T}_i \left(Z_i, 0, w^m \overline{h^m}, y_i\right)$ this amount. Then we also assumed that wife pay the supplement of taxes associated to her professional decision. According to that

hypothesis married female pay the following amount of taxes[4]:

$$T_i\left(Z_i, w^f h^f, w^m \overline{h^m}, y_i\right) - \overline{T}_i\left(Z_i, 0, w^m \overline{h^m}, y_i\right) \tag{9}$$

Then as in the Chiappori's model the negotiation process is sequential. But the first stage is modified. In that period, given the husband working time, spouses decide how to allocate the non-labor income and $\overline{T}_i$. On the other hand, the second stage stays the same.

Let introduce $\phi(.)$ a function that determines the transfers made by the husband to his wife for her private consumption. This sharing rule depends on a different variables W that influence female's bargaining power in the couple. W included gross hour wage rate of both spouses, w^f and w^m, spouse wage ratio, $\frac{w^f}{w^f+w^m}$, non earning income, y, the 1997 year dummy, $d97$, the labor supply of the husband $\overline{h^m}$, and his situation according to 35 hours process, $m35$.

We can do the same for the share of taxes. If $\overline{1-h_i^m}$ is fixed, then the female maximization program conditional to her husband working time becomes:

$$\max_{c_i,h_i} V^f\left(1-h_i^f, C_i^f\right) \mid \overline{V^m}\left(\overline{1-h_i^m}, C_i^m\right) \tag{10}$$

Her budget constraint is:

$$w^f h^f + T_i\left(Z_i, w_i h_i, w^m \overline{h^m}, y_i\right) - \overline{T}_i\left(Z_i, 0, w^m \overline{h^m}, y_i\right) + \phi(W) \geq C_{ij}^f \tag{11}$$

and

$$w^m h^m + \overline{T}_i\left(Z_i, 0, w^m \overline{h^m}, y_i\right) - \phi(W) \geq C_{ij}^m \tag{12}$$

C_i^f and C_i^m have to be between zero and y_{ij}^d.

For more generalization, we can deal with a more general female utility function linked by her husband working time. If we substitute V^f by $V^f\left(1-h_i^f, \overline{1-h_i^m}, C_i^f\right)$, it is still possible to decentralized this program (8). Note that would not be the case if the male utility function depends on his wife's working time. Then the program maximization is[5].:

$$\max_{c_i,h_i} \mu V^m\left(\overline{1-h_i^m}, C_i^m\right) + (1-\mu) V^f\left(1-h_i^f, \overline{1-h_i^m}, C_i^f\right) \tag{13}$$

According to equation (6), (11) and (12), spouse's working time reduction can affect married women in three different ways. Firstly through preferences. If spouses' leisure are complement, working time reduction will incite females to work less and more if their substitute. Second, through the allocation of income in the household. If working time reduction generate a reduction (increase) in the share recovered by the women such change stimulate her to increase (reduced) her working time.

To identify all of this three effects it is necessary to obtain an estimate of the sharing rule. But the main problem of such a collective specification is that the model is not uniquely identified. Two kinds of households are taking into consideration: singles and married females. For identification purpose we have to assume that single females have the same preferences as female in couple. This standard hypothesis appear quite restrictive but it is relaxed by heterogeneity specification.

[4]Note Vermeulen assumed $\phi(W)\, y_{ij}^d \geq C_{ij}^f$ is not coherent with collective model and Lise et al. (2004) assumed $w_f h^f + \phi(W)\, y_{ij}^d \geq C_{ij}^f$ is not tractable with the none individualized French tax schedule where the amount of taxes depends on working hours and income of both spouses.

[5]see Laan et ali. (2002)

4 Econometric specification

Let present the empirical specification to test the above structural model.

4.1 Utility function

A direct utility function in which utility depends on working hours h and net income $y^d - LD$. We note U_{ij} the women i's utility levels associated with each of the available hours choices j. Individual is assumed to choose that one which holds the highest utility.

