Do Men Care?

Estimating men's preferences for spending time with their children

Andreassen Leif[1], Di Tommaso Maria Laura[2], Maccagnan Anna[3]

Abstract

Is men's time used on child care and household work the result of preferences or cultural, institutional, and economic restrictions? We can observe men's choices but not their opportunities. Using a random utility model together with stochastic specifications of the probability of having different opportunities, the paper shows that it is possible to distinguish between preferences and opportunities. Utilising Spanish data, we find that even though men do relatively little childcare, it is important to them. So, men do care to care. Our estimates show that about 58% of men are restricted to a low level of care and housework. Many of these would not change behaviour if there were no restrictions, but about 20 % more men with children would choose to provide more child care and housework if there were no restrictions.

Keywords: household production, random utility models, time use, capabilities.

JEL: C25, D13, J13

Acknowledgements

The project has been carried out thanks to the "Progetto di Ateneo 2012" grant scheme funded by Compagnia di San Paolo. We are very grateful for the valuable work done by Marco Fuscaldo on the data.

Data come from the Multinational Time Use Study (MTUS), but the interpretation of the data and other views expressed in this text are those of the author. This text does not necessarily represent the views of the MTUS team or any agency which has contributed data to the MTUS archive. The author bears full responsibility for all errors and omissions in the interpretation of the MTUS data.

[1] Research Department, Statistics Norway, Oslo. leif.andreassen@ssb.no

[2] Dept of Economics and Statistics Cognetti de Martiis, University of Torino, Lungo Dora Siena 100/A, 10153 Torino, Italy. And Collegio Carlo Alberto Via Real Collegio 30, 10024 Moncalieri, Torino, Italy. Tel. 00390116704411. marialaura.ditommaso@unito.it *Corresponding author*

[3] Dept of Economics and Statistics Cognetti de Martiis, University of Torino. anna.maccagnan@unito.it

1. Introduction

Men's supply of unpaid work is lower than that of women in all OECD countries and is particularly low in Southern European countries (OECD 2017). This paper aims to estimate men's preferences for child care and housework, taking into consideration that they may not be free to provide as much time on these activities as they would like (due to for example social norms). The capability approach, as introduced by Sen (1985, 1992, 1999, 2009), points out the importance of studying what people are free to do and be (their capability sets), rather than what they do and who they are (their achieved functionings). Accordingly, the goal of this paper is to measure not only the observed functionings (how much unpaid work men do) but also their capability to provide unpaid labour i.e. whether they have restrictions in their freedom of being engaged in unpaid work. The capability set is not directly observable, but in our approach, is measured indirectly from behaviour. Our approach can thereby be viewed as an operationalisation of Sen's theoretical thinking on capabilities.

The restrictions faced by men in doing unpaid work are not necessarily hard restrictions implying that such work is physically or legally impossible. The restrictions are often of a softer type, reflecting cultural and social norms. Recent research for the US (Pew Research Centre 2015) shows that more fathers (50%) than mothers (39%) say that they do not spend enough time with their kids. Also in Europe, Kanji and Samuel (2015) find that male breadwinners feel constrained from participating as fully as they desire in family life, even if they do not have children. There might be cultural and gender norms against men looking after their children during the day, making it difficult, but not impossible for men to choose to do so. For example, paternal leave in Spain has been extended from 13 days to 16 weeks only in 2016. The labour market might also have restrictions on the taking of paternity leave or other types of leave connected with children. One can argue that whether such softer restrictions are prevalent is not a yes/no question, but a question of degree, so that it is preferable to think of these restrictions in probabilistic terms, as we do in this paper.

Many studies have analysed time spent by men and women in housework and childcare. The presence of children affects males' and females' paid and unpaid work, but the effects are of very different magnitudes and male`s paid work is hardly affected by the presence of children (Kalenkoski et al. 2005; Bloemen et al 2010; Mancini and Pasqua 2012). Parental education matters in the allocation of time towards unpaid work, with better educated parents spending significantly more time with their children (Gutierrez-Domenech 2010; Guryan et al 2008; Gimenez-Nadal and Molina 2013). An increase in own wages is also found to be positively related with own time with children for both parents (Connelly and Kimmel 2009). Moreover, higher women`s wages are associated with higher levels of fathers` unpaid work (Bloemen and Stancanelli 2014, Kalenkoski et al. 2009).

We use a random utility model to measure men's capability of being engaged in unpaid work. This approach was pioneered by Luce (1959) and McFadden (1973, 1984), and has been extended to a setting with latent capability sets by Dagsvik (2013) and Andreassen, Dagsvik and Di Tommaso (2013). We use the random utility model to find (probabilistically) the wishes of the men in our sample and multinomial logit rationing functions to find the probability of the men being unable to follow these wishes. Functional form and our choice of the variables to include in the different relationships ensure identification. Our sensitivity analysis shows that the choice of identifying variables does not affect our analysis greatly. We also compare our model with rationing functions to a

model without such restrictions. The use of random utility modelling within the Capability Approach framework is a novelty in the literature. We believe it is an important tool allowing us to study whether and to what extent men are restricted in their freedom of being engaged in unpaid and paid work. In addition, the structural nature of the model makes it possible to make counterfactual predictions about how many men would choose to use more time on caring for their children if there were no restrictions.

We utilise Spanish time-use data for 2002, taken from the Multinational Time Use Survey (MTUS), a cross-country harmonised set of time use surveys composed of comparably recoded variables. The Spanish 2002 sample is because it is relatively large, has information about both men and women in the household, and includes individual incomes. Spain has a Mediterranean welfare regime, characterized by a male breadwinner model, low female employment and a very high share of domestic and care work provided by women (Sevilla-Sanz et al. 2010, European Commission 2014). Such a regime is generally seen to limit women's freedom of choice, but as our study points out, may also be limiting men's freedom of choice. We use the time-use data to categorise the situation of men into four distinct categories according to how time they use on both paid and unpaid work. The characteristics of the states take into account the choices made by men's partner.

We find that even though men do relatively little child care, it is important to them. On average, Spanish men perform 17% of the total housework done by the couple and 22% of the total time devoted to care for children. Observed time use is determined by both preferences and restrictions. In our main model we find that few men are totally unrestricted in their capability sets (9% of men with children and 23% of men without children). Most are restricted, with many not being able to provide as much care for their children as they want (58%). In alternative specifications this falls to 52-53%. Our estimates suggest that individual, household, and institutional variables are important drivers in shaping restrictions and preferences. We find that the proportion of time used on housework by the man decreases and the time used on paid work increases as the ratio of his wage to his partner's wage increases. This can be explained by both a unitary model (opportunity costs) and non-unitary model (bargaining strength). We also find that man's share of time used on paid work decreases the older he is relative to his partner (controlling for the average age of the couple). This can be interpreted as his having greater bargaining power (assuming it increases with age difference) and thereby working relatively less and using relatively more time on his children. This is in accord with the bargaining theory of the family and with our finding that men are rationed by social norms in how much time they can spend with their children.

The paper is organised as follows: Section 2 describes the data. Section 3 presents the econometric model and in particular, it defines the state space, sets a model for the interaction within the couple, defines the utility function and the random utility model, and finally discusses identification issues. Section 4 presents the result of the empirical analysis, Section 5 predicts the capability set and Section 6 concludes.

2. Data

2.1. *Description of the data set*

The dataset used is the Multinational Time Use Survey (MTUS) for Spain for 2002. MTUS is a cross-country harmonised set of time use surveys composed of comparably recoded variables[4]. We utilise the Spanish dataset because it is larger than that of most other countries in MTUS and includes information about labour income, household composition, and data for both partners in a couple. No other countries in the MTUS combines these qualities to the same degree. The original Spanish dataset is composed of 42,675 individuals in 19,422 households. Our analysis focuses on heterosexual, married or cohabitating couples who do not have missing values for time use. They can have children or be childless. Unfortunately, our data do not have information on non-labour income

We drop couples with children living together with other household members, such as grandmothers, grandfathers etc. This makes it more likely that the time used by the couple on housework and child care reflect total used on these activities in the household. To have as homogenous sample as possible, we also exclude couples where both partners are retired, disabled or take care of other adults, for example grandparents.

We include only working couples defined as households where the sum of paid work, not including travel to and from work, is 5 hours or more per day. A time use survey, where each person is only surveyed one day, as is the case in our data, necessarily exhibits great variation, making it difficult to measure representative behaviour. Focusing on couples that together do at least 5 hours of paid work reduces this variation to a certain extent. We do not exclude weekends (which could be an alternative), because this would imply excluding too many couples (but our requirement that couples work on the observed day leads to many weekends being excluded anyway). We do not set an age limit, but our work requirement leads to our sample only including men from 19 to 73 years of age (see Table C4 in the appendix for summary statistics). We aggregate time use into six separate categories: paid work, unpaid work (including cooking, housework, odd jobs and domestic travel), time with children, travel to work, sleep and leisure. Each category describes the main activity, so housework could be done while looking after children.

The final sample consists of 4,625 heterosexual married or cohabitating couples. Of these, 2,839 have children. About 50% of the women in our sample do not do paid work on the day sampled and almost 50 % of the men do not engage in housework. Men's time in unpaid work is very low compared to women. Childless men on average perform 44 minutes per day of unpaid work compared to 270 minutes per day of female unpaid work. Men with children perform 81 minutes per day of unpaid work compared to 372 minutes of female unpaid work. Men, both with and without children, spend relatively more time in housework activities on Saturday while the opposite is true for women.

2.2. *Definition of the state space*

[4]Each individual fills a 24 hours diary for the same day as his/her partner, either on a weekday or on a weekend. Diary respondents report their main activities for every 10 minutes along the day. MTUS does not provide information about secondary activities (simultaneous activities).

In our analysis, we look at choices among four states categorized by high and low levels of paid employment, and two different levels of total unpaid housework. High and low levels of each activity are defined as being respectively above and below the median hours worked in the activities. The states are defined as

- *State 1*: A high level of paid employment and a high level of unpaid housework
- *State 2*: A high level of paid employment and a low level of unpaid housework
- *State 3*: A low level of paid employment and a high level of unpaid housework
- *State 4*: A low level of paid employment and a low level of unpaid housework

These states define the opportunity set of the men (and women) in our sample. We then estimate utility and rationing functions on the basis of this state space.

In our sample the median of paid work for all individuals (men and women) is 8 hours per day. Men whose paid work is higher than 8 hours belong to the full time work group, while those who work less than 8 hours per day belong to the part time work group.

The median of unpaid work for both men and women (household work and child care) is 2 hours and 20 minutes per day. Men who do more than 140 minutes of unpaid work belong to the high unpaid work group, while the low unpaid work group those who work less. We utilise the same median for men and women so that the states are defined the same for men and women (even if at the moment we are studying only men's choices).

Table 1 shows the distribution of men and women across the four states defined above. The majority of men (68%) are in state 2, characterized by a high level of paid employment and a low level of unpaid work, followed by men in state 4 (low paid and low unpaid hours), in state 3 (low paid and high unpaid hours) and state 1 (high paid and low unpaid hours). When men have no children aged less than 18, they are even more likely to be in a state of low level of unpaid work. As for women, the picture is completely reversed, with most women being in a state of high level of unpaid work, especially combined with a low level of paid work (71% of women are in state 3 and 14% in state 1). This is against 10% in state 2 and 5% in state 4. As expected, childless women are more likely to doing a high level of paid employment that those with children (7% of women with children against 17% of women without children are in state 2).

