TIME ALLOCATION WITHIN HOUSEHOLDS IN SPAIN AND CHANGES BETWEEN 2003 AND 2010

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(First Version)

Abstract. Using detailed Spanish time-use data in 2002-03 and 2009-10, we analyze spouses' time allocation and its evolution within household. The empirical model simultaneously specifies and estimates three time-use choices -paid work, childcare, and housework- for each spouse allowing for correlation across the errors of the six equations. We find significant differences between spouses and between 2003 and 2010. Our results show that in 2003, men married to women with university degree spend more time caring for their children. This effect disappears in 2010. Evidence shows that the number of children only affects the father's paid work load, but it has a stronger effect of mother's time allocation between paid work, unpaid work and childcare. Moreover, there are significant positive correlations between the unobservables of the equations suggesting positive assortative mating.

1. Introduction

One of the goals of the economy is the study of how agents allocate scarce resources. Time is a limited resource in the economy and unlike the scarcity of goods, the 24 hours per day time constraint does not relax in a growing economy (Hamermesh and Lee, 2007). Thus, how it is allocated is of interest in and of itself.

It is often claimed that parents, and in particular parents with small children, is a group suffering more from the lack of time than most other groups. The major explanation for any change in the situation of families with children is the increased female labor force participation, the better wage and employment opportunities for women and the fact that in most families, both parents work in the market. But one could also mention increased separation rates and the increased frequency of single parenthood. Single mothers are vulnerable both to budget and time squeezes.

Economic theory of time allocation is not very conclusive and the implications depend on, for instance, what is assumed about time with children, i.e., whether it is to be considered as "preferred leisure" or just an input in the house-hold production process. In a traditional Becker (1965) type of model, the parents' comparative advantages are very important in determining the allocation of time, while it is unimportant who generates the incomes and hence, who gets an income change. In the cooperative bargaining model (Apps and Rees (1997)), the comparative advantages are still important but the outside options for each parent will modify and dampen the results given by the Becker type of model. The income of each family member is of importance for the intra-household allocation of resources. In non-cooperative models, one parent's decision about time in home production and market work will depend on the actions of the other. In these models, the relative importance of comparative advantages is even lower than in the cooperative model.

Changes in parents' endowment of human capital, relative wages and incomes and public policies for providing inexpensive child care and other benefits to families with children have certainly influenced people's allocation of time. Much effort has gone

into analyzing their impact on the supply of labor. We know relatively less about the effects on time-use outside the labor market.

In this paper, we analyze the factors that determine how Spanish couples allocate their time between three time uses (paid work, unpaid work and childcare) and their trend between 2003 and 2010. The major contribution of the study is the simultaneous estimation of both partners' time use allocation within the same household and the comparison between 2003 and 2010. The interactions between spousal decisions are of great relevance. Therefore, we estimate the correlations across the unobservables of the partners' time use equations, which helps to shed light on the significance and the direction of the interactions between the two spouses (Bloemen et al., 2010).

Focusing on the literature review, Bloemen et al. (2010) looked at time allocation of Italian couples to child care, housework, and market work. They found that spousal time allocation is sensitive to personal and household characteristics, such as, education and children's age. We have also founded this conclusion. The study reveals evidence that men married to more highly educated women spend more time with their children. They also found that husband's own characteristics have less of an effect on women's time allocation. The researchers reported that individuals who have preferences for market work will have preferences for performing less childcare and fewer household chores. Furthermore, the time devoted by parents to childcare is complementary and that the time they devote to housework is substitutable.

Similarly, in an analysis of Swedish dual-earner married or cohabiting couples with children by Hallberg and Klevmarken (2003), it is stated that parents do not substitute for each other in activities with their children, but rather complement each other. They found that males' market time has a negative effect on the time with children and positive effect on his spouse's time with the children. On the contrast, researchers reported that variations in the wife's hours of market work neither have any significant effects on her own child related time nor on that of her husband. They also found that parents' provision of child care was not directly related to changes in their own wages.