A flexible direct utility function is used to determine the preferences of women:

$$\begin{aligned} U_{ij} &= \beta_1^i h_{ij} + \beta_2 (h_{ij})^2 + \beta_3 \left(y_{ji}^d - LD_{ij}\right) + \beta_4 \left[\left(y_{ij}^d - LD_{ij}\right) h_{ij}\right] + \beta_5 TP_{ij} + \eta_{ij} \\ U_{ij} &= V\left(h_{ij}, \left(y_{ji}^d - CF_{ij}\right)\right) + \eta_{ij} \end{aligned} \tag{14}$$

To take into account preferences variation across individuals, we assume β_1^i depends on family characteristics X_i, such as age, education, the number and the age of children.

$$\beta_1^i = \beta_{10} + \beta_1 X_{1i}$$

The model implies the standard restrictions on the female's utility function. The function must be monotone increasing in consumption and monotone decreasing in labor supply. Moreover, the function have to be quasi-concave. Then, following restrictions on the parameters have to hold:

$$\begin{aligned} \beta_3 + \beta_4 h_{ij} &> 0 \\ \beta_{10} + \beta_1 X_{1i} + 2\beta_2 h_{ij} + \beta_4 \left(y_{ij}^d - LD_{ij}\right) &< 0 \\ 4\beta_2 - (\beta_4)^2 &> 0 \end{aligned}$$

There is some discussion in the way to choose the number of available working hours. Hoynes used only three points (not working, working part-time and working full-time). Soest (1995), Soest and Das (2000) and Soest et al. (2002) tested the sensitivity of the results for the chosen number of points. They found little differences according to a modification of such a number. For identification the number of choices have to be larger than 3. According to observed working hours we take 5 alternatives. Then, if female enters the labor market, and chooses one of the 5 available hours alternatives $h \in (1, 2, 3, 4, 5)$ the utility is:

$$U_{ih} = \beta_1 h_{ih} + \beta_2 (h_{ih})^2 + \beta_3 \left(y_{ih}^d - LD_{ih}\right) + \beta_4 \left[\left(y_{ij}^d - LD_{ij}\right) h_{ij}\right] + \beta_5 TP_{ij} + \eta_{ij} \tag{15}$$

If female decides to not participate at the labor market her utility becomes:

$$U_{i0} = \beta_3 y_{i0}^d + \eta_{i0} \tag{16}$$

The probability of woman i chooses alternative j in S_i is given by:

$$P_i(j) = Pr(U_{ij} \geq U_{ik}, \forall k = 1, ..., J_i, k \neq j) \tag{17}$$

If the disturbances η are i.i.d. with type I extreme value distribution then:

$$P_i(j) = \frac{exp(V\left(h_{ij}, \left(y^d_{ji} - LD_{ij}\right)\right))}{\sum_{k=0}^{5} exp(V\left(h_{ik}, \left(y^d_{jk} - LD_{ik}\right)\right))} \qquad j = 0, ..., 5 \tag{18}$$

To analyze the impact of husband's working time on in couple female preferences we introduce an interaction variable between female and her husband working time (h^m), and the situation of his firm according to working time reduction. Those variables reflect the complementarity or the substitution between spouses leisure. It assumes to vary according the presence of a child under the age of 6 in the household. So β_1^i becomes:

$$\beta_1^i = \begin{cases} \beta_{10} + \beta_1 X_i & \text{for singles} \\ \beta_{10} + \beta_1 X_i + \beta_{12} h_i^m + \beta_{13}\left(h_i^m * child6\right) + \beta_{14}\left(wtr^m\right) & \text{for couples} \end{cases} \tag{19}$$

4.2 Wage equation

Wages are not observed for non-working individuals. In order to obtain available income associated to each professional decision, we have to estimate the gross hourly wage. Then all wages are replaced by predictions. Prediction errors are not controlled for computationally burdensome. Such a control can be achieved by integrating out the disturbance term of the wage equation in the likelihood (Soest, 1995). To determine the net income of each available working hours we assumed that the gross hourly wage rate does not depend on hours worked.

The Heckman's (1979) selection corrected wage equation is used. However, this approach implied that wages are estimated outside of the structural model. MaCurdy, Green and Paarsch (1990) suggested an alternative option. They assumed a joint distribution for tastes for work and wages. However, by taking into account taxes, this approach is not very convenient. As Soest (1995) and Blundell et al. (2001) the selection corrected wage procedure is applied.
A standard human capital approach to wages is used. Let lnW^t denotes the natural logarithm of the wage rate for individuals at the period t:

$$lnW_i^t = \beta^t X_i^t + u_i^t \text{ with } t = (1997, 2000) \text{ and } i = 1, ..., N \tag{20}$$

X_i^t are vectors of explaining variables such as:

$$X_i^t = \left(couple_i^t, FN_i^t, educ_i^t, age_i^t, (educ_i^t)^2, (age_i^t)^2, (age_i^t)^3, age_i^t * educ_i^t, dip_i^t * (age_i^t)^2\right)$$

The variable *age* is the age in year of the individual, *educ* is the higher education level, *couple* is equals to 1 if the individual is married and 0 otherwise and FN equals 1 if the individual has the French nationality and 0 otherwise.

