How does the Presence of Children Affect Adult Care and Labour Decisions? The Demonstration Effect Approach.[*]

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Abstract

In this paper, we study the influence children have on parental allocation of time, basing our analysis on the *Demonstration Effect*. We develop a model to explain time-transfers between generations. Using the 2002-03 Spanish Time Use Survey, we estimate a SUR model on the time parents spend in adult care, child care and market work activities, accounting for the effects of the presence of children. The *Demonstration Effect* increases the intensity of dependent care-giving, with this being higher for highly educated people. The state dependency of parents to children cannot explain the presence of children in the adult care activities. **JEL Classification:** J13, J14, J22, D64

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1   Introduction

Demographic changes in the European population in the last thirty years have led to a dramatic increase in the rate of growth of the elderly population in Europe, with population ageing being one of the most important challenges for all European countries. This leads to an increase in the number of people requiring care, which in turn generates increased need for informal care and social services. The ageing process is expected to continue because of the increase in life expectancy and low birth rates.

Care for the elderly is normally provided by family members. Family caregivers normally bear the economic and non-economic costs, including forgone labor supply and leisure. In order to develop policies to support caregivers, it is important to identify and evaluate the opportunity costs associated with informal care, but also how dependent care responsibilities impact on personal and family decisions, since these decisions may affect future inter-generational time transfers, and labor decisions.(e.g., Wolff 2001)

Some questions about the future viability of this pattern have appeared because of the increase of female labor force participation, and changes in family members' relationships. In this context, we analyze the effect that the presence of children has on both labor market decisions and caregiving activities. Specifically, our purpose is to analyze the effects that the *Demonstration Effect* (e.g., Cox and Stark 1996, Cox and Stark 2005) has on the time devoted to dependent care and labor supply. To do that, we first develop a theoretical model with a family consisting of three generations. This theoretical framework will be empirically tested using Seemingly Unrelated Three-Regression (SUR) models, of the time parents spend on adult care, on child care and in market work activities. This allows us to exploit error correlation across equations. We analyze how the number of children in the household, and the presence of children during the adult care activities, the *Demonstration Effect*, influences the time devoted to all three activities. We provide a theoretical model and empirical examination of how the *Demonstration Effect* should affect the time allocation decisions of parents.

We apply our framework to Spain, one of the countries with a growing percentage of older residents, where the informal provision of care is the most important and is left

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to family members (representative of the Southern-European pattern). The issue is of relevance within Spain because of the current implementation of relevant public policies. Informal carers are recognized as being central to these policies. Therefore, in order to develop appropriate support packages (for instance, direct cash payments to subsidize in-home care), it is important to identify the care-givers and discover how informal care responsibilities impact their lives. We use the 2002-03 Spanish Time Use Survey (STUS). The relatively large size of the survey, the time-diary nature of the data, the possibility of identifying time spent on adult care activities, and the presence of children while parents are engaged in these activities, allows for a consistent study.

We obtain evidence from the STUS to support the idea that the presence of grand-children while their parents are engaged in caring activities is positively related to adult care activities. It is well-documented in the economic literature on intra-family transfers that elder care depends negatively on the number of children. However, considering the presence of children while their parents are performing adult care activities, we show that the presence of children may positively affect adult care.

The positive relationship between the presence of children during adult care activities and the time devoted to these activities may be the result of joint production, since some of the time needed to care for children might be included in the time spent caring for adult members of the family. To test this hypothesis, we also analyze the impact on child care and labor market activities, showing that people who report spending time caring for adults spend more time in child care activities, which in turn affects the time devoted to the labor market. We observe that the increase in the time devoted to dependent care is fully compensated for with a decrease in the time devoted to market work activities.

We also study if these results validate the *Demonstration Effect* hypothesis and are not generated by other mechanisms. To do so we look at whether parents actions are shaped by their children's actions (*state dependency*). We compare the time devoted to different activities and the timing of these activities. We observe that people who report devoting time to adult care with their children present do not change their allocation of leisure and housework, compared to those who report their children are not present. Therefore, we

do not find evidence that the actions of parents who devote time to adult care activities with their children present are conditioned to the presence of their children, nor do we find differences in the amount and the timing of these agents.

The paper is organized as follows. Section 2 briefly reviews the literature regarding the intergenerational transfer models and time use studies. Section 3 develops the theoretical model. Section 4 describes the data used. Section 5 describes the econometric model and results. Section 6 looks at state dependency of parents to children. Section 7 sets out our main conclusions.

2 Literature

The study of transfers between members of the family has given rise to an abundant literature, reflected in the so-called intergenerational transfer models (see, for an excellent survey, Lafèrrere 1999). We concentrate on the thesis proposed by Cox and Stark (1996). They used a model with three generations and studied the possibility that the youngest generation will replicate the conduct of their own parents.

Cox and Stark (1996) and Cox and Stark (2005) consider that a mother P maximizes the expected value of her utility, $U(x, y)$ where x is "what the maximizer does for her mother", G, and y is "what the maximizer's daughter, K, does for the maximizer", P. They suppose that the daughter may imitate her mother's behavior or not, with probability $0 \leq \pi \leq 1$, as follows:

$$EU(x, y, \pi) = \pi U(x, x) + (1 - \pi)U(x, y)$$

Let $x = x(y, p)$ be the solution of the maximization problem. In that case, the imitative behavior benefits G (i.e. the grandmother) $(\partial \overline{x}/\partial \pi > 0)$.

Jelall and Wolff (2002) explain that in this framework there is an incomplete cycle, so the decisions taken by P do not depend on the previous behavior of his/her own parent. In that case, if there is no child $(x = 0)$, there are no time transfers. They also point out that the *Demonstration Effect* theory does not provide "convincing explanation why the

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Demonstration Effect works". To solve these problems, they focus on a model of cultural transmission of altruistic values between generations.