Table 1 - The number of men and women in the four different states

	Men					
	Full sample		**Couple with no children less than 18 years old**		**Couple with at least one child less than 18 years old**	
	Freq.	**%**	**Freq.**	**%**	**Freq.**	**%**
State 1: High paid employment, high unpaid work	376	8.13	62	3.47	314	11.06
State 2: High paid employment, low unpaid work	3,153	68.17	1,298	72.68	1,855	65.34
State 3: Low paid employment, high unpaid work	399	8.63	107	5.99	292	10.29
State 4: Low paid employment, low unpaid work	697	15.07	319	17.86	378	13.31
Total	4,625	100,00	1,786	100,00	2,839	100,00

	Women					
	Full sample		Couple with no children less than 18 years old		Couple with at least one child less than 18 years old	
	Freq.	%	Freq.	%	Freq.	%
State 1: High paid employment, high unpaid work	629	13.60	216	12.09	413	14.55
State 2: High paid employment, low unpaid work	486	10.51	298	16.69	188	6.62
State 3: Low paid employment, high unpaid work	3,298	71.31	1,148	64.28	2,150	75.73
State 4: Low paid employment, low unpaid work	212	4.58	124	6.94	88	3.10
Total	4,625	100,00	1,786	100,00	2,839	100,00

Source: MTUS Spain 2002-2003

3. The conceptual framework

The state space described above transforms the time use data into a data set describing the possibilities faced by men. This transformation is interesting on its own because it structures the time-use data so that the relationship between signal and noise is improved.

In the following, we first discuss the state space more generally, then discuss how we can implicitly model the strategic interaction within the couple through variables that describe how they share common chores and finally set up a random utility (utility) model that captures the choices made by men. We will later estimate the men's utility function both under the assumption that he faces no restrictions on his choices (standard multinomial logit) and under the assumption that he faces restrictions in what he can choose (the capability approach).

3.1. The state space

Assume that all the possible choices regarding paid and unpaid work of the male and the female in a couple are grouped into *K* discrete states. Let *S* be the universal set of all possible states, so there are K elements in S. It is the absolute maximal set of alternatives that are relevant, regardless of whether or not they are available to everybody[5]. The agents are assumed to have preferences over the alternatives in *S*. Let *C* denote the choice set of a particular agent. It consists of all the opportunities (functionings) available to the agent. For some agents *C* may be equal to *S*, but in many situations the choice set will be a proper subset of *S*. It could be that cultural norms reduce the care opportunities for some men. In the context of Sen's capability approach, *C* represents the agent's capability set, and the elements of *C* (which we call states) are the functionings that are available to the agent. The universal set *S* contains all the functionings that are generally possible.

The states are defined in the same manner for men and women, but each state affects them differently due to gender differences in time use. For example, a woman working full time will generally expect to have a partner doing less housework than a comparable man working full time. We view such gender differences as being the result of the strategic interaction within the couple.

[5] Note that while the states are defined in the same manner for all individuals, the characteristics of the states can differ between individuals. For example, in the state "full time work" different individuals can work different hours, as long as the number of hours worked falls within the definition of "full time".

3.2. The strategic interaction within the couple

We assume that the amount of time used by a couple on paid employment, household production and child care can be seen as the result of strategic interaction. Each individual is assumed to face a choice set that incorporates the response of the partner. For example, if a husband decides to do less paid work and contribute more at home, he might expect his wife to increase her paid employment while contributing less at home. We do not attempt to explicitly model the game theoretic structure of these negotiations, but only to quantify empirically how couples share paid employment, housework and child care.

Let e_{jm}, e_{jf}, and $e_{jT} = e_{jm} + e_{jf}$ be the time used on paid employment in state j by respectively the male, the female and in total, where we, until further notice, drop subscripts indicating household. In the same manner, let h_{jm}, h_{jf}, and $h_{jT} = h_{jm} + h_{jf}$ be the time used on household production excluding child care in state j and let c_{jm}, c_{jf}, and $c_{jT} = c_{jm} + c_{jf}$ be the time used on child care in state j. We reformulate these time variables so that each is the product of total time spent by the couple on an activity and a share variable indicating how this total is shared between the husband and wife:

$$e_{jm} = e_{jT} \cdot \alpha_{ej}, \quad e_{jf} = e_{jT} \cdot \left(1 - \alpha_{ej}\right) \quad j \in S \tag{1}$$

$$h_{jm} = h_{jT} \cdot \alpha_{hj}, \quad h_{jf} = h_{jT} \cdot \left(1 - \alpha_{hj}\right) \quad j \in S \tag{2}$$

$$c_{jm} = c_{jT} \cdot \alpha_{cj}, \quad c_{jf} = c_{jT} \cdot \left(1 - \alpha_{cj}\right) \quad j \in S, \tag{3}$$

where α_{ej}, α_{hj}, and α_{cj} are respectively the share of employment, housework and child care contributed by the male in state j. The shares of the female will thereby be $\left(1 - \alpha_{ej}\right)$, $\left(1 - \alpha_{hj}\right)$, and $\left(1 - \alpha_{cj}\right)$. These share variables will in the following be estimated; depending on the average age and average wage of the couple, the ratio of the man's age to the female's and the ratio of the man's wage to female's. The implicit assumption is that each couple's total time in paid work, housework, and child care is given in each state. This assumption is based on the idea that each couple has different preferences on the total time devoted to the above activities and we take those preferences for granted. In this paper we are only concerned about how this total time is shared within the couple.

In addition to the above time use variables, each individual also uses time on travel to work, t_{jm} and t_{jf}, sleep, s_{jm} and s_{jf}, and leisure (encompassing all other activities), l_{jm} and l_{jf}, where the subscripts denote state and gender. It is assumed that travel time is the same for all states so $t_{jm} = t_m \; \forall \, j$ and $t_{jf} = t_f \; \forall \, j$. This could be because travel time is mainly determined by where the couple lives. The time constraint for the man in the household is thereby given as:

$$e_{jm} + t_m + h_{jm} + c_{jm} + l_{jm} + s_{jm} = T, \tag{4}$$

where T is the total time constraint (T=24 hours=1440 minutes), and a similar constraint applies for the woman. Letting sleep be residually determined, we have that each state j is characterized by the time variable set $\{e_{jm}, h_{jm}, c_{jm}, e_{jf}, h_{jf}, c_{jf}, l_{jm}, l_{jf}, t_m, t_f\}$, or equivalently by the set $\{e_{jT}, h_{jT}, c_{jT}, \alpha_{ej}, \alpha_{hj}, \alpha_{cj}, l_{jm}, l_{jf}, t_m, t_f\}$.

Appendix A contains an interpretation of the share variable with a hypothetical example.

3.3. Consumption and the utility function

Let R_j be the household's consumption in state *j* (which we equate to the household's wage income since we do not have information on taxes or other income),

$$R_j = w_m e_{jm} + w_f e_{jf}, \tag{5}$$

Note that we assume that wages are the same across states. Changing hours worked will therefore not influence hourly wages.

Let H_{jm} be the male's valuation of total household production,

$$H_{jm} = h_{jm} + c_{jm} + \beta_m(h_{jf} + c_{jf}), \tag{6}$$

and let H_{jf} be the female's valuation of total household production,

$$H_{jf} = \beta_f(h_{jm} + c_{jm}) + h_{jf} + c_{jf}, \tag{7}$$

where β_m indicates how the man evaluates the household production of his wife in comparison to his own and β_f the same type of evaluation for the female. These β's can be interpreted as the "perceived contribution" (see Sen 1990) of the other household member. The β_m and β_f parameters can be interpreted as implicit pricing of the household work of the persons in the couple. Sen (1990) underlines that the "*perceived contribution*" of household members can influence the outcomes of the bargaining process within the couple.

As household size, *N*, increases there is often considered to be economies of scale. This can be taken into account by assuming that size equivalent consumption, R_j^*, and size equivalent total household production (including child care), H_{jm}^*, can be written as:

$$R_j^* = R_j / N^{\gamma_R} \tag{8}$$

$$H_{jm}^* = H_{jm} / N^{\gamma_H}, \tag{9}$$

where the equivalence scale parameters γ_R and γ_H are equal to one if there are no economies of scale[6].

We assume that each male derives utility from size equivalent consumption, R_j^*, his evaluation of total household production, H_{jm}, leisure, l_{jm}, and sleep (which is residually determined by the time constraint). In addition, he derives extra utility from own time spent with his children, c_{jm}. We consider R_j and H_{jm} (which includes child care) to be important inputs determining child quality (an investment aspect), while own time with children, c_{jm}, reflects the consumption aspect of having a child. Time traveling to work, t_m, brings disutility.

[6] We shall later see that in our chosen econometric specification (a random utility model with a log linear utility function) these economy of scale parameters are not identified, but we include them here for completeness.

Introducing the subscript *i* for household, we can now write the utility function of the male m, in household i, in state *j* as:

$$U_{ijm} = g_{jm}\left(R_{ij}/N_i^{\gamma_R}, c_{ijm}, H_{ijm}/N_i^{\gamma_H}, l_{ijm}, t_{im}; X_{im}\right), \tag{10}$$

where X_{im} is a vector of demographic characteristics of the male in household *i*. The utility function of the female can be written in the same way.

3.4. A random utility approach to measuring capabilities

Let v_{ijm} denote a utility function that represents the welfare of male m in household *i* in state *j* (assuming state *j* is available to the agent). Following McFadden (1973, 1984), we assume that

$$v_{ijm} = U_{ijm} + \varepsilon_{ijm}, \tag{11}$$

where U_{ijm} is the deterministic term and ε_{ijm} is a random error term that is supposed to capture unobserved characteristics that affect the agent's welfare. The random error terms, ε_{jk}, are assumed to be independent with c.d.f. $\exp\left(-exp(-x)\right)$.

Let $J(C)$ denote the choice of the agent when the choice set is equal to C. It is assumed that the agent chooses the alternative in *C* that maximizes the utility v_{ij} that is, $J(C) = j$ if $v_{ijm} = \max_{k \in C} v_{ik}$. Furthermore, let $P_j(C)$ be the probability that the man shall choose *j*, given the choice set *C*. Following (McFadden, 1984) the choice probabilities are:

$$P(J(C) = j) = P_j(C) = \frac{\exp(U_{ijm})}{\sum_{k \in C} \exp(U_{mik})} \tag{12}$$

which is the well-known Multinomial Logit Model. When there are state-dependent variables (as in our model), it is often referred to as the conditional logit model. The utility function is assumed to have a log-linear form,

$$U_{ijm} = \beta_1 \log\left(R_{ij}/N_i^{\gamma_R}\right) + \beta_2 \log\left(c_{ijm}\right) + \beta_3 \log\left(H_{ijm}/N_i^{\gamma_H}\right) + \beta_4 \log\left(l_{ijm}\right) + \beta_5 \log(t_{im}) + X_{im}\delta_j, \tag{13}$$

where $\beta_1 - \beta_5$ are alternative specific parameters (they do not vary between states) and δ_j is a vector of individual specific parameters. Combinations of alternative specific parameters and variables that do not vary between states (in this case N_i and t_{im}) are not identifiable under our assumptions and can be subsumed into the constant term, leading us to reformulate the utility function as

$$U_{ijm} = \beta_1 \log\left(R_{ij}\right) + \beta_2 \log\left(c_{ijm}\right) + \beta_3 \log\left(H_{ijm}\right) + \beta_4 \log\left(l_{ijm}\right) + X_{im}\delta_j, \tag{14}$$

where the parameter vector δ_j has a transformed constant term.