The selection equation is:

$$\alpha_i^t Z_i^t + v_i^t > 0 \text{ with } t = (1996, 1999) \tag{21}$$

Z_i^t are vectors of explaining variables.

$$(couple_i^t, FN_i^t, couple_i^t * FN_i^t, educ_i^t, age_i^t, (educ_i^t)^2, (age_i^t)^2, age_i^t * educ_i^t, y)$$

For identification purpose at least one parameter in Z_i^t is not in X_i^t. Note that neither wages nor selection do not depend on spouse's characteristics. (v^t, u^t) are assumed to have normal bivariate density with $var\,(u^t) = \sigma_u^t$, $var\,(v^t) = 1$ and $cov\,(v^t, u^t) = \rho^t$ and means 0. The two step Heckman's estimations are used to estimate β^t, α^t, σ^t and ρ^t for each period $t = 1997, 2000$. The selection equations are estimated by a probit model. Then wage equations are estimated by OLS introducing Mill's ratio and by using usual consistent estimated covariance matrix.

4.3 Heterogeneity

Equations (15) assumed that β_1^i depend on observed characteristics. We also included unobserved characteristics reflecting unobersed heterogenity of preferences. So β_1^i becomes:

$$\beta_1^i = \begin{cases} \beta_{10} + \beta_1 X_i + \upsilon_1 & \text{for singles} \\ \beta_{10} + \beta_1 X_i + \beta_{12} h_i^m + \beta_{13}\,(h_i^m * child6) + \beta_{14}\,(wtr^m) + \upsilon_2 & \text{for couples} \end{cases} \tag{22}$$

where $\upsilon = (\upsilon_1, \upsilon_2)$ are distributed with density f$(\upsilon|\theta)$, where θ refers to fixed parameters of the distribution means and variance covariance. We assume a normality distribution:

$$\upsilon = (\upsilon_1, \upsilon_2)' \sim N(0, \Omega) \tag{23}$$

Ω is the covariance matrix:

$$\Omega = \begin{pmatrix} \sigma_1^2 & \sigma_{12} \\ \sigma_{12} & \sigma_2^2 \end{pmatrix} \tag{24}$$

To make the model more convenient for simulation, we introduce P an upper triangular matrix Cholesky factor of Ω with $\Omega = PP'$ and:

$$P = \begin{pmatrix} c_1 & 0 \\ c_2 & c_3 \end{pmatrix} \tag{25}$$

By introducing equations (23) in the utility function (15) the individual's utility is decomposed in a nonstochastic part, a stochastic part that may be correlated over choices and heteroskedastic and a pure stochastic part that is *i.i.d.* over choices and individuals. Thus change in the utility function gives rise to relax the restrictive Independence from Irrelevant Alternatives (IIA) property associated to the conditional logit model. In fact, utilities take the following form:

$$\begin{aligned} U_{ij} \;&=\; \beta_{10} h_{ij} + \beta_1 h_{ij} X_i + \beta_2\,(h_{ij})^2 + \beta_3\left(y_{ji}^d - LD_{ij}\right) + \beta_4\left(\left(y_{ij}^d - LD_{ij}\right) h_{ij}\right) + \beta_5 TP_{ij} \\ &\quad + \upsilon h_{nij} + \eta_{ij} \end{aligned} \tag{26}$$

Or more compactly:

$$\begin{aligned} U_{ij} = \;& \beta f(h_{ij}, y_{ij}^d, LD_{ij}, X_i) \\ & + \upsilon_{ij} + \eta_{nj} \end{aligned} \tag{27}$$

Then we have to deal with the following mixed logit likelihood function:

$$LnL = \int_{-\infty}^{+\infty} \sum_{n=1}^{N} \sum_{j=1}^{J_n} y_{in} ln(P_n(i)) f(\upsilon|\theta) d\upsilon \tag{28}$$

Exact maximum likelihood estimation cannot be calculated analytically. Instead, we approximate by using simulated log-likelihood function (Revelt and Train, 1998 ; Train, 2003). Then, probabilities are approximated by summation over randomly chosen values θ. A value of υ is drawn from $f(\upsilon|\theta)$ density and label $\upsilon^{r|\theta}$ with the superscript r refers the r^{th} drawn. Then with this drawn the logit formula is calculated. This process is repeated for R draws and the average is taken as the approximate of choice probability:

$$SP_{nij}(\theta) = \frac{1}{R} \sum_{r=1}^{R} \frac{exp(\beta f(h_{ij}, y_{ij}^d, LD_{ij}, X_i) + \upsilon^{r|\theta})}{\sum_{j=1}^{J} exp(\beta f(h_{ij}, y_{ij}^d, LD_{ij}, X_i) + \upsilon^{r|\theta}))} \quad (29)$$