In the literature of the allocation of time, most of the studies analyzing the relationship between caregiving to elderly parents and labor supply decisions.[1] Most show that there exists a negative correlation between caregiving and labor supply decisions.[2] However, they do not take into account the simultaneity of child care, elder care and labor decisions that could lead to important biases in the estimates.

Using time-use surveys, we can take into account these three variables. Some studies have examined the time devoted to child care activities.[3] However, less evidence exists regarding the time devoted to adult care using time-use data. When people assume the role of assisting a person with impairments, or an older person, care activities account for a significant portion of their daily routines. Bittman, Fisher, Hill, and Thomson (2005) use the 1997 national Australian Time Use Survey, and find that diaries provide information for a more robust estimate, and that even people who offer only occasional assistance to a person with impairments tend to spend the equivalent of more than 10 minutes a day providing care.

The literature is inconclusive for two reasons. First, the theoretical approach developed by Cox and Stark (1996) has omitted the effects on the time allocation of individuals who are becoming care givers through a *Demonstration Effect*. Second, there are limitations in the data, as the data used do not account for the presence of children while parents are caring for adults, which can affect dependent care (adult and child care) and labor decisions.

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[1]See, for example, Ettner (1995), Ettner (1996), Johnson and Lo Sasso (2000), Wolf and Soldo (1994), Carmichael and Charles (1998) and Carmichael and Charles (2003).

[2]There is a "substitution response": with time being scarce, if informal care responsibilities increase, this will tend to increase the carers shadow wage rate and, thus, to depress the labor market activity (e.g., Carmichael and Charles 2003).

[3]See Fisher, Egerton, Gershuny, and Robinson (2006) and Aguiar and Hurst (2007). Both find that in the United States there has been an increase in the time devoted to child care activities.

3   Theoretical Model

We assume a family consisting of three generations. In period 0 the parent decides the hours he/she devotes to dependent care (child and adult care) and labor market. Let U_{s1} be the utility of the parent (2nd generation) which takes the following form:

$$U_{s1} = U_{s1}(C_{s1}, Q, T_{s1}, U_g) \tag{1}$$

The utility of the parent depends on the level of private consumption, C_{s1}; on Q which represents the quality of the child (3rd generation), which is the output of a household production process whose inputs are parental time; on T_{s1}, which is the output of elder care, and on the utility of the grandparent, that is, U_g. The level of satisfaction is increasing in all cases. We also assume that U_{s1} is continuous, twice differentiable and quasi-concave.

If parents want their children to care for them in the future, one way to set an example is by caring for their own parents, *Demonstration Effect*.[4] The child's behavior is conditioned by parents who take care of their elders in order to elicit a similar conduct from their children.

We should point out that assuming a model of altruism may be a strong assumption, but considering the *Demonstration Effect*, we are assuming that early transfer experience affects subsequent transfer behavior and, therefore, the allocation of time. Although one agent makes decisions in one period, the agent is affected by the decisions taken by the parent, so we consider this to be a complete cycle.

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[4]This approach is based on the Social Cognitive Theory (e.g., Bandura 1986). The Social Cognitive Theory explains that people learn by watching what others do. Children are probably most affected by the example set by those who raise them, given that observational learning occurs early in life. From this perspective, parents may influence the behavior and development of their children, to guide future behaviors, and that, in turn, affects the decisions taken by parents in the present. Therefore, the decisions taken by parents are influenced by the presence of children.

3.1   Analysis

We assume that the parent allocates his/her own time, m, among three activities, (labor market ,e_{s1}; child care,h_{s1}; and elder care, t_{s1}), and his/her own resources, (nonlabor income,y_{s1}). We examine the parent's choice as follows:

$$\underset{e_{s1}, t_{s1}, h_{s1}}{Max}\ U_{s1} = U_{s1}(C_{s1}, Q, T, U_g)$$

$$s.t.$$

$$C_{s1} = C_{s1}(w_{s1}e_{s1}, y_{s1})$$

$$h_{s1} = h_{s1}(m, t_{s1}, e_{s1})$$

$$T_{s1} = T_{s1}(t_{s1}, w_{s1}e_{s1}, y_{s1})$$

$$Q = Q(h_{s1}, \alpha t_{s1}, w_{s1}e_{s1}, y_{s1})$$

where w_{s1} is the parent's wage. Additionally, α represents the portion of time the parent devotes to care for the grandparent, when the grandchild is present.[5]

The first order conditions are:

$$-w_{s1}\frac{\partial U_{s1}}{\partial C_{s1}}\frac{\partial C_{s1}}{\partial(w_{s1}e_{s1})} = \frac{\partial U_{s1}}{\partial Q}\frac{\partial Q}{\partial h_{s1}}\frac{\partial h_{s1}}{\partial e_{s1}} + \frac{\partial U_{s1}}{\partial Q}\frac{\partial Q}{\partial(w_{s1}e_{s1})}w_{s1} + \frac{\partial U_{s1}}{\partial T_{s1}}\frac{\partial T_{s1}}{\partial(w_{s1}e_{s1})}w_{s1} \qquad (2)$$

$$-\frac{\partial U_{s1}}{\partial U_g}\frac{\partial U_g}{\partial t_{s1}} = \frac{\partial U_{s1}}{\partial Q}\frac{\partial Q}{\partial h_{s1}}\frac{\partial h_{s1}}{\partial t_{s1}} + \frac{\partial U_{s1}}{\partial T_{s1}}\frac{\partial T_{s1}}{\partial t_{s1}} + \alpha\frac{\partial U_{s1}}{\partial Q}\frac{\partial Q}{\partial(\alpha t_{s1})} \qquad (3)$$

Let us denote the solution to the maximization problem as t_{s1}^* and e_{s1}^*. Solving the first order condition implicitly for t_{s1}^*, e_{s1}^* we find that:[6]

$$e_{s1}^* = h_{s1}^*(w_{s1}, y_{s1}, m, \alpha) \qquad (4)$$

$$t_{s1}^* = t_{s1}^*(w_{s1}, y_{s1}, m, \alpha) \qquad (5)$$

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[5] If parents want their children to care for them in the future, one way to set an example is by caring for their own parents with their children present.