Bloemen et al. (2008) and Kalenkoski et al. (2009) have done further research on the impact of own and partner's wages on their time allocation. The first one analyzes time allocation of French spouses and the impact of economic variables. They found that parents' market time responds positively to changes in own wage. They also found that women's non-market time is independent of their husband's wage; but both, housework and childcare of fathers react positively to an increase in their wife's wage. Similarly, Kalenkoski et al. (2009) examines the impacts of own and partner's wages on parents' provision of child care and market work on weekdays, weekends and holidays. They conclude that while women's time allocation to paid work and childcare responds to own and cross (spouse's) wage increasing their market work, they found little evidence that men's time use responds to changes in their own wages but yes to its spouses' increasing husbands' passive child-care time on weekends and reduces their market-work time on weekends.

For the Spanish case, Sevilla-Sanz et al. analyze changes in the time allocation decisions of the Spanish population from 2003 to 2010. They found that a general decrease in men's market work coupled with increases in men's unpaid work, child care and leisure, and a general decrease in women's unpaid work coupled with increases in childcare and leisure.

Our main results are the following: In 2003, men married to women with university degree spend more time taking care for their children whereas in 2010, female's married to more highly educated males spend more time with their children. Also, the number of children only affects the father's paid work load, but is has a stronger effect of mother's time allocation. Regarding the effect of having domestic service, it seems to have a higher impact on wives' time allocation, rather than husband's. Most estimated correlation coefficients are statistically significant finding positive assortative mating in the three uses of time and complementarity in childcare.

The remainder of the paper is organized as follows. Section 2 specifies an econometric model for an empirical analysis. Section 3 discusses the data, explains the selected

samples. Section 4 reports a brief description of the samples. Section 5 shows the main results of the analysis. Section 6 sets out the main conclusions.

2. The empirical model

Our goal is to analyze how spouses allocate their time between paid work, housework and childcare and which factors determine the time devoted to each option. Therefore, we model simultaneously the three different time uses for the two spouses within each household based on the model proposed by Bloemen et al. (2010). The empirical time allocation model can be summarized as follows:

$$t_{ijk} = x_{ih}\,\beta_{jk,h} + x_{iw}\,\beta_{jk,w} + x_{iho}\,\beta_{jk,h} + e_{ijk} \quad j = 1,2,3 \quad \mathrm{k} = \mathrm{h,w} \quad \text{and} \quad i = 1,\dots,N \qquad (1)$$

where t_{ijk} is the time spent on activity j, with j = 1, 2, 3 (time at work, time for household work and time with children, respectively) by household member k, with k = h, w (where h is husband and w is wife), in household i, with i = 1, …. , N. We model the time uses as a function of observed spouse characteristics, x_{ik} , k = h, w, household characteristics x_{iho} and e_{ijk}, unobservables.

The way we constructed this system allows spending 0 time in a given activity. This could be either the result of personal choice or may be due to random sampling of the day the diary was filled in, so that on that particular day, that given activity was not performed.

Regarding the error term, since according to theory, spouses' decisions are taken simultaneously, we allow the errors of the six time use equations (three for each spouse) to be correlated to each other to allow for the simultaneity of spouses' time allocation choices. Therefore, we define:

$$\mathrm{w_i} = (\epsilon'_{\mathrm{ih}}\ \epsilon'_{\mathrm{iw}})' \text{ with } \mathrm{w_i} \sim \mathrm{N}(0, \sum) \qquad (2)$$

where ∑ is the unrestricted variance-covariance 6 by 6 matrix of the errors of the six equations system. Correlations between the errors of the six time-use equations may

arise from unobserved couple-specific correlations in preferences (for example, unobserved positive assortative mating or specialization effects), from unobserved productivity effects (someone who is productive in the labor market may also be productive in housework, or the opposite, if labor market attachment prevents individuals from accumulating housework experience) or from household-specific heterogeneity in market prices for housework and child care services, since we do not observe these variables.

In conclusion, the complete model we are going to estimate consists of the six time-use equations in equation (1) and the joint density of the errors in equation (2).

We estimate the models by Three-Stage Least Squares (3SLS). This method is the most commonly used full information estimator, making use of restrictions on all the equations of the simultaneous equation model. It takes into account the simultaneity of the equations and the cross-equation correlation. The resulting estimates of 3SLS method are consistent, and asymptotically efficient.

3. Data

The data used for our empirical analyses is drawn from the Spanish Time Use Survey (STUS), part of the Harmonized European Time Use Surveys (HETUS) launched by of Eurostat, the statistical office of the European Union. The STUS is a national, household-based study with multiple questionnaires (household and individual) and an activities diary that was conducted in 2002-03 and 2009-2010 over 12- month periods by the Spanish National Statistics Institute. We use both surveys in our empirical analysis.