The simulated log likelihood function is constructed as:

$$SLL_\theta = \sum_{n=1}^{N} \sum_{j=1}^{J_n} d_{nj} SP_{nj}(\theta) \quad (30)$$

where $d_{nj} = 1$ if n choose j and zero otherwise. To obtain an estimator asymptotically equivalent to the maximum likelihood estimator different draws are taken for each observation and the number of repetitions rises faster than the square root of the number observation.

According to Revelt and Train (1998) and Train (2003) is more efficient to use draws from a Halton sequence than random draws. The Halton sequences are created by dividing a unit interval into N parts. Then each part is again divided by N parts and so on.

5 Empirical results

5.1 Data

We use data from the "*Labor Force Survey*" (enquête emploi) form the years 1997 and 2000. These representative data were collected by the French statistical institute (Insee). They included detailed information on professional situation (working time per week, gross wage and job characteristics), socio-demographic characteristics (age, number and age of children, area localization, marital status)[6]. However, non earnings and tax and benefits are not available in this survey. Then, we matched those data with administrative files on taxation ("revenus fiscaux") for the years 1997 and 2000[7]. Note the administrative files on taxation matches only 1/3 of the Labor Force Survey for the year 1997. That explain their is less observations for such a year in our final sample.

We focus on married and single females aged between 25 and 55 to avoid the problem of students with a few-hour-job and retired individuals. Self employed and households with negative or huge level of non-labor income are excluded. In that sample there is 6,000 single women (with or without child) and 22,000 married women (with or without child). Single women live more often in huge cities and in the Paris area than the others.

Table 2 presents basic descriptive statistics for our sample. We observe that women in couple tend to work fewer hours than single ones. In average, the former work 3 hours less than the follower.

[6]The data of the Labor Force Survey were obtained from the Lasmas (www.iresco.fr/labos/lasmas/enquetes.htm)

[7]We are grateful to Cyrille Hagnière for helping us on the calculation of after tax available income.

Figures (1) and (2) provide the actual working hours for single and married females for the years 1997 and 2000. For both single and married women, we observed two peaks in 1997 and three peaks in 2000. They correspond to non working decision, working 39-hour per week and 35-hour per week. Institutional constraints affected also the working hours of part-time job. In fact, 80% and 50% of full time are options more frequently offered by firms for those jobs.

The discretisation is based on the observed peaks of the distribution of actual hours per week. 6 points $H = 0, 20, 30, 35, 39, 43$ are selected. They respectively correspond to non participation and intervals [1-25[, [25-33[, [33-38[, [38-41[, and 41 and over. The proportion of females in each points are given in table 1.
The hourly wage is calculated by using the two information available in the sample: the usual net monthly wage and the usual hours of work per week (including overtime).

The analysis of the simulated household's net income according to working time variation shows clearly the budget constraint is convex for most of the sample (57 %).

Table 1:

	All sample		Married women		Single women	
Women's labor supply	1997	2000	1997	2000	1997	2000
No participation	33.8%	31.4%	35.1%	32.5%	28.1%	27.5%
Small part time employee (]0-25])	9.9%	9.8%	10.4%	10.3%	8.1%	8.1%
Part time employee (]25-33[)	12.1%	13.5%	12.6%	14.4%	9.8%	10.4%
35 hours full time employee ([33-38[)	4.1%	15.0%	4.1%	14.4%	4.1%	16.9%
39 hours full time employee ([38-41[)	34.9%	24.9%	33.3%	23.5%	41.5%	29.8%
Over 39 hours full time employee	5.2%	5.4%	4.4%	4.9%	8.4%	7.3%
Number of obs.	6,955	21,937	5,604	17,132	1,351	4,805

The descriptives statistics are presented in Table 2.