[6] Second order conditions are satisfied.

We also obtain the hours that the parents spend in the labor market, e_{s1}^*, in equilibrium:

$$e_{s1}^* = e_{s1}^*(w_{s1}, y_{s1}, m, \alpha) \tag{6}$$

We assume that $\frac{\partial U_{s1}}{\partial U_g} = \beta_{s1}$, where β_{s1} is the degree of altruism. In this case, parent-to-grandparent services are not incentivised by self-interest alone. We also consider that $\alpha = \alpha(t_k^1)$, therefore the *Demonstration Effect* parameter depends on the time that the 3rd generation will devote in period 1 to care for his/her own parent.

On the basis of the above, we are in a position to draw a series of conclusions on the influence of the parameter α on the relationship between h_{s1}^*, e_{s1}^* and t_{s1}^*.

It is straightforward to deduce that changes in α have a positive effect on t_{s1}. Differentiating expressions (2) and (3) in equilibrium, we obtain the expression:[7]

$$\frac{\partial t_{s1}^*}{\partial \alpha} = \frac{-\frac{\partial U_{s1}}{\partial Q} \frac{\partial Q}{\partial (\alpha t_{s1})} \frac{\partial^2 U_{s1}}{\partial e_{s1}^2}}{\Delta} > 0 \tag{7}$$

We are also interested in the effect of this variable on the time spent on child care and labor activities. In the same way, we obtain that $\frac{\partial e_{s1}^*}{\partial \alpha} < 0$ in equilibrium. Due to this reallocation of time, the changes in child care activities depend on the relationship between $(\frac{\partial^2 U_{s1}}{\partial t_{s1} \partial e_{s1}})$ and $\frac{\partial^2 U_{s1}}{\partial e_{s1}^2}$. Given that, $\frac{\partial t_{s1}^*}{\partial \alpha} + \frac{\partial e_{s1}^*}{\partial \alpha} + \frac{\partial h_{s1}^*}{\partial \alpha} = 0$. If $\frac{\partial t_{s1}^*}{\partial \alpha} >> \left| \frac{\partial e_{s1}^*}{\partial \alpha} \right|$, so $\left| \frac{\partial^2 U_{s1}}{\partial e_{s1}^2} \right| >> \left| \frac{\partial^2 U_{s1}}{\partial t_{s1} \partial e_{s1}} \right|$, we can observe that $\frac{\partial h_{s1}^*}{\partial \alpha} > 0$. In other words, an increase in the hours this agent spends in the labor market decreases the marginal utility of working another hour, more than an increase in the hours this agent spends in elder care.

If there is the *Demonstration Effect*, parents spend time caring for their own parents with their children present and that affects their allocation of time. We observe that the time devoted to elder care increases, the time devoted to market work activities decreases, and the time devoted to child care activities may increase.

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[7]Given the second order conditions $\Delta > 0$.
$\Delta = \frac{\partial^2 U_{s1}}{\partial e_{s1}^2} \frac{\partial^2 U_{s1}}{\partial t_{s1}^2} - (\frac{\partial^2 U_{s1}}{\partial t_{s1} \partial e_{s1}})^2$

4 Data

The data comes from the Spanish Time Use Survey (STUS). This is the first Spanish survey conducted in conjunction with other European countries, following the recommendations of EUROSTAT. This survey contains information that allows for the analysis of, for example, the percentage of people who devote time to a given activity during the day, and the mean duration of this activity.

Throughout the analysis, we restrict our sample to include only non-retired, non--student individuals between the ages of 24 and 65, so these averages are "per working--age" adult. We drop adults younger than 24 and adults older than 65 (as well as early retirees), to minimize the role of time allocation decisions that have a strong inter-temporal component, such as education and retirement. Additionally, we select the head of the family, or people partnered with the head of the family. Finally, we select the households with no grandparents to avoid the presence of children being due to the presence of the grandparents in the home, and not being due to the *Demonstration Effect*. We focus on three uses of time: child care, adult care and market work. The market work activities are defined to include those for which people are paid (e.g., Burda, Hamermesh, and Weil 2006). The child and adult care activities include the informal-unpaid supply of care services to children and adults.

Regarding child care and adult care activities, since both are related to informal care (and we are interested in the effect of the presence of young children in their parents' time devoted to adult care, the *Demonstration Effect*), we restrict child care activities to exclude adult care activities as secondary activities, and viceversa.[8] It is possible that the main reason for children to be present while parents are in adult care activities is to seize the opportunity to care for both parents and children at the same time, thus saving time. As a result, we do not consider the situation where parents are devoting time to child care and adult care activities at the same time, and the presence of children during their parents' adult care activities is not due to the desire of parents to save time.

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[8]In the STUS, apart from the primary (*main*) activity, people who answer the time questionnaire must report information on the secondary (*what else*) activity, with whom was the person (*alone, children under 10, other members of the household, other people*) and the place where the person was doing the activity.

The key explanatory variable considers the presence of children under 10 while parents devote time to adult care activities. In this sense, with the information on who else was present at the time of the activity, we create a dummy variable that takes value "1" if any children under 10 were present at least once while the parent devoted time to adult care activities, while if the parent does not devote time to adult care activities or the children were not present, the variable takes value "0". Since we hypothesize that the *Demonstration Effect* increases the amount of time devoted to adult care activities, we should expect a positive correlation between the amount of time devoted to adult care activities and the explanatory variable, although this correlation is not significant(Corr(adult care, presence of children)=0.0982).