The questionnaires collect information on household characteristics such as income, housing, and family composition as well as individual characteristics that include education, employment status, earnings, and demographic information. All household members at least 10 years of age were asked to fill out a time diary for one randomly chosen 24-h period (the same day for all members). They were instructed to record

their main activity, any secondary activity undertaken simultaneously, and who was with them for each 10-min period (from 6:00 a.m. until 6:00 a.m. the following day).

Furthermore, the time-use diary data used here is particularly advantageous over other diary surveys because they are less sensitive to the recall and aggregation bias that is associated with broader survey questions capturing average time spent (Bianchi et al. 2006). They are less sensitive to the recall bias due to the shorter recall period. Also, they are less susceptible to aggregation bias because respondents report all activities sequentially and thus account for the full 1440 minutes in the day (Kalenkoski et al. 2011). Furthermore, they contain diary information not only on the respondent, but also on the spouse which is crucial for the construction of a measure of specialization within the household. Finally, time diaries provide information on non-market activities that is generally unavailable in labor force surveys (Burda et al. 2012).

Since one of our aims is to analyze how the time allocation between couples evolves from 2003 to 2009, sample's comparability must be taken into account. The main disadvantage is that the number of possible activity codes is greater in 2002-03 than in 2010-10. Therefore, we tackle it creating well defined categories, which will be explained below. Moreover, both surveys have the same sampling method (two-staged stratified sampling) and select equally the individuals (age 10 and older). On account of this, comparisons of changes in time allocation in Spain seem fairly safe.

3.1 Final Sample selection

We are interested in analyzing simultaneously the time allocated by husband and wife to paid work, unpaid work and childcare. Therefore, our target group is heterosexual couples with children aged between 20 and 65 who are working full time. Based on these requirements, we are going to restrict the initial data obtained from the Spanish Time Use Survey to get our final sample.

The starting points are the 2002-03 survey, which covered 46,774 diaries from 60,493 people living in 20,603 households, and the 2009-10 survey with 19,295 diaries from 25,895 people living in 9,541 households. We restrict the sample to couples[1] between the ages of 20 and 65 reporting positive earnings and working full-time. Same sex relationships are excluded. Furthermore, in order to get a better understanding of the time allocation, we include only individuals that report a usual day. For the sake of consistency, persons who fail to provide complete information on the variables of interest are excluded. Finally, the time-diary sample is further restricted to include households with dependent children. Hence, this exclusion results in a final sample that includes 1374 households in 2003 and 631 in 2010.

3.2 Time use variables and explanatory factors

The diary collects information on the time spent on a large number of tasks. We distinguish between the following three main activities:

1) Paid work, as time spent in paid sector on main jobs and second jobs, including time spent commuting to/from work.

2) Unpaid work, including time devoted to culinary activities, household maintenance, tailoring and care of clothing, gardening and pet care, constructions and repairs, shopping and services, household management and journeys made due to purchases, services and other household and family activities. And

3) Child care, as any time spent on child care as primary activity, such as physical childcare, supervision, teaching the children, reading, playing and talking with children, accompanying them and journeys made due to childcare.

[1] We select cohabitant couples, both, married and unmarried.

As far as education goes, we define 4 dummy variables capturing its impact. The first one, used as the reference group, captures the impact of lower than compulsory education, the second one for more than compulsory education, specifically for secondary education; the third one, for vocational studies, and the last one captures the impact of having a university degree.

We also control for age and job characteristics such as occupation and activity. Next, we constructed controls for the age of the youngest child in the household (categorized into 0-2 and 3-5), the number of children under 17 years old, and dummies to identify households with domestic services, the size of the town and the region where they live and whether the survey was filled in during a week day or weekend.

In order to tackle the working selection problem, we use two steps Heckman procedure. The explanatory variables used to estimate the probability of being working are: age, age square, region, education level, number of children and the age of the youngest child in the household (0-2 and 3-5). The estimated Mill's ratio has been used as a regressor in the simultaneous time-use equations model.