Table 2: Descriptive statistics

Sample statistics	All sample		Married women		Single women	
Variable (description)	Mean	s.t	Mean	s.t	Mean	s.t
Working time						
hw: *working hours per week, women*	20.6	18.6	19.8	12.3	23.51	18.6
hm: *working hours per week, husband*	-	-	35.7	12.3	-	-
dstm: *dummy working 35 hours in 2000, husband*	-	-				
Income						
wbw: before tax hourly wage rate, women (euros)	8.06	1.88	8.06	1.83	8.11	2.01
wbm: before tax hourly wage rate, husband (euros)	-	-	8.96	2.23	-	-
yd: *after tax available income (euros)*	21, 163.9	14, 475.7	23, 314.1	7, 355.2	13,175.7	5,178.1
Socio-demographic						
agew: *age, women*	39.0	8.0	38.6	7.8	40.6	8.5
agem: *age, husband*	-	-	40.6	7.9	-	-
edw: *education level, women ; 1: low, 6 high*	3.0	1.6	3.0	1.6	3.0	1.7
edm: *education level, husband ; 1: low, 6 high*	-	-	3.0	1.6	-	-
nch: *number of children*	1.17	1.1	1.3		0.6	
dch6: *dummy children younger than 6*						
dcz3: *dummy city size less 0.02 million*	0.26		0.30		0.14	
d97: *dummy year 1997*	0.76		0.75		0.78	
dm: dummy married women	0.79		-		-	
Number of obs.	28,892		22,736		6,156	

5.2 Results

The different columns of the table 4 report the estimates of the various specification model for female labor supply. Model I is the basic one, model II and III deal with the ML estimates. The latter include 35-hour job restriction.

In the linear labor supply framework MaCurdy et al. (1990) outline that if quasi-concavity or monotonicity is imposed, the labor supply cannot be backward bending and the estimate limit the range of elasticities. In the discretisation specification of labor supply, Soest et al. (2002) , show that quasi-concavity of preferences is sufficient but not necessary to guarantee the coherency of the model. Then quasi-concavity and monotonicity are not impose a priori but are observed ex post. To analyzed the quality of the different specifications, the table 3 presents their log-likelihoods, their Akaike Information Criterion value and their LR test.

Table 3: Fit of the model

Insert table 3

Table 4: Estimations results of the structural labor supply models

Insert table 4

Table 5: Estimations results of the structural labor supply models

Insert table 5

5.3 Predictions and Elasticities

To determine the predicted choices of the different specifications of the model we use the accept-reject simulator. The estimates $\widehat{\beta}$ allow to calculate the deterministic part of the utilities (XX). To determine the predicted choices we have to determine the stochastic part of the utility of each choice. For that purpose we draw in a type I extreme value (Weibull) distribution some series of pseudo residuals $\widehat{\eta}_{ij}$ for $i = 1, ..., N$, and $j = 1, ...; J$. The *c.d.f.* of a Weibull distribution is $F(\eta) = \exp(-\exp(\eta))$. Then a drawn x in a random distribution (Halton serie) gives a pseudo-residual $\widehat{\eta}_{ij} = -\ln(-\ln(x))$. For each draw we determine whether the simulated utilities of each choices would imply alternative j being chosen. The simulated probability is the proportion of draws that are accepts. Let define an indicating variable I_j^r such as:

$$\begin{array}{lll} I_{ij}^r = 1 & \text{if} & \widehat{U}_{ij}^r > \widehat{U}_{ik}^r \\ I_{ij}^r = 0 & \text{otherwise} & \end{array} \tag{31}$$

So, we first calculate

$$\widehat{U}_{ij}^r = V\left(h_{ij}, \left(y_{ji}^d - LD_{ij}\right)\right) + \widehat{\eta}_{ij}^r \tag{32}$$

Then, the simulated probability is calculated as follow:

$$\widehat{P}_i(j) = \frac{1}{R}\sum_{r=1}^{R} I_{ij}^r \tag{33}$$

We fixe R at 300 for the calculation of each simulated probability.

Table 6a: Predictions of the model

Insert table 6a

Table 6b: Predictions of the model

Insert table 6b

Table 7: Change in average work hours and in average participation rate

Insert table 7

6 Simulations on 35-hours

The collective model used in these paper is that it is able to identify the implication of de diffusion of 35-hour reduction in the economy. We simulated the consequence of working time reduction policy by calculating the pre and post reform hours choices. The structural model allow to identify the way of such a modification.

According to the structural framework, spouse's working time reduction can affect married women in different ways. Firstly through preferences, if leisure of spouses are complement working time reduction will incite females to work less and more if their substitute. Second, through the allocation of income in the household. If working time reduction generate a reduction (increase) in the share recovered by the women such change stimulate her to increase (reduced) her working time.

In progress

7 Conclusion

The purpose of this paper is to develop and estimate a decision model of French single and married women labor supply in order to predict the impact of 35-hour working time reduction policy on females' professional choice. The estimation takes into account taxation and discretisation of working hours.