We assume that the above utility function applies both to (working) couples with and without children. Note that our original formulation in Equation 13 includes the number of individuals in the household. We could also have included (additively) the utility of children in this equation and still ended up with Equation 14, because the number of children does not vary between states. By including couples without children, we increase our sample by more

than 60 percent, from 2,839 to 4,625 couples, making it possible to estimate our fairly complex model. All couples are observed working at least 5 hours on the observation day.

The motivation of psychologists such as Thurstone (1927) for proposing a random utility framework was to deal with the observational fact that individuals often violate transitivity when faced with replications of (seemingly) identical choice experiments. His explanation was that decision makers may be ambiguous about the precise value of the respective alternatives, in the sense that if the same choice setting is repeated they may choose a different alternative. This unpredictable temporal variation in tastes is represented by the stochastic error terms in the utility representation.

In our context, the assumption that the agents' preferences are uncertain is of crucial importance. A currently chosen alternative is considered only a momentary choice. Other, different, choices may be made in the future (even under the same circumstances) due to the influence of whims in perception and problems with assessing the precise value of the alternatives once and for all. This implies that reducing the opportunities available to an agent while leaving him with the possibility of making his current choice, will nevertheless reduce his well-being because it reduces the range of possibilities in the future. Our stochastic structure thereby makes an agents' well-being depend, not only on his choices (functionings), but also on his opportunities (capability sets).

3.5. The possibility of having a restricted capability set

Above, we have outlined a multinomial model for time use, based on the random utility model. It can be the basis for estimating the choice of time use when males face no restrictions in their capabilities (have a full choice set). As a base line, we report below the estimates from such a model (see Section 4).

Our main concern is, however, to estimate the degree to which men's capability for caring for their children might be constrained by norms or conditions in the labour market. We now let $r(C_s)$ denote the conditional probability that the capability set is equal to C_s,

$$r(C_s) = P(C = C_s) \tag{15}$$

We shall call these probabilities, restriction probabilities, which must satisfy the restriction $\sum_s r(C_s) = 1$. The joint probability of having choice set C_s and choosing alternative j as can then be written as

$$P(J(C) = j, C = C_s) = P(J(C) = j \mid C = C_s) \cdot P(C = C_s) = P_j(C_s) \cdot r(C_s) \tag{16}$$

In our case we have four different states leading to there being 15 different theoretically possible capability sets. They range from the full capability set, consisting of all of the possible states, {1,2,3,4}, to the sets where one is restricted to only one state, such as {1}, {2}, {3} or {4}. To simplify this structure, we assume that these restriction probabilities are the product of two probabilities, one denoting the probability of being restricted in the provision of paid labour,r_e, and one denoting the probability of being restricted in the provision of unpaid labour in the household, r_h. Each of these are defined over three outcomes: the probability of being restricted to a high state, to a low state or not being restricted at all. Let r_e^H be the probability of being restricted to a high level of paid employment and r_e^L the probability of being restricted to a low level. Denote r_h^H as the probability of being restricted

to a high level of housework (including child care) and r_h^L as the probability of being restricted to a low level of housework. The probability of being unrestricted in employment is denoted r_e^{NR}, while the probability of being unrestricted in housework is denoted r_h^{NR}. We assume that the probabilities have a multinomial structure,

$$r_e^H = \frac{\exp(Y\theta_H)}{\exp(Y\theta_H)+\exp(Y\theta_L)+1} \tag{17a}$$

$$r_e^L = \frac{\exp(Y\theta_L)}{\exp(Y\theta_H)+\exp(Y\theta_L)+1} \tag{17b}$$

$$r_e^{NR} = \frac{1}{\exp(Y\theta_H)+\exp(Y\theta_L)+1} \tag{17c}$$

and

$$r_h^H = \frac{\exp(Z\gamma_H)}{\exp(Z\gamma_H)+\exp(Z\gamma_L)+1} \tag{18a}$$

$$r_h^L = \frac{\exp(Z\gamma_L)}{\exp(Z\gamma_H)+\exp(Z\gamma_L)+1} \tag{18b}$$

$$r_h^{NR} = \frac{1}{\exp(Z\gamma_H)+\exp(Z\gamma_L)+1} \tag{18c}$$

where Y and Z are vectors of individual characteristics and θ_j and γ_j are vectors of state specific parameters. This simplified structure reduces the number of possible capability sets to 9, consisting of the 3x3 combinations of the r_e and r_h probabilities.

Assuming that the probabilities of being restricted in employment (r_e^H, r_e^L, and r_e^{NR}) are stochastically independent of the probabilities of being restricted in home care level (r_h^H, r_h^L, and r_h^{NR}), we have the following 9 possible capability sets with corresponding probabilities, $r(C_j)$:

$$C_1 = \{1\} \text{ with probability } r(C_1) = r_e^H \cdot r_h^H \tag{19a}$$

$$C_2 = \{2\} \text{ with probability } r(C_2) = r_e^H \cdot r_h^L \tag{19b}$$

$$C_3 = \{3\} \text{ with probability } r\ (C_3) = r_e^L \cdot r_h^H \tag{19c}$$

$$C_4 = \{4\} \text{ with probability } r(C_4) = r_e^L \cdot r_h^L \tag{19d}$$

$$C_5 = \{1,2\} \text{ with probability } r(C_5) = r_e^H \cdot r_h^{NR} \tag{19e}$$

$$C_6 = \{1,3\} \text{ with probability } r(C_6) = r_e^{NR} \cdot r_h^H \tag{19f}$$

$$C_7 = \{2,4\} \text{ with probability } r(C_7) = r_e^{NR} \cdot r_h^L \tag{19g}$$

$$C_8 = \{3,4\} \text{ with probability } r(C_8) = r_e^L \cdot r_h^{NR} \tag{19h}$$

$$C_9 = \{1,2,3,4\} = S \text{ with probability } r(C_9) = r_e^{NR} \cdot r_h^{NR} \tag{19i}$$

The assumption of independency between the probabilities of being restricted in employment and the probabilities to be restricted in housework is rather strong but it reduces the number of capability sets.

The probability of observing a person in state *j* is denoted Q_j. The probability of being in the different states can be written as:

$$Q_1 = r(C_1) + P_1(C_5) \cdot r(C_5) + P_1(C_6) \cdot r(C_6) + P_1(C_9) \cdot r(C_9) \quad (20a)$$

$$Q_2 = r(C_2) + P_2(C_5) \cdot r(C_5) + P_2(C_7) \cdot r(C_7) + P_2(C_9) \cdot r(C_9) \quad (20b)$$

$$Q_3 = r(C_3) + P_3(C_6) \cdot r(C_6) + P_3(C_8) \cdot r(C_8) + P_3(C_9) \cdot r(C_9) \quad (20c)$$

$$Q_4 = r(C_4) + P_4(C_7) \cdot r(C_7) + P_4(C_8) \cdot r(C_8) + P_4(C_9) \cdot r(C_9) \quad (20d)$$

The $P_j(C_s)$ probabilities are assumed to be determined by the linear expressions U_{i1m}, U_{i2m}, U_{i3m} and U_{i4m}, defined in equation (14), which depend on the alternative specific variables $\beta_1 - \beta_5$ (the same for all states) and on the vectors of state specific parameters $\delta_1 - \delta_4$ (a separate vector for each state). The $r(C_s)$ probabilities are assumed to depend on the state specific parameter vectors θ_H, θ_L, γ_H and γ_L. Equations (20a) to (20d) represent 3 independently observable equations due to the Q-s summing to one, often represented as the odd-ratios Q_j/Q_4, *j=1,…,3*. The parameters are jointly estimated by maximum likelihood.

3.6. Identification

We identify the model through exclusion restrictions analogous to the exclusion restrictions used to identify supply and demand in the econometric analysis of markets. This implies that the vectors of individual specific characteristics *X* (denoted X_{im} earlier, but here we drop subscripts), *Y*, and *Z* do not contain the same variables but some variables are only to be found in one or two of the vectors of explanatory variables. Some variables will be unique to the choice probabilities, while others will be unique to the restriction probabilities. This does not exclude the possibility of using some variables in more than one explanatory vector or in both probabilities (though in our analysis we have different variables in the different vectors).

As an illustration of how this works, consider including a set of dummy variables only in the *Z*-vector, excluding them from the other explanatory vectors (assuming that there are no previous explanatory variables so that $Z \cdot \gamma_H = a_H$ and $Z \cdot \gamma_L = a_L$ before the dummy variables are included). Denoting these three dummy variables by $I_a \in \{0,1\}$, $I_b \in \{0,1\}$, and $I_c \in \{0,1\}$, they divide the sample into 2^3=8 different subgroups (all combinations of the binary dummy variables). For each of these non-overlapping subgroups there will be three odd-ratios, Q_j/Q_4, *j=1,…3*, giving us 8x3=24 independent equations. Assuming, as mentioned, that the dummy variables are only included in the r_h probabilities, the number of parameters only increases by 2·3=6, as follows:

$$Z \cdot \gamma_H = a_H + b_H I_b + c_H I_c + d_h I_d \quad (21a)$$

$$Z \cdot \gamma_L = a_L + b_L I_b + c_L I_c + d_L I_d, \quad (22b)$$

where the six additional parameters are $b_H,\ c_H,\ d_H,\ b_L,\ c_L,$ and d_L. In this example we have thereby increased the number of empirical equations from 3 to 24, while only increasing the number of parameters by 6. As is well-known, counting equations against parameters does not guarantee identification, but having at least as many equations as parameters is a necessary requirement. A more detailed discussion of identification in a similar context is given in an appendix in Andreassen, Dagsvik and Di Tommaso (2013).

Identification is complicated by the fact that it is not feasible to use all combinations of variables. Our data contain a large number of dichotomous variables, which can lead to estimation problems if there are empty cells for a combination of these in one of the states. In practice, empty cells lead to large insignificant estimates with extremely large standard errors.

Which variables to include in the two types of probabilities is mainly a modelling issue. Some variables will naturally be thought of as influencing choice while others affect the probability of being restricted. If there is doubt one can compare different specifications, such as one with the age of the youngest child in the choice probability and another specification where it is in the restriction probability. The stability of the estimates (how stable the coefficient of one variable is to inclusion or exclusion of others) depends on the covariances between these variables, and is thereby analogous to standard multicollinearity problems. We will later see that our estimates are fairly robust to changes in specification. Given our modest sample size, we also strive to limit multicollinearity problems by not including variables in more than one explanatory vector, though, since our model is non-linear, this is not necessary to achieve identification.

A related question is whether our model, with its fairly strong assumptions, actually uncovers the mechanisms of choices and constraints that we are trying to uncover. Can we be sure we are actually uncovering the constraints faced by men in Spain?