Additionally, we hypothesize that the *Demonstration Effect* varies by education level. Education, or human capital, can be considered an asset that has effects in the long run, and we may assume that people with a high education level are more concerned about their future earnings. Thus, we can say that education reflects the importance of the future for people and, since the *Demonstration Effect* refers to future actions taken by the children, we hypothesize that this effect is greater for highly educated people. As a result, we interact the variable of the presence of children in adult care activities with the high and low education levels.

However, the time devoted to the labor market depends on the opportunity cost of individuals, which depends on the education level. A higher education level means a higher opportunity cost, so people tend to work more and devote less time to other activities, such as adult care and child care. For this reason, we control for the opportunity cost of individuals net of the *Demonstration Effect*, so we use the imputed wage rate.[9] Other explanatory variables are: age, age squared, cohort, gender, marital status, number of adults in the household, number of children 0-4, number of children 5-12 and number of children 13-17.[10]

Mean and standard deviations for the main variables are reported in Table 1. Columns (1) and (2) report values for the whole sample, and for the people who devote time to

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[9]Table 1 in the Appendix shows estimates for the imputed wage rate.
[10]See the Appendix for a full description of the variables.

adult care activities. Comparing both columns, we see that the amount of time devoted to market work and child care activities is greater in the first column than in the second, while the opposite holds for the adult care activities. As a result, there is a substitution between the time devoted to market work and child care activities, and the time devoted to adult care. However, we are restricting child care solely to child care, excluding child care combined with adult care, and viceversa, so we do not consider that this substitution is due to the fact that parents are engaged in child care and adult care at the same time. Individuals who devote time to adult care activities are older (44 vs. 46), have a higher probability of being married (rather than cohabiting) (94.53% vs. 96.44%), and the proportion of men is lower in the carers sample (33.71% vs.49.34%), indicating that women are the individuals who specialize in care activities. The number of adults in the household is equal in both samples, while the education level is lower in the sample that engages in some level of adult care, showing a lower opportunity cost of their time and, as a result, a lower imputed wage rate. Finally, the number of children is lower in the sample of adult carers.

In summary, people who report devoting time to adult care activities are older, mainly women, married, work less in the labor market and have a lower educational level.

5 Empirical Specification and Results

5.1 Empirical Specification

Our purpose is to analyze the effects that the *Demonstration Effect* (Cox and Stark 1996, Cox and Stark 2005) has on the time devoted to dependent care and market work, which requires several considerations. First, time is scarce and people suffer from the lack of sufficient time to accomplish all desired activities (Hamermesh and Lee 2007). As a result, parents must substitute time devoted to some activities (e.g., leisure) with time devoted to some other activities (e.g., market work and home production). Second, children are time-intensive commodities, are public goods that require time, so children are sources of parental stress. (Apps and Rees 2002, Folbre 1994) As a result, comparing Column (1)

and Column(2) in Table 1, we see that the more time is devoted to adult care activities, the less time is devoted to child care and market work. These two considerations lead us to conclude that the uses of time are related. Since each individual reports three uses of time as primary activities (adult care, child care and market work) we estimate a Seemingly Unrelated Three-Regression Model (SUR) on the time devoted to these activities.

The statistical model is as follows: For a given individual "i", let T_{1i}, T_{2i} and T_{3i} represent the daily minutes that the individual "i" reports performing three activities; let X_i be a vector of personal and household characteristics, and let e_{surI1}, e_{surI2} and e_{surI3} be random variables that represent unmeasured factors. The model is defined as:

$$T_{1i} = \gamma_{sur1} + X_{ji}\beta_{sur1i} + e_{sur1i} \tag{8}$$

$$T_{2i} = \gamma_{sur2} + X_{ji}\beta_{sur2i} + e_{sur2i} \tag{9}$$

$$T_{3i} = \gamma_{sur2} + X_{ji}\beta_{sur3i} + e_{sur3i} \tag{10}$$

with γ, β vectors of parameters and $i = 1, 2, ...n$. For each individual we jointly estimate the regressions, allowing for the correlations between e_{sur1i}, e_{sur2i} and e_{sur3i}. Regarding the specification of the error terms for each individual, we allow for correlations in the unobserved determinants of their activities, by allowing the error terms to be jointly normally distributed, with no restrictions on the correlation. This specification accounts for the time constraint that may require individuals to spend more time on one activity and therefore less time on another. We additionally assume that the error components are independent across individuals:

$$\begin{bmatrix} e_{sur1i} \\ e_{sur2i} \\ e_{sur3i} \end{bmatrix} \sim N \left(\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} \sigma^2_{sur1i} & \varrho_{sur1i,sur2i}\sigma_{sur1i}\sigma_{sur2i} & \varrho_{sur1i,sur3i}\sigma_{sur1i}\sigma_{sur3i} \\ \varrho_{sur2i,sur1i}\sigma_{sur2i}\sigma_{sur1i} & \sigma^2_{sur2i} & \varrho_{sur2i,sur3i}\sigma_{sur2i}\sigma_{sur3i} \\ \varrho_{sur3i,sur1i}\sigma_{sur3i}\sigma_{sur1i} & \varrho_{sur3i,sur2i}\sigma_{sur3i}\sigma_{sur2i} & \sigma^2_{sur3i} \end{bmatrix} \right) \tag{11}$$

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5.2 Results

Columns (1), (2) and (3) in Table 2 shows results for the estimates of adult care, child care and market work, without taking into account the variable reflecting the presence of children (*Demonstration Effect*).[11]

While *Age* has a positive correlation with the time devoted to adult care activities (1.018 more minutes per day for each additional year), it has negative correlations with the time devoted to child care and market work activities (1.228 and 5.372 fewer minutes). However, those effects are not permanent, since the coefficients of *Age Squared* are opposite to the coefficients of *Age*. This fact holds for the whole life span of people.