In the estimations a direct utility function is used.. We allow for hours restrictions and random preferences by using simulated mixed logit model. Then as proposed by Vermeulen (2003) and Lise and Seitz (2004), we proposed a collective approach by introducing a sharing rule. Finally to take into account for unobserved heterogeneity of preferences we used the simulated mixed logit version (Train, 1998 ; 2003).

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9 Appendix 1: Estimation results of wage and participation equations

Table A1: Gross hourly wage rate and participation decision

	Year 1997				Year 2000			
	Log wage equation		Participation equation		Log wage equation		Participation equation	
	coeff.	s.t.	coeff.	s.t.	coeff.	s.t.	coeff.	s.t.
constant	3.766	0.678	-2.619	0.524	3.755	0.387	-3.643	0.295
edw	-0.431	0.077	0.584	0.084	-0.422	0.044	0.658	0.049
agew	0.016	0.050	0.061	0.023	0.020	0.027	0.095	0.013
$(\text{edw})^2$	0.025	0.002	-0.022	0.007	0.022	0.001	-0.021	0.004
$(\text{agew})^2$	-0.001	0.001	-0.000	0.000	-0.001	0.001	-0.001	0.000
$(\text{agew})^3$	0.000	0.000	-	-	0.000	0.000	-	-
agew × edw	0.015	0.004	-0.004	0.001	0.015	0.002	-0.005	0.001
edw × $(\text{age})^2$	-0.001	0.000	-	-	-0.001	0.000	-	-
fnw	0.013	0.025	0.238	0.149	0.039	0.014	0.446	0.075
dm	0.039	0.017	-0.622	0.158	0.025	0.006	-0.234	0.080
fnw × dm	-	-	0.432	0.163	-	-	0.065	0.083
yd	-	-	-0.731	0.147	-	-	-0.433	0.050
$(\text{yd})^2$	-	-	0.260	0.101	-	-	0.024	0.007
σ^2	0.323	0.007			0.309	0.005		
ρ	-0.499	0.069			-0.395	0.068		
N	6956				21939			
Wald test	1343.7***				3605.2***			
Pseudo R2			0.08				0.10	
Log likelihood	-5099.4				-15395.9			

Explanation:
fnw: French Nationality

σ^2 : standard deviation of the error term in the wage equation

ρ : correlation coefficient between the error terms in the participation equation and the wage equation

9.1 Appendix 2: Reduced forms

Equations (XX), () and () can be expressed in reduced form for singles:

$$
\begin{aligned}
U_{ij}^{s} &= \Pi_0^s h_{ij} + \Pi_1^s y^d + \Pi_2 y^d h_{ij} + \Pi_3 h_{ij} X_i + \Pi_4 (h_{ij})^2 + \Pi_5 TP_{ij} \\
&\quad + \Pi_{60} wtr^w + \Pi_{61} wtr^w h_{ij}
\end{aligned}
$$

$$\Pi_{61} = \Pi_{60}\Pi_2/\Pi_1$$

with

$$
\begin{array}{lll}
\Pi_0 = \beta_{10} & \Pi_1 = \beta_3 & \Pi_2 = \beta_4^s \\
\Pi_3 = \beta_1^s & \Pi_4 = \beta_2^s & \Pi_5 = \beta_5^s \\
\Pi_6 = \pi_0^s & &
\end{array}
$$

The reduced form for married individuals is:

$$
\begin{aligned}
U_{ij}^{c} &= \Pi_0^c h_{ij} + \Pi_1^c y_{ji}^f + \Pi_7 y_{ji}^f h_{ij} + \Pi_8 h_{ij} X_i + \Pi_9 (h_{ij})^2 + \Pi_{10} TP_{ij} \\
&\quad + \Pi_{110} y_i + \Pi_{120} W_i y_i \\
&\quad + \Pi_{111} y_i h_{ij} + \Pi_{121} W_i y_i h_{ij} \\
&\quad + \Pi_{130} wtr^w + \Pi_{131} wtr^w h_{ij}
\end{aligned}
$$

For identification purpose we impose:

$$
\begin{aligned}
\Pi_0^c &= \Pi_0^s \\
\Pi_1^c &= \Pi_1^s
\end{aligned}
$$

with

$$
\begin{array}{lll}
\Pi_7 = \beta_4^c & \Pi_8 = \beta_1^c & \Pi_9 = \beta_2^c \\
\Pi_{10} = \beta_5^c & \Pi_{110} = \beta_3 \phi_0 & \Pi_{120} = \beta_3 \phi \\
\Pi_{130} = \pi_0^c & &
\end{array}
$$