4. Descriptive analysis

Descriptive statistics are provided in Table 1. The average age in 2003 is 41 years for men and 39 years for women, which becomes 40 and 38.5 in 2010. In overall, not only the sample is more educated in 2010 than in 2003 but specifically women are slightly more educated than men. The percentage of husbands and wives with compulsory education remains almost unchanged, in around 10 percentage points. However, this is not the case for the secondary education, which suffers a decrease of 5 percentage points in the case of males and 6 percentage points in the case of females. This fall is counteracted with a similar increase (5 percentage points) among husbands with vocational training from 17 percentage points up to 22 percentage points, and among wives with university degree, from 29 percentage points up to 34 percentage points,

remaining constant the percentage of males with university degree and wives with vocational training.

Table 1 Sample descriptive statistics (Standard deviations between brackets)

	Husbands		Wives	
	2002-03	2009-10	2002-03	2009-10
Age	41.30	40.51	38.93	38.58
	(6.56)	(6.65)	(6.05)	(5.98)
Primary education	0.13	0.14	0.11	0.11
	(0.33)	(0.35)	(0.31)	(0.32)
Secondary education	0.47	0.42	0.44	0.38
	(0.50)	(0.49)	(0.50)	(0.49)
Vocational training	0.17	0.22	0.16	0.16
	(0.38)	(0.41)	(0.37)	(0.37)
University degree	0.23	0.23	0.29	0.34
	(0.42)	(0.42)	(0.46)	(0.47)
Hourly wage, Euros	7.84	8.35	7.18	7.81
	(4.68)	(3.89)	(7.53)	(4.32)
Paid work (hours per day)	7.28	6.52	5.46	4.73
	(4.51)	(4.67)	(3.88)	(3.94)
Unpaid work (hours per day)	1.39	1.61	3.64	3.40
	(1.71)	(1.75)	(2.08)	(2.01)
Child care (hours per day)	0.77	1.25	1.39	1.91
	(1.17)	(1.57)	(1.63)	(2.02)
Household characteristics				
Total number of children	1.57	1.55		
	(0.66)	(0.63)		
Youngest child aged 0–2	0.21	0.29		
	(0.41)	(0.46)		
Youngest child aged 3–5	0.18	0.21		
	(0.39)	(0.41)		
Domestic paid services	0.24	0.14		
	(0.43)	(0.35)		
Sample size	1374	631		

Interestingly, husbands' average wage per hour is higher than wives' average wage, not only in 2003 but also in 2010. However, this difference slightly decreases due to the fact that both wages increase but that of wives increases in a larger rate than their partner's: 7.84 up to 8.35 in the case of males and 7.18 up to 7.81 in the case of females.

From the time use point of view, a clear pattern of specialization within the household emerges from Table 1. Husbands account for the larger share of paid work. On the

other hand, wives do a lot more of housework and childcare than do their husbands, although the difference between genders is much smaller in the case of childcare.

Regarding the distribution of time, must be stressed out the fact that this descriptive statistics represents those couples fulfilling the survey during a week day but also a weekend day. The table shows that married men devote to market work in average 1.8h more than married women: 7.28h (2003) and 6.52 h (2010) relative to 5.46h and 4.73h of women. Note that even there has been a decrease for both genders, this difference remains almost equal. In contrast, women devote on average more than twice time to unpaid work than men. However, this difference diminishes slightly in 2010, because the time husbands devote to household chores increases whereas wives' decreases: 3.64h (2003) and 3.40h (2010) for women to just 1.39 h and 1.61 for men. Moving to childcare, we observe that time devoted to this activity is the lowest for both, husbands and wives, though there is an increase from 2003 to 2010. As happens with time devoted to unpaid work, wives spend more time with their children than husbands. While husbands devote, on average, 0.77 hours a day in 2003 and 1.25 hours in 2010 to child care their spouses devote 1.39 hours in 2003 and 1.91 hours in 2010.

The average number of children is 1.57 per couple in 2003 and 1.55 in 2010. In 21% of the households the youngest child is below 3 years of age in 2003 increasing up to 29% in 2010 years, while in 18% of the families, the youngest child is between 3 and 5 years in 2003 and this percentage raises to 21% in 2010. Last, it can observe how the percentage of households with domestic service shrinks notably, from 24% to 14%, between 2003 and 2010. This may be a clear effect of the economic crisis Europe is going through.