In general, men devote less time to adult care (1.923 minutes per day) and child care (28.099 minutes per day), while they devote more time to market work (141.251 minutes per day). At the same time, being married rather than cohabiting has a positive correlation with the time devoted to child care activities (5.824 minutes per day).

The number of adults in the household has a negative correlation with the time time devoted to child care (2.815 minutes per day) and a positive correlation with the time devoted to market work (6.948 minutes per day). Additionally, children aged 0-4 and 5-12 have positive and negative correlations with the time devoted to child care and market work activities, respectively. An additional child aged 0-4 or 5-12 increases the time devoted to child care by 75.832 and 18.384 minutes per day, respectively, and decreases the time devoted to market work by 35.353 and 10.862 minutes per day, respectively. On the other hand, the number of children in the family has a negative correlation with the time devoted to adult care activities for the three age intervals considered. As a result, an additional child aged 0-4, 5-12 or 13-17 decreases the time devoted to adult care activities by 1.516, 2.111 and 1.734 minutes per day, respectively.

Finally, the imputed wage rate has a negative correlation with the time devoted to adult and child care activities, while it has a positive correlation with the time devoted to market work activities. Thus, a one-unit increase in the imputed wage rate means a decrease in the time devoted to adult and child care activities of 0.099 and 0.309 minutes

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[11]We also control for the 18 regions of residence, i.e. Aragon, Andalucia, etc.

per day, respectively, while it increases the time devoted to market work by 7.570 minutes per day. These results are consistent, since an increase in the opportunity cost of staying at home, engaged in home production, encourages people to work more in the labor market and less at home.

Regarding the presence of children while parents are caring for the grandparents, Columns (4), (5) and (6) in Table 2 show the results of including the variable related to the presence of children while parents perform adult care activities. This variable has a significant and positive correlation with the time devoted to adult care and child care activities, increasing by 75.715 and 24.704 minutes per day, respectively, the time devoted to these activities. This result supports the *Demonstration Effect* hypothesis, since the possibility of children being present during the adult care activities of their parents makes parents devote more time to these activities. Also, the presence of children during the adult care activities leads parents to devote less time to market work activities, as shown by the negative correlation (112.348 fewer minutes).

The positive correlation between the presence of children during adult care activities and the time devoted to those activities may be the result of specialization within the household. If children were present during adult care activities, individuals could care for children and adults at the same time (joint production). In such a case, the time devoted to child care activities as a primary activity should decrease, since some of the time needed to care for children could be be included in the time spent caring for adult members of the family. Additionally, if they were caring for several individuals at the same time, they could devote more time to other activities (including market work) since they would be saving time with the joint production of dependent care.

However, parents who report children present while performing the adult care activities devote more time to child care activities, so the presence of children during the adult care is not motivated by joint production. Furthermore, the time devoted to market work activities decreases if children are present in the adult care activities, showing that the simultaneous increase in the time devoted to adult care and child care activities generated by the *Demonstration Effect* is fully compensated for with the decrease in the time devoted

to market work activities. Again, we obtain evidence to support that the *Demonstration effect* increases the intensity of dependent care-giving, which affects the time devoted to market work.

Additionally, we hypothesize that the *Demonstration Effect* varies by educational level. Columns (7), (8) and (9) in Table 2 show results of interacting the educational level with the variable related to the presence of children during the adult care activities of their parents. Considering that the medium level of education is the reference level, we observe that the presence of children has a positive correlation with the time devoted to adult care activities for all three education levels. The presence of children in adult care activities means an increase in the time devoted to adult care activities of 23.453, 28.920 and 50.053 minutes per day for the low, medium and high levels of education, respectively. We observe that the higher the education, the greater the effect of the variable. Though the differences between the low and medium levels of education are not significant, the differences between the high level of education and the others is significant. This last result may be related to the fact that the more highly educated people are, the more concerned they are about the future, including the care they will receive when they become old.

In this section we have shown a positive evidence of the *Demonstration Effect* hypothesis.[12] The presence of children during the adult care activities of the parents makes parents to devote more time to these activities, since they have the chance to teach their children how to care for old people. In this way, since children learn from parents, parents are providing their children with an opportunity to learn how to care for them in the future. Additionally, the *Demonstration Effect* is higher for highly educated people, since their opportunity cost is also higher.

6   State Dependency

In the previous section, we have shown positive evidence of the *Demonstration Effect* hypothesis. However, the positive correlation between the presence of children and the

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[12]Tables 2 and 3 in the Appendix show the results of using a 3sls model and a sample of families with and without grandparents. Results are consistent with the results we have shown in this section.

adult care activities may be motivated by state dependency of parents regarding their children, meaning that parents' actions are shaped by their children's actions.[13] For example, an individual having both young children and dependent parents, will bring the children with him when he is engaged in adult care activities, since they are too young to be left alone and he will not pay for public care, or his partner is unable to spend time with the children at that moment. In this setting, he is with his children while caring for his parents, and still must devote time to his children, and thus his allocation of time is conditioned by the presence of the children. For this reason, in this section we compare the time devoted to different activities and the timing of these activities. If the activities of people are shaped by their children's actions, we should expect to find differences in the total amount of time devoted to these activities (e.g., leisure and housework) and the timing of these activities.

Table 3 shows the means and standard deviations of the time devoted to housework and leisure activities for those who devote time to adult care activities.[14] Since we are considering the presence of children under 10 during the adult care activities in the estimates, we also restrict the sample to include only individuals with children under 10 in the household. The idea is to compare the time devoted to these activities for people who report that children are present, and those whose children are not present. If children are shaping their parents's actions, we may see differences between the two groups in the time devoted to these activities. We apply a mean comparison test to compare the amount of time devoted to both activities by the two groups.[15]

Regarding housework, while people whose children are not present during the adult care activities devote 184.29 minutes per day to this activity, people whose children are present devote 155.11 minutes per day. Table 3 shows the p-value of the null hypothesis, rejecting the hypothesis that the means are different. Regarding leisure, the values of the means are 922.24 and 916.89 minutes per day, respectively, while the p-value rejects the

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[13]See Ejrnaes and Portner (2004), Kimmel (1998), and Lundberg and Rose (2000) as examples of how children affect parents' allocation of time.