The collective model implies the following over-identifying restrictions:

$$
\begin{aligned}
\Pi_{111} &= \Pi_{110}\Pi_7/\Pi_1 \\
\Pi_{111} &= \Pi_{110}\Pi_7/\Pi_1 \\
\Pi_{131} &= \Pi_{130}\Pi_7/\Pi_1
\end{aligned}
$$

Table 3: Fit of the model

Specification	# parameters	Log likelihood	AIC	LR test	Quasi-concavity	Sharing rule between 0 and 1	Positive marginal utility according to total income	Negative marginal utility according to working hours
Model I	32	-21 051	3,23	280***	100%	95,3%	39%	81%
Model II	35	-21 011	3,22	314***	100%	95,7%	39%	83%
Model III	37	-20 734	3,18	910***	100%	95,4%	39%	87%

* LR test is performed where the constrained log-likelihood has only choice specific constants

Table 4: Estimations results of the reduced form of the structural labor supply models

	Model I		Model II		Model III	
	coef	Sdt	coef	Sdt	coef	Sdt
Single's parameters						
$\Pi_0 = \beta_{10}$	-3,711***	0,376	-3,774***	0,386	-3,841***	0,411
$\Pi_1 = \beta_3$	12,454***	2,128	12,360***	2,143	12,891***	2,210
$\Pi_2 = \beta_4^s$	-8,227***	0,696	-8,386***	0,700	-8,164***	0,714
	-0,243***	0,023	-0,247***	0,024	-0,255***	0,025
	2,008***	0,188	2,048***	0,192	2,102***	0,202
$\Pi_3 = \beta_1^s$	2,970***	0,158	3,006***	0,160	3,032***	0,168
	-0,008	0,052	-0,009	0,052	0,002	0,054
	-0,040**	0,017	-0,040**	0,017	-0,045***	0,018
	-0,083**	0,043	-0,080**	0,043	-0,195***	0,044
$\Pi_4 = \beta_2^s$	-0,357***	0,085	-0,422***	0,105	-0,511***	0,113
$\Pi_5 = \beta_5^s$	-1,083*	0,062	-1,114***	0,072	-1,128***	0,081
$\Pi_6 = \pi_0^s$					-1,799***	0,352
married's parameters						
$\Pi_7 = \beta_4^c$	-17,503***	3,546	-17,560***	3,638	-18,124***	3,787
	-0,194***	0,026	-0,199***	0,027	-0,197***	0,028
	1,523***	0,200	1,554***	0,208	1,540***	0,222
	3,108***	0,224	3,212***	0,244	3,371***	0,273
$\Pi_8 = \beta_1^c$	0,020	0,127	0,015	0,132	0,027	0,142
	-0,058	0,044	-0,062	0,045	-0,082**	0,048
	-0,053***	0,012	-0,054***	0,012	-0,052***	0,013
	-0,121	0,137	-0,116	0,142	-0,257	0,150
	0,467***	0,063	0,480***	0,066	0,487***	0,072
	-0,276***	0,070	-0,285***	0,073	-0,292***	0,079
	0,323*	0,174	0,340*	0,180	0,198	0,199
$\Pi_9 = \beta_2^c$	0,147	0,166	0,077	0,180	0,023	0,191
$\Pi_{110} = \beta_3\phi_0$	1,400	5,979	1,480	6,130	1,589	6,616
	-3,988***	1,850	-4,052***	1,937	-4,368**	2,026
	-2,173	4,776	-2,092	4,893	-1,842	5,273
	1,775	4,225	1,750	4,330	1,574	4,665
$\Pi_{120} = \beta_3\phi$	10,430	12,680	10,475	13,007	10,835	14,036
	-6,672***	2,015	-6,743***	2,040	-7,160***	2,172
	2,060*	1,169	2,128*	1,206	1,928	1,295
	-0,602	0,808	-0,585	0,825	-0,736	0,883
$\Pi_{10} = \beta_5^c$	-0,748***	0,062	-0,749***	0,071	-0,708***	0,083
$\Pi_{130} = \pi_0^c$					-0,971***	0,283
Heterogeneity parameters						
$P = \begin{pmatrix} c_1 & 0 \\ c_2 & c_3 \end{pmatrix}$			-0,356***	0,118	-0,514***	0,116
			-0,404***	0,112	-0,651***	0,110
			-0,241***	0,108	-0,355***	0,107

Table 5: Sharing rule and spouses leisure complementarity or substitution (Standard errors are constructed using the delta method)