There is good reason to treat our results with caution, but one must also recognize that we are dealing with a difficult econometric problem. We are attempting to disentangle the choices of individuals from the unobservable constraints they face. Even in surveys, we cannot be sure individuals will tell of constraints that they do not consider binding. For example, if social norms make it difficult for a man to spend time with his children, he may not consider this a constraint if he shares this social norm. He might not miss what he cannot have. Our model can find, by inferring his wishes from other men's behaviour, that in the absence of such a social norm the man would like to spend more time with his children.

Our situation is in some ways comparable to the problems of inference found in the empirical analysis of tax evasion, see for example Slemrod and Weber (2012). Also in this type of analysis one faces fundamentally unobservable variables. As they say in their abstract:

> *Unlike invisible phenomena in the natural sciences, these invisible social science phenomena are hard to measure because of choices made by individuals. Analysis of tax evasion and the informal economy must proceed even in the absence of the direct observability of key variables, and theory should guide the construction and interpretation of evidence of the "invisible".* Slemrod and Weber (2012), p 25.

We believe this also applies to our investigation. Our analysis should be viewed as one way of trying to infer the characteristics of something unobservable, the constraints, from observable variables, the choices made by

individuals. Using economic theory and making assumptions about which variables may affect choices and constraints we are able to measure these constraints. As we show, under different assumptions one gets different estimates. We believe our result are important, but not definitive. Instead, they should be seen as giving one view of a phenomenon that needs to be viewed from other angles as well. We think our (imperfect) method for measuring the constraints faced by individuals is an important innovation in the study of capabilities. As Sims (2010) says in another context:

> *Because economics is not an experimental science, economists face difficult problems of inference. The same data generally are subject to multiple interpretations. It is not that we learn nothing from the data, but that we have at best the ability to use data to narrow the range of substantive disagreement.* Sims (2010), p 60.

4. The empirical application and the results

4.1. Predicted variables used in the estimation

The estimation of the above model requires predicted values of household consumption, man's child care, household production and leisure for the 4 states (also the states in which the man is not observed). Table 2 lists the definitions of the variables used in estimating the model and describes how the different state dependent variables depend on predictions of wages and time used on paid work, child care, housework and leisure. These relationships were derived earlier in Section 3.

Table 2 - Definition of the variables used in the estimation

Variable	Description
State dependent variables	
Consumption	(Man's predicted hours paid work · w_M) + (woman's predicted paid work · w_f)
Man's child care	Man's predicted hours of child care; 0 if no children
Couple's household production (evaluated by the man)	(Man's predicted hours of housework + predicted hours of child care) + β_m · (woman's predicted hours of housework + woman's predicted hours of child care)
Man's leisure · age	Man's predicted leisure* man age
Preference variables	
Man's years of schooling	Man's education measured as years of schooling
Employment restriction variables	
Male regional unemployment rate	Male unemployment rate at the regional level (Source: Eurostat)
Education ratio (W/M)	Woman's years of schooling / man's years of schooling
Man unemployed	Binary variable = 1 if the man is unemployed
Housework and child care restriction variables	
South	Binary variable = 1 if living in Andalusia or Murcia; 0 otherwise
Child age	Age of the youngest child + 1; 0 if no children or children older than 18
Child age squared	Squared age of the youngest child
Computer at home	Binary variable = 1 if there is a computer in the household
Woman's years of schooling	Woman's education measured as years of schooling

In order to calculate the level of household consumption in each state, we multiply the predicted hourly wages of the two partners by their respective working hours in each state. The hourly wages for men and women are predicted applying the usual Heckman procedure; Appendix B describes the procedure and reports the estimated equations.

Table 3 -Estimation of the share of housework done by the man in each state, α_{hj}. GLM using the logistic function.

	State 1: High level of employment High level of unpaid work α_{h1}	State 2: High level of employment Low level of unpaid work α_{h2}	State 3: Low level of employment High level of unpaid work α_{h3}	State 4: Low level of employment Low level of unpaid work α_{h4}
Average wage in the couple	0.0343*	0.2003***	-0.0524**	0.1252***
	(0.0187)	(0.0125)	(0.0241)	(0.0198)
Wage ratio (m/w)	-0.3356***	-0.6981***	-0.5158***	-0.7835***
	(0.0960)	(0.0681)	(0.1234)	(0.1090)
Average age	-0.0071	-0.0503***	-0.0147**	-0.0250***
	(0.0047)	(0.0033)	(0.0060)	(0.0059)
Age ratio (m/w)	-0.2160	0.7451***	0.3057	0.1789
	(0.4488)	(0.2427)	(0.4227)	(0.3890)
No. of children: 1	-0.3455***	-0.4008***	-0.3482***	-0.1926*
	(0.0994)	(0.0685)	(0.1236)	(0.1078)
No. of children: 2	-0.5046***	-0.5550***	-0.5702***	-0.6198***
	(0.1026)	(0.0707)	(0.1247)	(0.1421)
No. of children: 3+	-0.7936***	-1.0381***	-0.9298***	-0.8619***
	(0.1864)	(0.1559)	(0.2441)	(0.2529)
Constant	0.5156	-1.0973***	1.8722***	-0.3035
	(0.5439)	(0.3021)	(0.5724)	(0.5103)
N	376	3,120	399	691

Source: MTUS Spain 2002-2003
Ref category for no of children: 0 children
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

The men's share of hours used on housework in each state, α_{hj}, (also for the states where the men are not observed in) are predicted using a GLM approach with a logistic function. Total hours are then calculated for each man using the predicted shares multiplied by predicted hours used on housework by the couple. Table 3 shows the results of our logit estimation of α_{hj}. The higher the average wage in the couple, the higher the share of unpaid work done by men in all the states, while the wage ratio (m/f) has a negative effect on α_{hj}. The more children the couple has, the smaller the share of housework done by the man.

We have performed similar estimations of α_{ej} and α_{cj}. Tables with these estimation results can be found in Tables C2 and C3 in Appendix C. The men's share of doing paid work, α_{ej}, is negatively related to the average wage in the couple in all states except state 3 (low paid hours and high unpaid hours) and positively related to the wage ratio. So the higher the wage of the man with respect to the woman and the more children he has, the more paid hours he works relative to his partner.

The men's share of performing child care, α_{cj}, is positively correlated with the average wage of the couple (a proxy the wealth of the couple), is negatively correlated with the wage ratio (a measure of the opportunity cost of child care for the man relative to the opportunity cost of his partner) and is negatively correlated with the number of children (greater specialization within the couple). These results are in line with the literature on allocation of time on child care (Kalenkoski et al 2009; Connelly and Kimmel 2009).

The consumption of the household in the different states is calculated based on the predicted wage of couple (from the estimations using the Heckman procedure) and the predicted hours of paid work. Leisure is imputed as the average by state and number of children (0, 1, 2, 3+). Sleep is residually determined so that the 24-hour time constraint applies to all individuals.

The resulting predicted consumption and predicted hours of child care, housework and leisure are shown in Table 4. A more detailed table can be found in Table C4 in Appendix C, which also includes summary statistics for the other variables used in the estimation. The consumption of the household in the different states is calculated based on the predicted wage of couple (from the estimations using the Heckman procedure) and the predicted hours of paid work (from the estimates of the share variable). Leisure is imputed as the average by state and number of children (0, 1, 2, 3+). Sleep is residually determined so that the 24-hour time constraint applies to all individuals.

Table 4 - Mean predicted consumption and mean predicted hours of child care, housework and leisure in the different states. Used to calculate the state dependent variables *Y*.

	State 1: High level of employment High level of unpaid work	State 2: High level of employment Low level of unpaid work	State 3: Low level of employment High level of unpaid work	State 4: Low level of employment Low level of unpaid work
Household Consumption (€)	95.55	96.15	57.74	59.97
Male child care	1.33	0.22	1.68	0.21
Male housework	2.33	0.38	3.30	0.62
Male leisure	4.41	5.32	7.81	8.89
Woman's child care	2.17	1.52	1.43	1.02
Woman's housework	4.30	4.93	3.19	4.20

Source: MTUS Spain 2002-2003
Note: Child care time is computed considering only men and women with children.

Table 4 describes the average characteristics of the state space faced by men. We see that as men do more paid work and less unpaid work, women increase their hours of child care and housework. So, if a man chooses a high

level of employment (either state 1 or 2), he can expect his partner to increase her work in the home (and to reduce her work outside the home). Ideally, we would have explicitly modelled this, but instead we use the data to implicitly take into account the reaction of the partner to the choice of the man.

Table 5 - Estimation results for four different specifications

	(1) Model with no restriction	(2) Model with restricted capabilities	(3) Sensitivity analysis 1	(4) Sensitivity analysis 2
Alternative specific variables P_j				
Consumption	1.4633**	4.1233***	4.5543***	3.4590***
	(0.5814)	(1.3126)	(1.4871)	(1.2630)
Man's child care	1.5254***	3.9559***	5.0918***	3.6178***
	(0.1480)	(0.5842)	(0.9462)	(0.5556)
Household production	-0.6896***	8.4448***	8.0695***	7.5888***
	(0.1738)	(2.6080)	(3.0690)	(2.7227)
Leisure	0.0468***	0.1658***	0.1644***	0.1384***
	(0.0083)	(0.0386)	(0.0543)	(0.0427)
β_m	-0.1528***	0.3803***	0.4188***	0.4155***
	(0.0096)	(0.1167)	(0.1278)	(0.1326)
Individual specific variables P_j				
State 2: High paid work, low unpaid work (ref. State 1)				
Man's years of schooling	-0.0346**	-0.0807***	-0.0724**	-0.0677***
	(0.0165)	(0.0288)	(0.0345)	(0.0255)
South				0.3536*
				(0.2119)
Youngest child's age[1]			0.0393	
			(0.1250)	
Youngest child's age squared[1]			0.0116	
			(0.0107)	
Computer at home			-0.0713	
			(0.1892)	
Education ratio W/M			-0.1025	
			(0.1340)	
Constant	1.6485***	7.5369***	7.1474***	6.8712***
	(0.3473)	(1.2940)	(1.6055)	(1.2896)
State 3: Low paid work, high unpaid work (ref. State 1)				
Man's years of schooling	0.0040	0.4543***	0.4795**	0.9290***
	(0.0200)	(0.1713)	(0.1956)	(0.3468)
South				-2.2390**
				(1.0410)
Youngest child's age[1]			-0.1462	
			(0.2324)	
Youngest child's age squared[1]			0.0155	
			(0.0162)	
Computer at home			2.4435**	
			(1.1902)	
Education ratio W/M			0.5211	
			(1.2319)	
Constant	-0.1236	-7.5192***	-9.7470**	-10.9538***
	(0.3875)	(1.9624)	(4.7123)	(3.9809)
State 4: Low paid work, low unpaid work (ref. State 1)				
Man's years of schooling	-0.0080	0.3777**	0.4237**	0.8673**
	(0.0181)	(0.1684)	(0.1927)	(0.3444)
South				-1.5813
				(1.0442)
Youngest child's age[1]			-0.2864	
			(0.2199)	