5. Results of estimation

The econometric model is estimated for the two years the survey was conducted, 2003 and 2010. For each year we have proceed to estimate a simultaneous six-equation system, where dependent variables (t_{ijk}) are (i) time devoted to paid work; (ii) time

devoted to housework ; and (iii) time devoted to childcare for each spouse. We allow for corner solutions and correlation across the errors of the six equations, because our aim is to analyze how couples within the same household allocate their time jointly.

Results of the estimation of the model are displayed in Table 2 whereas the correlations of the unobservables of the six equations of the model are presented on Tables 3 and 4. They are, generally, significant, confirming the importance of allowing for simultaneity.

5.1 Results of the model

We will analyze the factors determining how wives and husbands allocate their time regarding paid work, unpaid work and child care. Also, we will analyze whether there is any significant variation from 2003 to 2010.

Age does not have any influence neither on paid work nor on unpaid work for women. The effect of education for women varies from 2003 to 2010. While in 2003 education has no effect on wives time allocation, in 2010 we find that women with university degree spend significantly more time on childcare activities though we do not find evidence of any impact on paid work and unpaid work. Regarding men, no effect of education on child care activities is found neither in 2003 nor in 2010. We find that men with university education work more hours and spend fewer hours doing unpaid work at home.

Interestingly, in 2003, men married to women with university degree spent, on average, more time taking care for their children. This effect disappears in 2010. This finding is consistent with Bloemen et all. (2010). Similarly, in 2010, female's married to more highly educated males spend more time with their children. We also find that these women perform significantly fewer household chores.

The number of children only affects the father's paid work load, but is has a stronger effect of mother's time allocation. In 2003 having dependent children at home reduced their time devoted to paid work and increased their unpaid work and childcare activities. However, this trend changes in 2010. In 2010 the number of children

increases the time devoted to market work, and has no significant effect on the other uses of time.

In 2003, the presence of young children reduces husband's market hours while it strongly increases their childcare time. Childcare activities of wives also increase with the presence of children under six while no effect is found on paid work hours and a negative effect is found on housework load. However, in 2010, the negative effect on husband's paid work load disappears and a negative effect on household chores shows up, keeping the rest of the significant impacts unchanged.

Having domestic service seems to have a higher impact on wives' time allocation, rather than husband's. Decreases the time females spend in household chores but not their partner's, and increases the time both spouses spent with their offsprings.

Finally, it's clear that the time spend varies significantly depending if it is a week day or not. We found that spouses devote more time to paid work during week days whereas unpaid work is higher during the weekend. Moreover, it is interesting the difference we found, between husbands and wives, in the effect of the day of the week on the time they spent caring for their children. While husbands spent less time in childcare activities on weekdays than during the weekend, we find that the opposite occurs for wives.

Table 2 Results of estimation

	Husbands		**Wives**	
	2002-03	2009-10	2002-03	2009-10
Paid work				
Age	-0.38	1.17***	-0.49	-0.40
	(0.42)	(0.69)	(0.38)	(0.63)
Age squared	0.005	-0.01***	0.007	0.005
	(0.005)	(0.008)	(0.005)	(0.008)
Secondary education	-0.62***	0.49	0.45	-0.02
	(0.33)	(0.44)	(0.32)	(0.51)
Vocational studies	-0.61***	-0.91***	0.58	0.36
	(0.35)	(0.48)	(0.38)	(0.54)
University degree	-0.73	2.14***	-1.00	-2.90
	(0.47)	(1.21)	(1.72)	(2.11)
Spouse's age	-0.10	-0.19	0.32***	-0.48**
	(0.19)	(0.26)	(0.17)	(0.21)
Spouse's age squared	0.001	0.002	-0.004***	0.006**
	(0.002)	(0.003)	(0.002)	(0.002)
Spouse's secondary ed.	0.27	1.11**	-0.76**	0.15