	Model I		Model II		Model III	
	coef	Sdt	coef	Sdt	coef	Sdt
Utility preferences						
hw						
… * hm	0,467***		0,480***		0,487***	
… * hm*dch6	-0,276***		-0,285***		-0,292***	
… * wtr^{m}	0,323*		0,340*		0,198	
Sharing rule						
Constant	0,112		0,120		0,123	
y	-0,320		-0,328		-0,339	
wbw	-0,174		-0,169		-0,143	
wbm	0,143		0,142		0,122	
wbw / (wbw + wbm)	0,837		0,847		0,841	
earn capacity	-0,536		-0,546		-0,555	
wtr^{m}	0,165		0,172		0,150	
D2000	-0,048		-0,047		-0,057	
$\Omega = \begin{pmatrix} \sigma_1^2 & \sigma_{14} \\ \sigma_{14} & \sigma_{24}^2 \end{pmatrix}$			0,127	0,144	0,264	0,335
			0,144	0,221	0,335	0,550

Table 6a: Predictions of the model (Singles)

	Actual	Model I	Model II	Model III
No participation	27,6%	17,6%	20,0%	22,3%
Small part time employee (]0-20])	8,1%	10,5%	11,3%	11,4%
Part time employee (]20-35]	10,3%	10,8%	12,7%	12,2%
35 hours full time employee	14,1%	17,7%	16,5%	16,0%
39 hours full time employee	32,4%	21,8%	20,2%	19,4%
over 39 hours full time employee	7,6%	21,6%	19,4%	18,7%

Year 1997 only	Actual	Model I	Model II	Model III
No participation	28,1%	16,9%	19,5%	21,4%
Small part time employee (]0-20])	8,1%	10,5%	11,3%	11,8%
Part time employee (]20-35]	9,8%	10,8%	12,7%	12,5%
35 hours full time employee	4,1%	18,2%	16,6%	16,3%
39 hours full time employee	41,5%	22,0%	20,4%	19,7%
over 39 hours full time employee	8,4%	21,6%	19,5%	18,4%

Year 2000 only	Actual	Model I	Model II	Model III
No participation	27,5%	17,8%	20,1%	22,6%
Small part time employee (]0-20])	8,1%	10,5%	11,3%	11,3%
Part time employee (]20-35]	10,4%	10,8%	12,7%	12,1%
35 hours full time employee	16,9%	17,6%	16,4%	16,0%
39 hours full time employee	29,8%	21,7%	20,1%	19,4%
over 39 hours full time employee	7,3%	21,6%	19,4%	18,7%

Table 6b: Predictions of the model (Married women)

	Actual	Model I	Model II	Model III
No participation	33,6%	24,0%	27,2%	30,5%
Small part time employee (]0-20])	10,3%	10,8%	12,9%	12,5%
Part time employee (]20-35]	13,5%	10,7%	12,9%	12,1%
35 hours full time employee	11,8%	14,9%	13,4%	14,0%
39 hours full time employee	26,1%	19,3%	16,6%	16,1%
over 39 hours full time employee	4,8%	20,2%	17,1%	14,8%

Year 1997 only	Actual	Model I	Model II	Model III
No participation	35,1%	24,1%	27,4%	30,5%
Small part time employee (]0-20])	9,5%	10,9%	12,9%	12,9%
Part time employee (]20-35]	13,5%	10,7%	12,9%	12,3%
35 hours full time employee	4,6%	14,9%	13,3%	14,1%
39 hours full time employee	33,2%	19,3%	16,6%	16,0%
over 39 hours full time employee	4,2%	20,2%	17,0%	14,2%

Year 2000 only	Actual	Model I	Model II	Model III
No participation	33,1%	24,0%	27,1%	30,5%
Small part time employee (]0-20])	10,5%	10,8%	12,9%	12,4%
Part time employee (]20-35]	13,5%	10,7%	12,9%	12,0%
35 hours full time employee	14,1%	14,9%	13,4%	14,0%
39 hours full time employee	23,8%	19,3%	16,6%	16,2%
over 39 hours full time employee	5,0%	20,3%	17,1%	15,0%

Table 7: Change in average work hours and in average participation rate

Increase of 100% of the hourly wage	Model I	Model II	Model III
For singles			
Change in average work hours	-4,4%	-4,0%	-4,9%
Change in average participation rate	-0,9%	-1,0%	-1,4%
For married women			
Change in average work hours	-52,2%	-57,4%	62,6%
Change in average participation rate	-43,0%	-45,0%	46,0%