Youngest child's age squared[1]			0.0360**	
			(0.0160)	
Computer at home			2.4406**	
			(1.1941)	
Education ratio W/M			1.8313*	
			(1.1058)	
Constant	0.0066	-1.2177	-5.2611	-5.5111
	(0.4486)	(1.9756)	(4.7265)	(3.8175)
Restriction variables				
Restricted to paid work, r_e				
- to high paid work (ref. not being restricted in paid work)				
Male regional unemployment rate		-0.0902**	-0.0936**	-0.1381***
		(0.0428)	(0.0400)	(0.0425)
Education ratio W/M		-0.5309**		-0.4939**
		(0.2576)		(0.2075)
Constant		2.1239***	1.8580***	3.0869***
		(0.6533)	(0.4626)	(0.4966)
- to low paid work (ref. not being restricted in paid work)				
Male regional unemployment rate		-0.0053	-0.0123	-0.0518
		(0.0388)	(0.0372)	(0.0427)
Education ratio W/M		-0.2866**		-0.3041**
		(0.1384)		(0.1298)
Man unemployed		4.8064***	4.6590***	4.8579***
		(0.4801)	(0.4428)	(0.4758)
Constant		0.0477	-0.0356	0.8978*
		(0.6250)	(0.4589)	(0.5289)
Restricted to unpaid work , r_h				
- to high unpaid work (ref. not being restricted in unpaid work)				
South		0.0150	0.6147	
		(0.4268)	(0.6210)	
Youngest child's age[1]		0.7173		0.7847
		(0.4809)		(0.4921)
Youngest child's age squared[1]		-0.1474**		-0.1520**
		(0.0748)		(0.0773)
Computer at home		-0.4769		-0.4843
		(0.3899)		(0.3894)
Woman's years of schooling		0.0869*	0.0584	0.0883*
		(0.0526)	(0.0561)	(0.0504)
Constant		-2.1538*	-2.7902***	-2.5423**
		(1.2580)	(0.8126)	(1.2021)
- to low unpaid work (ref. not being restricted in unpaid work)				
South		0.4247**	0.7402***	
		(0.2058)	(0.2873)	
Youngest child's age[1]		-0.1634*		-0.1460
		(0.0969)		(0.0909)
Youngest child's age squared[1]		0.0123***		0.0119***
		(0.0044)		(0.0043)
Computer at home		-0.5785***		-0.6115***
		(0.2127)		(0.2173)
Woman's years of schooling		-0.0550*	-0.0832**	-0.0683**
		(0.0316)	(0.0354)	(0.0298)
Constant		1.4651**	0.8897**	1.4014***
		(0.5714)	(0.3753)	(0.5395)
Statistics				
ll	-4318.7246	-4115.9987	-4103.8927	-4112.1784
Aic	8659.4492	8291.9974	8275.7854	8286.3569
N	4625	4625	4625	4625

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
1) We use the specification: age+1 so that the lowest possible value is 1 for couples with children and is 0 for all those without children.
Source: MTUS Spain 2002-2003

4.2. Estimation of the model with and without restrictions.

We have estimated four different specifications of our model, shown in Table 5. Model specification 2 in the second column is our preferred specification, while specification 1 gives the estimates for our model under the assumption that there are no restrictions on men. This assumption leads to a traditional multinomial logit with both state dependent and individual specific variables, where only preferences are important for how many hours men use on child care. It serves as a reference point for the estimations with the possibility of being restricted.

Columns 3 and 4 look at the effect of changing which variables are included in the choice probabilities (in the utility function) and which are included in the restriction probabilities. Remember that $\beta_{household}$ indicates how the male evaluates the housework and child care done by the female. If it is less than one, the male values the female's contribution less than his own.

Specification 1 has the same specification of the choice probabilities as our preferred specification, but leaves out the restriction probabilities. From Table 5 we see that the signs of the coefficients in this specification are generally the same as those in specifications including restrictions, with the exception of household production and β_m. Men derive positive utility from consumption, child care and leisure. Furthermore, they derive disutility from their own household production (housework and child care), while deriving positive utility from the household production of the woman (the parameter for household production is multiplied with β_m). In other words, this specification implies that men would prefer a very dirty house to having to do any cleaning themselves, but are happy if their partner cleans it. This, in contrast to our results in the specifications with restrictions, where men derive net positive utility from their contribution to household production. That the model without restrictions leads to estimates implying that house work in total gives disutility (implying that the disutility from the work effort is greater than the utility of the produced outcome) while we observe men doing such work in all states can be seen as reflecting the underlying stochactistic nature of the utility function. Even so, it can make the model seem internally inconsistent. The models with restrictions, specifications 2-4, do not have this inconsistency. This is a positive feature of our models, indeed the simple conditional model without restrictions would seem to be wrong.

Column 2 in Table 5 presents the results of our preferred model with restricted capability sets, i.e. where some institutional, personal and family characteristics affect the actual capability of the man of being in a certain state. Different variables determine restrictions in paid work and restrictions in unpaid work. We assume that men without children are not restricted in housework (i.e. the probabilities to be restricted in unpaid work for men without children are all equal zero)[7].

The estimated parameters of the alternative specific variables, consumption, man's child care, household production and leisure, are all positive and significant, implying that they have a positive effect on men's utility. The parameter β_m is positive and significant, but lower than 1, suggesting that men value their wife's household production less than their own.

The man's education level is the only individual specific variable in the choice probability P_j. Our estimations use state 1 as the reference state. We find that an increase in men's years of schooling decreases the probability of

[7] We have also estimated a model where all men are restricted, but the results did not change substantially.

choosing state 2, implying more educated men prefer to provide more unpaid work (as was the case in specification 1). They have a higher utility in states of low employment than less educated men (though, they both generally prefer full employment to low employment). This can be because men with higher education are better able to utilize a low employment situation.

Table 6 -Marginal effects of child care, $\Delta Q_j / \Delta c_{jk}$ (the change in the probability of being in states 1-4 when the level of child care in state *j* increases marginally). Percent.

	Change in probability of being in:			
	State 1: High level of employment High level of unpaid work	State 2: High level of employment Low level of unpaid work	State 3: Low level of employment High level of unpaid work	State 4: Low level of employment Low level of unpaid work
Increase in:	$\Delta Q_1 \cdot 100$	$\Delta Q_2 \cdot 100$	$\Delta Q_3 \cdot 100$	$\Delta Q_4 \cdot 100$
Man's child care in state 1: Δc_{1m}	0.0844**	-0.0661**	-0.0178*	-0.0005**
	(0.0337)	(0.0281)	(0.0096)	(0.0002)
Man's child care in state 2: Δc_{2m}	-0.1175**	0.1522**	-0.0217*	-0.0131**
	(0.0497)	(0.0608)	(0.0123)	(0.0059)
Man's child care in state 3: Δc_{3m}	-0.0157*	-0.0107*	0.0342***	-0.0078
	(0.0084)	(0.0060)	(0.0093)	(0.0053)
Man's child care in state 4: Δc_{4m}	-0.0009**	-0.0137**	-0.0167	0.0313***
	(0.0004)	(0.0062)	(0.0112)	(0.0119)
Wife's child care in state 1: Δc_{1f}	0.0423**	-0.0331**	-0.0089	-0.0002**
	(0.0207)	(0.0169)	(0.0055)	(0.0001)
Wife's child care in state 2: Δc_{2f}	-0.0538*	0.0696**	-0.0099	-0.0060**
	(0.0275)	(0.0339)	(0.0064)	(0.0028)
Wife's child care in state 3: Δc_{3f}	-0.0080	-0.0054	0.0174***	-0.0040
	(0.0049)	(0.0035)	(0.0062)	(0.0025)
Wife's child care in state 4: Δc_{4f}	-0.0004**	-0.0064**	-0.0078	0.0147***
	(0.0002)	(0.0030)	(0.0048)	(0.0049)
Predicted probabilities	*17.42*	*60.46*	*11.43*	*10.69*

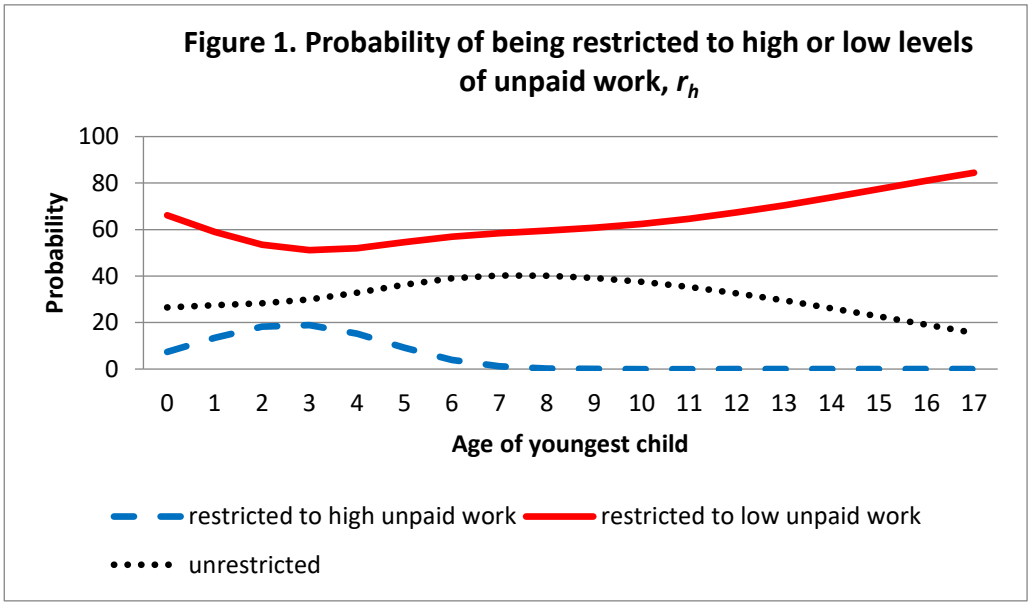
Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: MTUS Spain 2002-2003
Note: Marginal effects are evaluated for an individual with dummy variables equal to 0 and continuous variables equal to their averages, with the exception that child age is set equal to 4 (to focus on effects when children are young). Marginal effects are expressed in percentages.

The main focus of our paper is child care. The model includes children in three ways. First, there is the man's direct utility from spending time with his children, then there is the utility he derives from household production (producing, among other things, care for his children), and finally there is the influence of children on the degree to

which he is restricted in doing housework (due to cultural factors). We have already concluded that both time with children and household production have positive utility; so, in this sense, men do care about care.

Table 6 shows the marginal effects of changes in the hours of child care done by men and by their partners. To understand the magnitude of the marginal effects, these should be compared to the predicted probabilities for being in each state (last row of Table 6). The predicted probabilities suggest that the majority of men are predicted to be in state 2 (60%), followed by around 17% of men predicted to be in state 1.

The marginal effects describe how an increase in child care in state *j* changes the likelihood of being in each state for an individual with dummy variables set to zero, with a youngest child of age 4 and average values for all other variables[8]. For example, the first line of Table 6 shows the effect of this individual, if choosing state 1, having a bit more time with his children than before. We see that this increases the probability that he will be in state 1 by 0.08 percentage points, while decreasing his probability of being in the other three states. A marginal increase in the man's hours of child care in state 2 will increase the probability of being in state 2 by 0.15, an increase in state 3 will increase the probability by 0.03 and an increase in state 4 will increase it by 0.03. All these increases are significant. They show the total effect of a change in a variable, taking both the choice probability and the restriction probabilities r_e and r_h into account. One should note that both the shape of the utility function and that of the probability function plays a role here, as well as the average time spent in child care in each state. So an increase in men's child care in a state has the largest direct effect in state 2, due to this state having a probability relatively close to 0.5 (marginal effects are largest in the middle of the distribution and smallest at the tails).