	(0.32)	(0.48)	(0.30)	(0.41)
Spouse's vocational studies	0.25	0.86	-0.78**	0.46
	(0.37)	(0.55)	(0.35)	(0.43)
Spouse's University degree	-0.62	0.56	-1.11*	0.26
	(0.37)	(0.53)	(0.36)	(0.49)
Number of children	0.19	0.54**	-0.33**	0.59*
	(0.14)	(0.21)	(0.14)	(0.20)
Youngest child 0–2 years	-1.26**	-0.36	0.44	-0.08
	(0.60)	(0.41)	(1.25)	(0.73)
Youngest child 3–5 years	-1.28*	0.74	0.30	0.75
	(0.49)	(0.50)	(0.82)	(0.78)
Domestic Service	-0.32	-0.15	0.32	-0.60
	(0.24)	(0.40)	(0.24)	(0.40)
Week day	6.52*	6.29*	4.64*	4.58*
	(0.19)	(0.26)	(0.19)	(0.25)
Lambda	-6.23	11.92**	-3.02	-7.55
	(4.23)	(5.86)	(4.02)	(5.70)
Unpaid				
Age	0.06	-0.32	0.50**	0.12
	(0.22)	(0.36)	(0.24)	(0.39)
Age squared	-0.0007	0.004	-0.006***	-0.0009
	(0.003)	(0.004)	(0.003)	(0.004)
Secondary education	0.22	-0.41***	-0.12	0.06
	(0.17)	(0.22)	(0.20)	(0.31)
Vocational studies	0.40**	0.19	-0.16	-0.24
	(0.17)	(0.24)	(0.24)	(0.33)
University degree	-0.19	-1.46**	1.34	0.36
	(0.24)	(0.63)	(1.12)	(1.30)
Spouse's age	-0.03	0.10	-0.17	0.04
	(0.10)	(0.13)	(0.10)	(0.13)
Spouse's age squared	0.0007	-0.001	0.02***	-0.0006
	(0.001)	(0.002)	(0.001)	(0.001)
Spouse's secondary ed.	-0.12	-0.26	0.16	-0.09
	(0.16)	(0.24)	(0.18)	(0.27)
Spouse's vocational studies	0.08	-0.28	0.31	-0.02
	(0.18)	(0.28)	(0.21)	(0.29)
Spouse's University degree	0.08	0.24	0.03	-0.59***
	(0.18)	(0.27)	(0.22)	(0.31)
Number of children	-0.003	-0.06	0.41*	-0.09
	(0.07)	(0.11)	(0.08)	(0.12)
Youngest child 0–2 years	0.41	0.03	-1.57***	-0.55
	(0.31)	(0.21)	(0.81)	(0.45)
Youngest child 3–5 years	0.09	-0.44***	-1.26**	-0.79***
	(0.26)	(0.26)	(0.54)	(0.48)
Domestic Service	0.006	0.03	-0.59*	-0.006
	(0.12)	(0.20)	(0.14)	(0.24)
Week day	-1.17*	-0.90*	-0.78*	-0.61*
	(0.09)	(0.13)	(0.11)	(0.15)

Lambda	0.43	-3.32	4.59***	1.60
	(2.24)	(3.01)	(2.63)	(3.51)
Childcare				
Age	0.31**	-0.12	0.19	0.96*
	(0.14)	(0.30)	(0.15)	(0.33)
Age squared	-0.004**	0.001	-0.003	-0.01*
	(0.002)	(0.004)	(0.002)	(0.004)
Secondary education	-0.04	0.07	0.07	0.28
	(0.10)	(0.19)	(0.12)	(0.27)
Vocational studies	0.03	0.29	0.007	0.42
	(0.11)	(0.20)	(0.15)	(0.29)
University degree	0.21	0.17	0.24	3.46*
	(0.15)	(0.53)	(0.69)	(1.11)
Spouse's age	0.02	0.09	-0.07	0.10
	(0.06)	(0.11)	(0.07)	(0.11)
Spouse's age squared	-0.0004	-0.001	0.0007	-0.001
	(0.0007)	(0.001)	(0.0007)	(0.001)
Spouse's secondary ed.	0.07	-0.19	0.03	0.37
	(0.10)	(0.20)	(0.11)	(0.23)
Spouse's vocational studies	0.01	-0.16	0.01	0.04
	(0.11)	(0.23)	(0.13)	(0.25)
Spouse's University degree	0.22***	0.00008	0.12	0.58**
	(0.12)	(0.22)	(0.14)	(0.27)
Number of children	0.04	0.05	0.10***	0.16
	(0.04)	(0.09)	(0.05)	(0.11)
Youngest child 0–2 years	1.32*	1.39*	2.04*	1.16*
	(0.19)	(0.17)	(0.50)	(0.39)
Youngest child 3–5 years	0.95*	0.57*	0.97*	-0.14
	(0.16)	(0.21)	(0.33)	(0.41)
Domestic Service	0.20*	-0.05	0.15	0.51**
	(0.07)	(0.17)	(0.09)	(0.21)
Week day	-0.21*	-0.26**	0.30*	0.50*
	(0.06)	(0.11)	(0.07)	(0.13)
Lambda	3.11**	-1.75	0.07	8.22*
	(1.37)	(2.53)	(1.62)	(2.99)

*Significance at the 1% level, ** Significance at the 5% level and *** Significance at the 10% level. In the estimation we also control for occupation, activity, region of residence and size of the town.