[14]We do not include either child care or adult care in housework activities. We define leisure to include both leisure and personal care activities, following Aguiar and Hurst (2007)

[15]The null hypothesis is that the means are different. We apply a t-test that takes into account the number of observations, the means and the standard deviations.

hypothesis that means are different. As a result, we can assume that both groups devote the same amount of time to housework and leisure, so people who report doing adult care with their children present do not change the amount of time devoted to housework and leisure, compared to those who report that their children are not present.

Though we do not find any difference in the amount of time devoted to housework and leisure, it could be the case that young children have influence on the timing of these activities, since the main reason for children to be present is that parents must bring children with them. Children need time devoted to them, and parents may be restricted by the times children wake up, get up, go to school, have lunch... For this reason, we analyze the timing of the activities for people who devote time to adult care activities and have children under 10 in the household. We analyze the timing of market work, housework, adult care and leisure, focusing on adult care activities. Figures 1, 2, 3 and 4 show the timing in market work, housework, leisure and adult care for people who care for adults and have children under 10 in the household.

In general, regarding the timing of market work, there is little difference between both groups. Most work is concentrated between 8 a.m. and 8 p.m. For both groups, there is a decrease in the proportion of people working between 1 p.m. and 4 p.m., corresponding to the time people have for meals. In summary, we cannot conclude that there are differences in the timing of work between both groups.

For the timing of housework, we can conclude the same as for market work. Most housework is concentrated between 8 a.m. and 11 p.m., with two main peaks. The first peak is located around noon and corresponds to cleaning the house, shopping, making lunch, etc. Then, between 2 p.m. and 7 p.m., the proportion of people doing housework decreases, corresponding to lunch time, working people who go to work, and house workers who rest after doing housework the whole morning. Then, at 7 p.m., there is an increase in the proportion of people doing housework, corresponding to working people who arrive home and have to do the housework they did not do during the day, or simply people who have to make dinner. Though variation is higher for people whose children are present during the adult care activities, we cannot conclude that there are differences in the timing

of housework between both groups.

Regarding the timing of leisure and personal care, we observe that this timing is very similar between both groups. Since we include personal care as leisure, we can see that most people are sleeping from midnight to 7 a.m. in both groups. Then, the percentage of people at leisure decreases for both groups, since people have to work and do housework. This decrease in the proportion of leisure runs from 7 a.m. to 2 p.m., after which the proportion of people at leisure clearly increases. This corresponds to lunch time. Then, the proportion of people at leisure increases, and there is a significant increase between 10 p.m. and midnight. Though the variation is higher for people whose children are present during the adult care activities, we cannot conclude that there are differences in the timing of leisure between both groups.

Regarding the timing of adult care, we see slight differences between both groups. In both groups, there is an increase in the proportion of people engaged in adult care from 7 a.m. onwards. Though the variation is greater for people whose children are present during the adult care activities, the majority of the adult care activities are done from 7 a.m. to 5 p.m. and from 7 p.m. to 11 p.m. in the group with children present, and from 7 a.m. to 4 p.m., and from 6 p.m. to 10 p.m. in the group with no children present. Since people whose children are present during adult care activities devote more time to these activities, we see that the only difference is between the 5 p.m. and 7 p.m., coinciding with the time children come home from school. As a result, we find slight difference in timing between both groups.

In summary, we cannot be certain that the timing is different for people whose children are present during the adult care activities from those whose children are not present during the adult care activities. As a result, state dependency does not condition the time parents devote to adult care activities, and the presence of children is due to the preferences of parents who want their children to be present because of the *Demonstration Effect*.

Finally, we analyze the timing in couples where one of the members devotes time to adult care activities with children present. We compare the timing of adult care activities

of the parent whose children are present, on the one hand, and the timing of market work, housework and leisure/personal care of the partner, on the other hand. The idea is to see whether the presence of children during adult care activities is due to the partners being engaged in activities where children cannot be present (mainly market work) or simply because they want their children to be present. This is another way to study the state dependency, since children may be present because the partner cannot take the children with him/her.

Figure 5 shows the timing of adult care activities of the parent whose children are present, and the timing of market work, housework and leisure/personal care of the partner. Looking at market work and leisure of the partner, we see that from 7 a.m. to 10 a.m. the proportion at work increases, and the proportion at leisure decreases, while the proportion of people engaged in adult care with children present increases. However, from noon to 5 p.m., the proportion of partners at market work decreases, and the proportion at leisure/personal care increases, while the proportion of people engaged in adult care activities remains constant. Additionally, from 6 p.m. to 9 p.m., the proportion of people engaged in adult care activities increases, while the proportion of partners at leisure increases and the proportion at market work decreases. As a result, we can see that the presence of children during adult care activities results from the parent's desire to have the children present, and not simply the result of state dependency.

Summarizing, in this section we have studied the state dependency of parents to their children during adult care activities, and we find no evidence of such a dependency. If parents' actions are conditioned by the presence of their children, we should find differences in the amount of time devoted to some activities such as leisure and housework. Given that the allocation of time and the timing of the activities do not change, we conclude that there is no such evidence. Additionally, the presence of children during the adult care activities is not because the partners are doing activities where children cannot be present. Hence, state dependency does not explain the presence of children during adult care activities, showing positive evidence for the *Demonstration Effect* theory.