[8] The marginal effects are computed simulating a change in male child care of about 18 seconds per state. This change has been calculated in the following way: first we have calculated for each state a 1% increase in average child care done by men; second we have computed the weighted average of these increases, using, as weights, the proportion of men in each state. As for wife's child care, the simulated change is about 54 seconds.

In the second part of Table 6 we show the marginal effects of a change in the partner's time used on child care. This increases household production, which enters the man's utility function. Also here, the direct effects (the effect on being in the state in which the variable is increased) are significantly positive, and the largest effect is found for an increase in time use in state 2.

The degree to which a man is restricted in doing housework is influenced by the age of the youngest child. In Table 5 one can find the coefficients for child age and child aged squared in the restriction probability for unpaid work, r_h. To assess the total effect of child age, we have calculated how the probability r_h changes with the age of the youngest child and looked at marginal effects.

Figure 1 shows how the probability of being restricted to high or low levels of unpaid work changes as the age of the youngest child increases. The probability of being restricted in care work depends on institutional and family characteristics. We include a regional dummy for living in the South of Spain, a quadratic term in child age, a dummy on whether the couple has a computer at home and a variable on female education. In Figure 1 it is calculated for a person not living in the South, with no computer at home and with a partner with average schooling (10 years). We see that at all times there is a high probability of the man being restricted in his ability to spend time with his children, being at its lowest when the youngest child is 3 years of age. When the youngest child is under 7, there is a possibility of the man having to spend time with child, even if he doesn't wish to. After the age of 3, it becomes increasingly more probable that the man will be restricted in the time he can spend with his children. So, in this sense, he cannot provide as much care as he might like to.

Table 7 -Marginal effects of the variables explaining the probability of being restricted in unpaid work, r_e. Percent.

	Change in probability of being in:			
	State 1: High level of employment High level of unpaid work	State 2: High level of employment Low level of unpaid work	State 3: Low level of employment High level of unpaid work	State 4: Low level of employment Low level of unpaid work
Increase in:	$\Delta Q_1 \cdot 100$	$\Delta Q_2 \cdot 100$	$\Delta Q_3 \cdot 100$	$\Delta Q_4 \cdot 100$
South	-3.6127	4.2175	-2.4019**	1.7970***
	(2.4629)	(2.8546)	(1.0128)	(0.6744)
Child age	-0.1314**	0.1492**	-0.0376*	0.0198
	(0.0585)	(0.0660)	(0.0209)	(0.0128)
Computer at home	1.0841	-1.3802	2.0950**	-1.7989***
	(2.4088)	(2.8185)	(1.0253)	(0.6937)
Woman's years of schooling	0.1149***	-0.1598***	0.0758***	-0.0309**
	(0.0377)	(0.0447)	(0.0221)	(0.0151)
Predicted probabilities	*17.42*	*60.46*	*11.43*	*10.69*

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Source: MTUS Spain 2002-2003

Note: Predicted probabilities and marginal effects are evaluated for an individual with dummy variables equal to 0 and continuous variables equal to their averages, with the exception that child age is set equal to 4 (to focus on effects when children are young). The marginal effect of dummy variables is computed changing the variable value from 0 to 1. Marginal effects are expressed in percentages.

Table 7 shows the marginal effects of the variables in the restriction probability for unpaid work, r_h. We see that a change in the age of the youngest child significantly decreases the probability of being in state 1, with a high level of unpaid work, and increases the probability of being in state 2. These changes are the combined result of the changes in probabilities illustrated in figure 1 and the underlying wishes of the man described by the utility function.

Table 7 also shows that living in the South increases the probability for men of being restricted to a low level of unpaid work. This can be connected to cultural aspects that restrict men to more traditional gender roles.

Having a computer at home, a proxy for cultural factors, decreases the probability of being restricted to low levels of unpaid work while it is not statistically significant for being restricted to high levels of unpaid work.

Finally, years of schooling of the partner increase the restriction probability to high levels of unpaid work and decrease the restriction probability to low levels of unpaid work. Education seems to increase women's bargaining power within the couple. This confirms a result that is commonly found in the literature (Gimenez-Nadal and Molina 2013, Bloemen et al. 2010, Mancini and Pasqua 2012).

The probability of being restricted in employment depends on the unemployment rate in the region in which the man lives and the ratio between the women's and the man's years of schooling. In addition, we add a dummy to the low employment state if the man is unemployed. This ensures that the probability of being restricted to low employment is close to 1 if a man is unemployed[9].

Table 5 indicates that high levels of regional unemployment decrease the probability of being restricted to high levels of paid work while they are not statistically significant for low levels of paid work. This is due to the dummy for unemployment taking out all the variability. The estimated parameters for the ratio between women's and men's years of education show that the more education the woman has in relation to the man, the less restricted the man is in employment.

4.3. Sensitivity analysis

The alternative specific variables in our model are derived from theory, so we do not consider them in our sensitivity analysis. On the other hand, one might think that the age of youngest child or whether you live in the South will influence your preferences. Columns 3 and 4 of Table 5 present the estimation results of two alternative specifications that investigate this: the former has the variables child age, child age squared, computer and education ratio among the preferences rather than among the restrictions, the latter has South acting as a preference variable. In these alternative specifications, the original variables in the preference probability (consumption, child care, household production, leisure and man's schooling) maintain their size and significance. The age of youngest child is

[9] Not all men that declare themselves as unemployed in our survey are observed to work 0 hours, and some unemployed men are actually observed in a high level of paid work (i.e. 6 out of the 90 unemployed men observed in our sample).

not significant when included in the preference probability. This indicates that our model (specification 2) is robust to this change, even though having a computer makes it more likely to provide a low level of paid work.

As for model in column 4, we observe that living in the South increases the probability of preferring state 2 vs. state 1, while it decreases the probability of preferring state 3 vs. state 1. Even so, including the variable South in the utility function does not lead to large changes in the rest of the model. In the following, we will also see if the different specifications have a great effect on predicted probabilities.

5. Predicting capability sets and counterfactual predictions

The estimated model is used to predict how many men are restricted in their possibility to choose among the 9 possible capability sets found in equation 19. In Table 8 we present the results of such predictions, distinguishing between fathers and men without children. These results are particularly interesting because they show that only 9% of fathers and 23% of men without children are completely unrestricted.

Table 8 - Predicted capability sets: numbers of men and percentages in each capability set

	Model with restricted capabilities		Sensitivity analysis 1		Sensitivity analysis 2	
	Numbers	%	Numbers	%	Numbers	%
Men with children (2839 obs.)						
C1: High paid & high unpaid	95	*3%*	97	*3%*	103	*4%*
C2: High paid & low unpaid	901	*32%*	874	*31%*	968	*34%*
C3: low paid & high unpaid	34	*1%*	31	*1%*	31	*1%*
C4: low paid & low unpaid	323	*11%*	290	*10%*	294	*10%*
C5: high paid	577	*20%*	732	*26%*	746	*26%*
C6: high unpaid	44	*2%*	33	*1%*	27	*1%*
C7: low unpaid	410	*14%*	313	*11%*	252	*9%*
C8: low paid	201	*7%*	227	*8%*	226	*8%*
C9: not restricted	254	*9%*	241	*9%*	192	*7%*
Total	2839	*100%*	2839	*100%*	2839	*100%*
Men without children (1786 obs.)						
C5: high paid	1011	*57%*	1083	*61%*	1166	*65%*
C8: low paid	356	*20%*	350	*20%*	352	*20%*
C9: not restricted	419	*23%*	353	*20%*	268	*15%*
Total	1786	*100%*	1786	*100%*	1786	*100%*

Source: MTUS Spain 2002-2003

Focusing on men with children, we see that 55% are restricted to high levels of paid work i.e. their capability sets are either C1 or C2 or C5. 58% are restricted to low levels of unpaid work (their capability sets are either C2 or C4 or C7). As for men without children, we see that the majority of them (57%) are restricted into high levels of paid work. The measurement of the capability sets demonstrates that the use of random utility models allows us to measure not only the preferences but also the constraints that men face.

The capability sets predicted following the two alternative specifications are very similar, with the exception that more men are restricted to high levels of paid work (capability set C5) and consequently less are completely unrestricted, in particular among men without children. This, again, indicates that our model is fairly robust to changes in specification.

Table 9 – Change in the number of men in each state if there are no constraints

	State 1: High level of employment High level of unpaid work	State 2: High level of employment Low level of unpaid work	State 3: Low level of employment High level of unpaid work	State 4: Low level of employment Low level of unpaid work
Total sample (4625 obs.)				
Absolute change	+178	-130	+366	-414
Percent change	+3.84	-2.82	+7.92	-8.94
Men with children (2839 obs.)				
Absolute change	+174	-261	+398	-311
Percent change	+6.12	-9.19	+14.03	-10.96
Men without children (1786 obs.)				
Absolute change	+4	+131	-32	-102
Percent change	+0.22	+7.31	-1.79	-5.74

Source: MTUS Spain 2002-2003

If all men were completely free to choose how much to work in the labour market and at home, we would observe men changing state according to their preferences. Table 9 reports the net changes in the number of men observed in each state if there were no constraints. In this case we would expect to observe more men in state 1 and 3, i.e. providing high levels of unpaid work, and fewer men in state 2 and 4, i.e. providing low levels of unpaid work. About 20% more men with children would choose to provide a high level of child care and household work, if there were no restrictions (there would be a net movement of 6.12% to state 1 and 14.03% to state 3). Men without children are assumed to be unconstrained in performing domestic activities, but can be restricted in doing paid work. If there were no restrictions more than 7% of men without children would choose to do more paid work (+0.22% in state 1 and +7.31% in state 2).

Table 9 nicely illustrates a very important point about the nature of capability sets, namely that many individuals with reduced capability sets do not miss the capabilities they are without. Table 9 shows that the net number of individuals changing their state is much lower than the (expected) number who we find are restricted. Table 9 only shows net changes, so gross changes are larger, but we would not expect them to be as large as the number experiencing restrictions.

6. Conclusion

This paper estimates the capability of men to provide care work utilising a random utility model. We find that, despite observing that men spend very little time in caring for their children, childcare matters to them. Nevertheless, they face many constraints both at the individual, household and regional level and therefore are constrained in the amount of time they can provide in caring for their children. The use of a random utility model allows the estimation of the probabilities of being restricted to different capability sets (or choice sets). We find that about 58% of fathers are restricted to capability sets where they cannot choose a high level of unpaid work. Many of these would not change behaviour if there were no restrictions, but about 20 % more men with children would choose to provide more child care and housework if there were no restrictions.

Men married to low educated women are more likely to be restricted to low levels of unpaid work. On the contrary, highly educated men prefer to spend more time in child care and domestic work. Living in the South of Spain increases the probability of being restricted to low level of unpaid work.

The probability of being restricted to a low level of care reaches a low point when the youngest child reaches the age of 3 and increases with the age of the youngest child after that. There is a probability of the man having to do a high level of care (being restricted to a high level of unpaid work) up to when the youngest child reaches school age.