5.2 Effects of the unobservables

The empirical model allows the errors of the three time-use equations of the spouses within each household to be correlated with each other. Tables 3 and 4 show the estimates of these correlations and their standard deviations for 2003 and 2010, respectively.

For the interpretation of the correlation coefficients, it is important to be aware that they do not represent total correlations between time uses, but the residual correlations that cannot be explained by the variables included in the time allocation equations. Thus, it must be taken into account that these correlations may not only capture the unobserved individual preferences, but also all the omitted variables in the regression.

Most estimated correlation coefficients between the unobservables of the equations are statistically significant and no changes are found from 2003 to 2010.

There is a negative correlation between the unobservables explaining market job and non market activities, reflecting that the unobservables that increase market job will decrease the time spend on household chores and child care time.

Table 3 Covariance matrix errors for the model in 2003: standard deviations on main diagonal, correlation coefficients off-diagonal.

	Paid work husband	Housework husband	Childcare husband	Paid work wife	Housework wife	Childcare wife
Paid work husband	3.19					
Housework husband	-0.38**	1.54				
Childcare husband	-0.21**	0.06**	1.00			
Paid work wife	0.33**	0.006	0.03	3.13		
Housework wife	-0.03	0.15**	0.02	-0.52**	1.91	
Childcare wife	0.03	-0.03**	0.25**	-0.26**	0.002	1.22

** Significance at the 5% level

The unobservables of the equations explaining paid work of both spouses are positively correlated. This suggests that wife and husbands have similar unobserved preferences regarding their market work. These findings are consistent with Bloemen et all. (2010). We also find this positive correlation in the unobservables of the

equation determining unpaid work. This suggests positive assortative mating; individuals marry others who have similar tastes for market and non-market work.

Moreover, the unobservables of the equations explaining child care of both spouses are positively correlated. This suggests that the time spend by parents taking care of their children is complementary, supporting the research done by Hallberg and Klevmarken (2003).

Table 4 Covariance matrix errors for the model in 2009: standard deviations on main diagonal, correlation coefficients off-diagonal.

	Paid work husband	Housework husband	Childcare husband	Paid work wife	Housework wife	Childcare wife
Paid work husband	2.94					
Housework husband	-0.44**	1.53				
Childcare husband	-0.26**	-0.02	1.24			
Paid work wife	0.19**	0.01	0.06	3.00		
Housework wife	-0.008	0.09**	-0.06	-0.54**	1.82	
Childcare wife	0.12**	-0.08	0.09**	-0.42**	0.05	1.58

** Significance at the 5% level

6. Conclusions

This paper is focused on the time allocation of parents and its trend from 2003 to 2010. We study simultaneously spouses' time allocation decisions regarding market work and non-market time, distinguishing three time uses: paid work, childcare and housework. We exploit the richness of information collected by the 2002-03 and 2009-10 Spanish time-use survey to estimate the model.

Men and women married to highly educated partners spent, on average, more time taking care for their children. Having domestic service seems to have a higher impact on wives' time allocation, rather than husband's. We found that spouses devote more time to paid work during week days whereas unpaid work is higher during the weekend. Furthermore, husbands spent less time in childcare activities on weekdays than during the weekend, and the opposite is also true for wives. Evidence show that the number of children only affects the father's paid work load, but is has a stronger effect of mother's time allocation.

Most estimated correlation coefficients are statistically significant, confirming the importance of allowing for simultaneity. Furthermore, we found no statistical difference from 2003 till 2010. The unobservables of the equations explaining paid work and unpaid work of both spouses are positively correlated suggesting positive assortative mating. Also, the unobservables of the equations explaining child care of both spouses are positively correlated, indicating complementarity. These results coincide with the ones done by Bloemen et al.(2010) and Hallberg and Klevmarken (2003).

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