7   Conclusions

This paper has studied, on the basis of the *Demonstration Effect* hypothesis, the influence children have on their parents' allocation of time, given that there are differences in the allocation of time, to working and to adult care, among persons with and without young children. We have developed a theoretical model by combining the *Demonstration Effect* and an inter-generational altruism model. This approach suggests that the decisions taken by the child, in the future, depend on the previously-observed behavior of the parent. We use time-diary data from the 2002-03 Spanish Time Use Survey (STUS) in order to implement this theoretical framework. In our empirical analysis, we specify a Seemingly Unrelated Three-Regression (SUR) model on adult care, child care and market work activities, to see how the presence of children during their parents' adult care activities influences the time devoted to dependent care and market work.

We find evidence to support the idea that the presence of children is not due to joint production, increasing the intensity of dependent caregiving which affects the time devoted to the labor market. The increase in the time devoted to dependent care, as a result of the *Demonstration Effect*, is fully compensated for with a decrease in the time devoted to market work activities. The increase in the time devoted to dependent care, as a result of the *Demonstration Effect*, is greater for highly educated people. Additionally, the state dependency of parents to children cannot explain the presence of children during the adult care activities, reinforcing the *Demonstration Effect* hypothesis.

Our results have certain policy implications. Policy options available to government show a trade-off between caring and labor policies. On the one hand, policy makers aim at maintaining the supply of informal care. On the other hand, policy makers have a clear objective to increase labor market participation. In western industrialized societies, policy makers have shown interest in increasing the prevalence of home-based care, as the demand for caregiving has increased. The *Demonstration Effect* approach represents one way to maintain and ensure the continuity of family care. However, the *Demonstration Effect* should not be treated as "free" in policy recommendations, since adult care activities with children present involve an opportunity cost in the form of the forgone labor supply.

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TABLE 1: SUMMARY STATISTICS OF THE MAIN VARIABLES

	Whole Sample	Individuals with Adult Care
Market Work	263.1451	140.7304
	(292.0024)	(227.0186)
Child Care	38.3326	25.4117
	(78.7603)	(59.5458)
Adult Care	4.7019	87.9228
	(34.2522)	(120.9807)
Age	43.6134	46.2219
	(10.1508)	(9.6297)
Gender	0.4934	0.3371
	(0.5000)	(0.4730)
Marital Status	0.9453	0.9644
	(0.2273)	(0.1855)
Number of Adults	3.4889	3.5205
	(1.0287)	(1.0390)
Low Education	0.6562	0.7066
	(0.4750)	(0.4556)
Medium Education	0.1799	0.1584
	(0.3841)	(0.3653)
High Education	0.1639	0.1350
	(0.3702)	(0.3419)
Number of Children 0-4	0.3038	0.1708
	(0.5713)	(0.4192)
Number of Children 5-12	0.3563	0.2360
	(0.6190)	(0.5183)
Number of children 13-17	0.2548	0.2616
	(0.5098)	(0.4956)
Imputed Wage Rate	2581.6040	1906.2580
	(2025.2450)	2121.847
Presence of Children	0.0028	0.1113
	(0.0530)	(0.3227)
N Observations	16166	906

Source: Spanish Time Use Survey

TABLE 2: COEFFICIENT ESTIMATES FROM SUR MODEL OF TIME USE [1,2,3]

|	Adult Care b/se	Child Care b/se	Market Work b/se	Adult Care b/se	Child Care b/se	Market Work b/se	Adult Care b/se	Child Care b/se	Market Work b/se
Age	1.018***	-1.228**	-5.372**	0.995***	-1.236**	-5.339**	0.992***	-1.233**	-5.326**
	(0.3320)	(0.6020)	(2.3930)	(0.3300)	(0.6010)	(2.3920)	(0.3290)	(0.6010)	(2.3920)
Age Squared	-0.977***	0.572	5.027**	-0.965***	0.575	5.010**	-0.967***	0.569	5.013**
	(0.2980)	(0.5410)	(2.1510)	(0.2960)	(0.5410)	(2.1510)	(0.2960)	(0.5410)	(2.1500)
Birth Cohort	0.381	-1.459	10.576	0.271	-1.495	10.740	0.254	-1.518	10.783
	(1.0400)	(1.8840)	(7.4940)	(1.0320)	(1.8840)	(7.4920)	(1.0310)	(1.8840)	(7.4910)
Gender	-1.923***	-28.099***	141.251***	-2.042***	-28.137***	141.427***	-1.985***	-28.152***	141.235***
	(0.6200)	(1.1240)	(4.4690)	(0.6150)	(1.1230)	(4.4680)	(0.6150)	(1.1230)	(4.4680)
Marital Status	0.816	5.824**	-10.419	0.566	5.742**	-10.048	0.600	5.743**	-10.157
	(1.2890)	(2.3360)	(9.2920)	(1.2800)	(2.3360)	(9.2900)	(1.2790)	(2.3360)	(9.2890)
Number of Adults	0.355	-2.815***	6.948**	0.315	-2.828***	7.007**	0.303	-2.856***	7.034**
	(0.3810)	(0.6910)	(2.7470)	(0.3780)	(0.6910)	(2.7470)	(0.3780)	(0.6910)	(2.7470)
Number of Children 0-4	-1.516**	75.832***	-35.353***	-1.736***	75.761***	-35.027***	-1.736***	75.799***	-35.012***
	(0.6350)	(1.1510)	(4.5780)	(0.6310)	(1.1510)	(4.5780)	(0.6300)	(1.1510)	(4.5780)
Number of Children 5-12	-2.111***	18.384***	-10.862***	-2.185***	18.360***	-10.753***	-2.226***	18.374***	-10.614***
	(0.5580)	(1.0110)	(4.0200)	(0.5540)	(1.0110)	(4.0190)	(0.5530)	(1.0110)	(4.0190)
Number of Children 13-17	-1.734***	-0.763	7.492	-1.705**	-0.753	7.449	-1.717***	-0.736	7.497
	(0.6690)	(1.2130)	(4.8250)	(0.6640)	(1.2130)	(4.8240)	(0.6640)	(1.2130)	(4.8230)
Imputed Wage Rate	-0.099***	-0.309***	7.570***	-0.095***	-0.308***	7.564***	-0.096***	-0.305***	7.570***
	(0.0220)	(0.0390)	(0.1560)	(0.0210)	(0.0390)	(0.1560)	(0.0210)	(0.0390)	(0.1560)
Children Present	-	-	-	75.715***	24.704***	-112.348***	28.920***	3.122	30.833
	-	-	-	(5.1490)	(9.3990)	(37.3800)	(11.0380)	(20.1630)	(80.1870)
Children Present*Low Education	-	-	-	-	-	-	52.373***	39.468*	-153.613
	-	-	-	-	-	-	(12.9590)	(23.6730)	(94.1480)
Children Present*High Education	-	-	-	-	-	-	78.973***	-3.871	-259.105**
	-	-	-	-	-	-	(15.6180)	(28.5300)	(113.4610)
Constant	-20.387	76.271***	77.340	-19.047	76.708***	75.352	-18.779	76.734***	74.491
	(15.3530)	(27.8280)	(110.6790)	(15.2420)	(27.8220)	(110.6470)	(15.2280)	(27.8170)	(110.6280)
Observations	14760	14760	14760	14760	14760	14760	14760	14760	14760