Our modelling approach consisted of first reworking the data from a time use survey into a state space representation and then using a random utility model to distinguish preferences and restrictions. Our theoretical model posits a relationship between what we can observe, the choices made by couples, and what we cannot observe, the restrictions they face. At present, there are not many competing ways of achieving this, and our approach is therefore a valuable tool in understanding situations in which (unobservable) constraints play an important role. Our paper also shows that it is possible to estimate quite complicated behavioural models using time use surveys of limited size, indicating that the level of child care provided by men is not only a reflection of their wishes, but also a result of the prevailing norms and restrictions in society.

Bibliography

Andreassen L., Dagsvik, J. K. and Di Tommaso M.L., 2013. Measuring capabilities with random scale models. Women's freedom of movement**.** Working Papers del Dipartimento di Economia e Statistica "Cognetti de Martiis", 34. http://www.est.unito.it/do/home.pl/View?doc=WP_Dipartimento.html#2013

Bloemen, H., Pasqua, S. and Stancanelli, E.G.F., 2010. An empirical analysis of the time allocation of Italian couples: are they responsive? Review of Economics of the Household, 8: 345–369.

Bloemen, H. and Stancanelli, E.G.F., 2014. Market hours, household work, child care, and wage rates of partners: an empirical analysis. Review of Economics of the Household, 12(1): 51-81.

Connelly, R. and Kimmel J., 2009. Spousal influences on parents' non-market time choices. Review of Economics of the Household, 7(4): 361-394.

Dagsvik, J. K., 2013. Making Sen's Capability Approach Operational: A Random Scale Framework. Theory and Decision, 74: 75-105.

European Commission, 2014. Report on Progress on equality between women and men in 2013. http://ec.europa.eu/justice/gender-equality/files/swd_2014_142_en.pdf

Gimenez-Nadal, J.I. and Molina, J.A., 2013. Parents' education as a determinant of educational childcare time. Journal of Population Economics, 26: 719–749.

Guryan, J., Hurst, E. and Kearney, M., 2008. Parental education and parental time with children. Journal of Economics Perspectives, 22(3): 23–46.

Gutierrez-Domenech, M., 2010. Parental Employment and Time with Children in Spain. Review of Economics of the Household, 8(3): 371-391.

Kalenkoski, C.M., Ribar, D. C., and Stratton, L.S., 2009. The influence of wages on parents' allocation of time to child care and market work in the United Kingdom. Journal of Population Economics, 22(2): 399-419.

Kalenkoski, C.M., Ribar, D.C. and Stratton, L.S., 2005. Parental Child Care in Single Parent, Cohabiting, and Married Couple Families: Time Diary Evidence from the United Kingdom. American Economic Review, 95: 194-98.

Kanji, S. and Samuel R., 2015. Male Breadwinning Revisited: How Specialisation, Gender Role Attitudes and Work Characteristics Affect Overwork and Underwork in Europe, Sociology
Kimmel, J. and Connelly, R., 2007. Mothers' Time Choices. Caregiving, Leisure, Home Production, and Paid Work. The Journal of Human Resources, 42(3): 643-681.

Luce, D., 1959. Individual Choice Behaviour. New York: John Wiley and Sons Inc.

Mancini, A.L. and Pasqua, S., 2012. Asymmetries and interdependencies in time use between Italian parents. Applied Economics, 44: 4153-4171.

McFadden, D., 1973. Conditional Logit Analysis on Qualitative Choice Behaviour, in: Zarembka, P. (Ed.), Frontier in Econometrics, New York: John Wiley and Sons Inc., pp. 105-141.

McFadden, D., 1984. Econometric Analysis of Qualitative Response Models, in: Griliches, Z., Intrilligator, M.D. (Eds.), Handbook of econometrics Vol III. Oxford: Elsevier Science Publisher, pp. 1395-1457.

OECD (2017), Employment database, http://stats.oecd.org/index.aspx?queryid=54757. Last accessed 16/3/2017.

Pew Research Center, 2015. Raising Kids and Running a Household. How working parents share the Load. Report November 2015.

Sen, A.K., 1985. Commodities and Capabilities. Oxford: Elsevier Science Publisher.

Sen A.K., 1990. Gender and Cooperative Conflicts, in: Tinker, I. (Ed.), Persistent Inequalities. New York: Oxford University Press, pp. 458-500.

Sen, A.K., 1992. Inequality Re-examined. Oxford: Clarendon Press

Sen A.K., 1999. Development as a Freedom. Oxford: Oxford University Press

Sen A.K., 2009. The Idea of Justice. Harvard: Harvard University Press.

Sevilla-Sanz, A., Gimenez-Nadal, J.I., Fernandez, C., 2010. Gender roles and the division of unpaid work in Spanish households. Feminist Economincs 16:137–184.

Sims, S.A., 2010. But Economics Is Not an Experimental Science. The Journal of Economic Perspectives 24:59–68.

Slemrod, J. and Weber, C., 2012. Evidence of the invisible: toward a credibility revolution in the empirical analysis of tax evasion and the informal economy. International Tax & Public Finance, 19: 25-53.

Thurstone, L.L., 1927. A Law of Comparative Judgment. Psychological Review, 79: 281-299.

Appendix A: Interpretation of the share variable: an example

We interpret the variables α_{ej}, α_{hj}, α_{cj} e_{jT}, h_{jT}, and c_{jT} as describing the strategic interaction within the couple. To see why, consider a state space where each individual either works full-time or part-time defined as working more or less than 7 hours a day (at this point the numbers are only illustrative). This definition applies equally to men and women, but the characteristics of the states will be different between the genders. Assume that discussions within the couple, norms and labour market characteristics narrow the realistic options available to a couple to the following four states:

		Female	
		Full-time	Part-time
Male	1. Full-time	e_m=9, e_f=7	e_m=10, e_f=2
	2. Part-time	e_m=4, e_f=8	e_m=5, e_f=3

where each quadrant says how many hours the male and the female work in paid employment for different choice combinations. For the sake of simplicity, in this example we ignore all other activities. The above is an example of a standard game matrix, with the complication that also the contents of the payoff quadrants are affected by negotiation. The larger the state space, the more of the negotiation process can captured in the game matrix, while the smaller the state space, more of the process is embedded in the payoffs. In the following we only consider the male's choice between the two states of full-time and part-time employment, while, the response of the female is unobserved. We only observe average responses, so the above matrix collapses to:

		Consequence of an average response by the female
Male	1. Full-time	e_{1m}=9.5, e_{1f}=4.5
	2. Part-time	e_{2m}=4.5, e_{2f}=5.5

where, to keep things simple, we assume that half the women choose part-time and half full-time irrespective of the male's choice. This matrix can be reformulated using the share variables introduced earlier:

		Consequence of an average response by the female
Male	1. Full-time	e_{1T}=14, α_{e1}=0.68
	2. Part-time	e_{2T}=10, α_{e2}=0.48

where empirical counterparts to e_{1T} and e_{2T} are the averages observed among those working full-time and part-time respectively, while, as mentioned, α_{e1} and α_{e2} are estimated (in the table above we have for illustrative purposes inserted the averages) and we thus interpret the estimates of α_{e1} and α_{e2} as partly describing the strategic interaction within the couple. These estimated relationships are also used to input hours employed in all the different states (this is necessary, since we only observe each individual in one state).

Appendix B: Predicting hourly wages.

In order to predict hourly wage we use the Heckman Selection Procedure. We exclude couples with missing information on income, weekly hours, educational level and people aged more than 64 years old. The final sample is composed of 8691 men and 8953.

To compute the own hourly wage we used information about monthly labour income after taxes and the number of hours of paid work done in the last week. Since monthly labour income after taxes is defined in intervals in our data (for anonymity reasons), we decided to assign to each individual in an interval, the median wage of this interval. In order to compute the monthly hours of paid work, we took the number of working weeks in the month of the interview and we multiplied it by the number of hours of paid work done in the last week. The resulting observed hourly wage is monthly labour income after tax divided by the monthly number of hours of paid work. Table B1 shows mean monthly hours of paid work and mean hourly wage for those who are working.

Table B2 presents the results of our estimation, done separately for men and women. The dependent variable is the logarithm of the observed hourly wage. Table B3 presents the predicted hourly wage using the estimated coefficients.

Table B1: Monthly hours of paid work: men and women

	Men		**Women**	
	Mean	**SD**	**Mean**	**SD**
Monthly hours of paid work	149.6	42.3	139.6	45.2
Hourly Wage (€)	9.6	6.7	7.7	5.8

Table B2: Heckman selection procedure: dependent variable logarithm of wage, selection variable working/not working

	Men	Women
Wage equation		
Age	0.0318***	0.0410***
	(0.0072)	(0.0086)
Age square	-0.0003***	-0.0004***
	(0.0001)	(0.0001)
Educational level		
Illiterate or less than 5 years of school	-0.4380***	-0.6030***
	(0.0435)	(0.0764)
Primary education	-0.3556***	-0.4445***
	(0.0335)	(0.0605)
Secondary education	-0.3418***	-0.4182***
	(0.0281)	(0.0459)
High school, low professional degree	-0.2785***	-0.3488***
	(0.0277)	(0.0437)
High professional degree, general degree	-0.2055***	-0.2373***
	(0.0256)	(0.0326)
Partner educational level		
Partner: secondary education	0.0793***	0.0466
	(0.0175)	(0.0309)
Partner: above secondary education	0.1410***	0.1377***
	(0.0224)	(0.0353)
Partner: missing educational level	0.3826***	0.2400
	(0.1216)	(0.1865)
Occupation		
Management	0.4486***	0.3696***
	(0.0244)	(0.0289)
Finance/legal profsnl	0.6706***	0.5559***
	(0.0320)	(0.0525)
Scienc/engin/med prof	0.4126***	0.5043***
	(0.0314)	(0.0442)
Education professional	0.4155***	0.5825***
	(0.0427)	(0.0446)
Other professional	0.3298***	0.2705***
	(0.0369)	(0.0533)
Health/educ/soc care support	0.1770***	0.1302***
	(0.0568)	(0.0395)
Clerical/office support	0.1223***	0.1451***
	(0.0375)	(0.0349)
Security/armed forces	0.2099***	0.2557*
	(0.0369)	(0.1319)
Farm, forestry, fishing	0.1552***	0.0282
	(0.0343)	(0.0514)
Construct, /repair, transpt	0.1633***	0.0640*
	(0.0207)	(0.0376)
Self-employed non-professional	0.0445	0.0664
	(0.0556)	(0.1355)
Missing or not applicable	0.1837**	0.0086
	(0.0765)	(0.1099)
Public sector	-0.0389**	0.0154
	(0.0181)	(0.0237)

Rural area	-0.0369***	-0.0282
	(0.0124)	(0.0191)
Constant	1.1894***	0.7871***
	(0.1559)	(0.1867)
Selection equation		
Age	0.1999***	0.1337***
	(0.0179)	(0.0151)
Age square	-0.0027***	-0.0017***
	(0.0002)	(0.0002)
Educational level		
Secondary education	0.3900***	0.3678***
	(0.0410)	(0.0371)
Above secondary education	0.6869***	1.2500***
	(0.0557)	(0.0472)
Partner		
Age of the partner	-0.0017	-0.0183***
	(0.0048)	(0.0037)
Having an old partner	-0.3906**	0.0727
	(0.1642)	(0.0808)
Spanish citizenship	0.4218***	0.1104
	(0.1048)	(0.0868)
Rural/urban area		
Rural	0.0362	0.0471
	(0.0367)	(0.0295)
Age of the youngest child		
0	0.0964	-0.7007***
	(0.1299)	(0.0994)
1-2	0.1599	-0.2595***
	(0.1100)	(0.0781)
3-5	0.1074	-0.2136***
	(0.1018)	(0.0733)
6-7	0.0372	-0.0086
	(0.1065)	(0.0753)
8-9	0.1375	-0.0820
	(0.0976)	(0.0696)
10-12	0.1421	-0.0446
	(0.0981)	(0.0726)
13-17	0.0917	-0.0374
	(0.0697)	(0.0553)
Number of children	-0.0407	-0.1147***
	(0.0380)	(0.0285)
Constant	-2.9218***	-2.2807***
	(0.3923)	(0.2985)
Rho	-0.1097	0.2082***
	(0.0938)	(0.0872)
Lambda	-0.0546	0.1098***
	(0.938)	(0.0473)
Observations	8,691	8,953
Number not working	1,498	5,507

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B3: Predicted hourly wages in different labour income intervals

	Men			Women		
Monthly income interval	**Freq.**	**Mean**	**SD**	**Freq.**	**Mean**	**SD**
Not working	4,841	7.39	1.25	8,607	4.25	1.01
0 – 499 €	190	7.4	1.78	576	4.62	1.24
500 – 999 €	2,141	7.19	1.57	1,534	5.13	1.54
1000 – 1249 €	2,153	7.87	1.86	625	6.55	2.04
1250 – 1499 €	1,125	8.86	2.45	342	8.1	2.25
1500 – 1999 €	956	10.15	2.7	354	9	2.34
2000 – 2499 €	426	10.91	2.99	93	9.84	2.7
2500 – 2999 €	156	12.15	2.86	28	9.6	2.39
More than 3000 €	207	13.46	3.25	36	10.2	2.43
Total	**12,195**	**8.08**	**2.27**	**12,195**	**4.81**	**1.8**

Appendix C: Estimation of the share variables

We predict the minutes each man uses on the different activities in the different states, also in states where the individuals are not observed in. To predict the values of the couples' minutes of paid work, domestic work and care (e_{jT}, h_{jT}, and c_{jT})[10], we use the observed average for each combination of state and number of children. Table C1 shows these observed values. Therefore, the minutes each couple uses in the different states are the same for couples with the same number of children. The fraction of work done by men for each activity within the couple (α_{ej}, α_{hj}, and α_{cj}) is predicted based on the parameters found from estimations using a logit model. The estimates for α_{hj} are reported in Table 3 in the main text, while α_{ej} and α_{cj} are reported in Table C2 and C3 respectively. The resulting predicted consumption and hours used on child care, housework and leisure are reported in table C4, which also includes summary statistics for the other explanatory variables.

[10] See Section 3.2

Table C1: Observed minutes spent by men (M), women (W) and couples (CP) in paid work, housework and child care according to the number of children and the state in which the man is observed

Paid work

	State 1: High level of employment High level of unpaid work			State 2: High level of employment Low level of unpaid work			State 3: Low level of employment High level of unpaid work			State 4: Low level of employment Low level of unpaid work		
Nochildren	M	W	CP	M	W	CP	M	W	CP	M	W	CP
0	496.94	283.55	780.48	563.97	202.92	766.89	138.32	388.79	527.10	294.51	224.58	519.09
1	499.79	266.86	766.64	576.02	174.45	750.48	180.24	368.32	548.56	304.60	183.65	488.25
2	503.18	232.45	735.63	580.03	148.61	728.64	232.40	322.81	555.21	331.45	146.74	478.19
3+	518.70	239.57	758.26	588.48	121.32	709.80	194.76	305.71	500.48	326.21	150.69	476.90

Housework

	State 1: High level of employment High level of unpaid work			State 2: High level of employment Low level of unpaid work			State 3: Low level of employment High level of unpaid work			State 4: Low level of employment Low level of unpaid work		
No children	M	W	CP	M	W	CP	M	W	CP	M	W	CP
0	183.71	261.45	445.16	22.38	284.49	306.87	236.64	176.26	412.90	40.38	242.88	283.26
1	124.43	229.21	353.64	21.24	287.52	308.77	193.84	173.68	367.52	39.95	251.80	291.75
2	120.13	264.70	384.83	22.03	320.60	342.63	186.64	206.16	392.81	31.81	270.72	302.54
3+	95.65	266.96	362.61	14.30	332.65	346.95	149.52	233.81	383.33	26.55	292.07	318.62

Child care

	State 1: High level of employment High level of unpaid work			State 2: High level of employment Low level of unpaid work			State 3: Low level of employment High level of unpaid work			State 4: Low level of employment Low level of unpaid work		
No children	M	W	CP	M	W	CP	M	W	CP	M	W	CP
1	75.50	114.21	189.71	10.86	69.33	80.19	102.88	64.80	167.68	10.28	49.10	59.38
2	85.83	135.36	221.19	14.27	109.08	123.35	98.01	95.48	193.49	15.94	73.77	89.71
3+	103.04	170.87	273.91	15.96	130.40	146.36	148.57	129.05	277.62	12.76	75.86	88.62

Source: MTUS Spain 2002-2003

Table C2 -Estimation of the share of paid work done by the man in each state, α_{ej}. GLM using the logistic function.

	State 1: High level of employment High level of unpaid work	State 2: High level of employment Low level of unpaid work	State 3: Low level of employment High level of unpaid work	State 4: Low level of employment Low level of unpaid work
	α_{e1}	α_{e2}	α_{e3}	α_{e4}
Average wage in the couple	-0.0448**	-0.1429***	0.1379***	-0.0755***
	(0.0213)	(0.0086)	(0.0311)	(0.0190)
Wage ratio (m/w)	0.7053***	0.7547***	0.7777***	0.9288***
	(0.1324)	(0.0613)	(0.2119)	(0.1325)
Average age	0.0154**	0.0222***	0.0025	-0.0009
	(0.0075)	(0.0026)	(0.0100)	(0.0060)
Age ratio (m/w)	-0.4658	-0.7969***	-2.2205***	-0.1026
	(0.5756)	(0.2082)	(0.7071)	(0.4525)
No. of children: 1	0.2643*	0.2828***	0.3646*	0.2132*
	(0.1353)	(0.0537)	(0.2036)	(0.1248)
No. of children: 2	0.3795***	0.4883***	0.7651***	0.5309***
	(0.1333)	(0.0602)	(0.1961)	(0.1564)
No. of children: 3+	0.3869*	0.7382***	0.6479	0.5437**
	(0.2298)	(0.1230)	(0.4060)	(0.2223)
Constant	-0.4275	0.5962**	-1.0123	-0.5432
	(0.7253)	(0.2537)	(0.8970)	(0.5862)
N	376	3,153	399	697

Source: MTUS Spain 2002-2003
Ref category for no of children: 0 children
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C3 -Estimation of the share of paid work done by the man in state *j*, α_{cj}. GLM using the logistic function.

	Men's share of the time the couple uses on child care α_{cj}
Average wage in the couple	0.0580***
	(0.0143)
Wage ratio (m/w)	-0.1521**
	(0.0765)
Average age	-0.0071
	(0.0061)
Age ratio (m/w)	0.0483
	(0.2981)
No of children: 2	-0.1668***
	(0.0636)
No of children: 3+	-0.1914*
	(0.0993)
State *j*=2 (High paid Low unpaid)	-1.4800***
	(0.0692)
State *j*=3 (Low paid High unpaid)	0.6254***
	(0.0870)
State *j*=4 (Low paid Low unpaid)	-1.0912***
	(0.1159)
Constant	-0.3098
	(0.3730)
N	2,062

Source: MTUS Spain 2002-2003
Ref category for no of children: 0 children
Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C4 - Descriptive statistics by state of the man

Variable	Obs.	Mean	SD	Min	Max
State 1: Predicted Household Consumption (euros)	4625	95.55	28.52	43.36	248.39
State 2: Predicted Household Consumption (euros)	4625	96.15	27.25	44.87	225.03
State 3: Predicted Household Consumption (euros)	4625	57.74	20.65	25.05	186.00
State 4: Predicted Household Consumption (euros)	4625	59.97	17.67	28.17	143.02
State 1: Predicted Child care Man with children (hours)	2839	1.33	0.17	0.97	2.19
State 2: Predicted Child care Man with children (hours)	2839	0.22	0.04	0.14	0.40
State 3: Predicted Child care Man with children (hours)	2839	1.68	0.24	1.35	2.96
State 4: Predicted Child care Man with children (hours)	2839	0.21	0.05	0.13	0.39
State 1: Predicted Housework Man (hours)	4625	2.33	0.59	1.04	4.11
State 2: Predicted Housework Man (hours)	4625	0.38	0.26	0.05	1.89
State 3: Predicted Housework Man (hours)	4625	3.30	0.61	1.13	5.08
State 4: Predicted Housework Man (hours)	4625	0.62	0.28	0.14	1.81
State 1: Predicted Housework Woman (hours)	4625	4.30	0.39	2.99	5.74
State 2: Predicted Housework Woman (hours)	4625	4.93	0.41	3.03	5.82
State 3: Predicted Housework Woman (hours)	4625	3.19	0.55	1.85	5.46
State 4: Predicted Housework Woman (hours)	4625	4.20	0.38	2.67	5.16
State 1: Predicted Child care Woman with children (hours)	2839	2.17	0.29	1.52	3.14
State 2: Predicted Child care Woman with children (hours)	2839	1.52	0.37	1.01	2.26
State 3: Predicted Child care Woman with children (hours)	2839	1.43	0.34	0.76	2.45
State 4: Predicted Child care Woman with children (hours)	2839	1.02	0.21	0.70	1.31
State 1: Predicted Leisure Man (hours)	4625	4.41	0.22	3.65	4.80
State 2: Predicted Leisure Man (hours)	4625	5.32	0.24	4.42	5.76
State 3: Predicted Leisure Man (hours)	4625	7.81	0.88	5.89	9.19
State 4: Predicted Leisure Man (hours)	4625	8.89	0.38	7.39	9.54
Man’s age	4625	44.22	9.55	19.00	73.00
Man's years of schooling	4625	10.23	3.56	0.00	21.00
Male regional unemployment rate	4625	8.13	3.30	2.40	17.00
Education ratio (W/M)	4625	1.04	0.60	0	13.00
Man unemployed	4625	0.02	0.14	0.00	1.00
South	4625	0.22	0.41	0.00	1.00
Youngest child’s age	4625	5.28	5.91	0.00	18.00
Computer at home	4625	0.61	0.49	0.00	1.00
Woman's years of schooling	4625	10.00	3.51	0.00	21.00

Source: MTUS Spain 2002-2003

State 1 is a state of high paid work and high unpaid work; State 2 is a state of high paid work and low unpaid work; State 3 is a state of low paid work and high unpaid work; State 4 is a state of low paid work and low unpaid work.