Notes: [1] Imputed Wage Rate comes from the Spanish sample of the ECHP for the year 2001 [2] Standard errors in parenthesis [3] ***Significant at the 1% level **Significant at the 5% level *Significant at the 10 % level

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TABLE 3: TIME DEVOTED TO HOUSEWORK AND LEISURE [1,2,3]

|	Not children Present	Children Present
Housework	184.2964	155.1086
	(140.5819)	(119.4823)
Leisure	922.2398	916.8857
	(188.9603)	(207.8696)
$p\_value_{housework}$	0.0021	
$p\_value_{leisure}$	0.0001	

Notes: [1] Means and Standard Deviations are shown for each activity [2] Both samples only include people who report doing some adult care and there is at least one child under 10 in the household [3] Standard Deviations in brackets
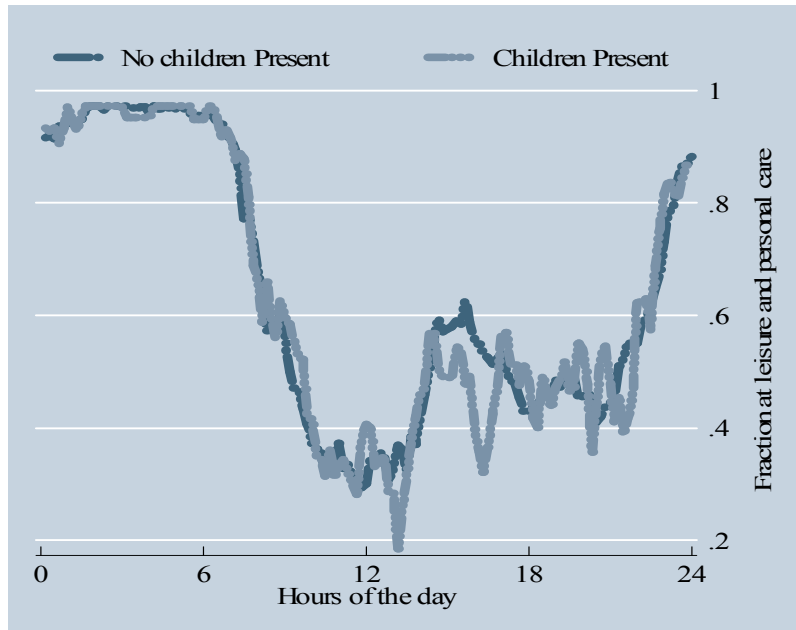
FIGURE 1: TIMING OF MARKET WORK [1,2]
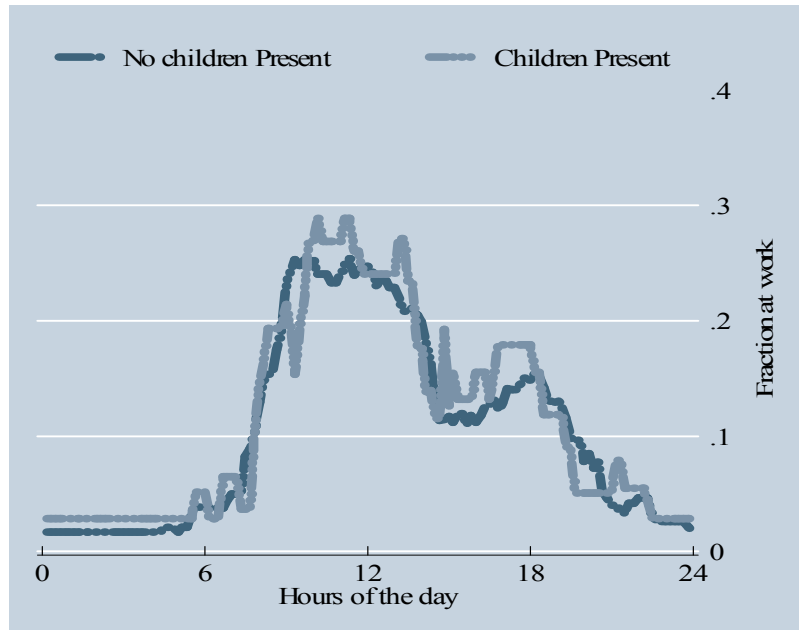
Notes: [1] Spanish Time Use Survey, 2002-2003 [2] The fraction at work is defined as the proportion of people doing market work at this moment of the day.

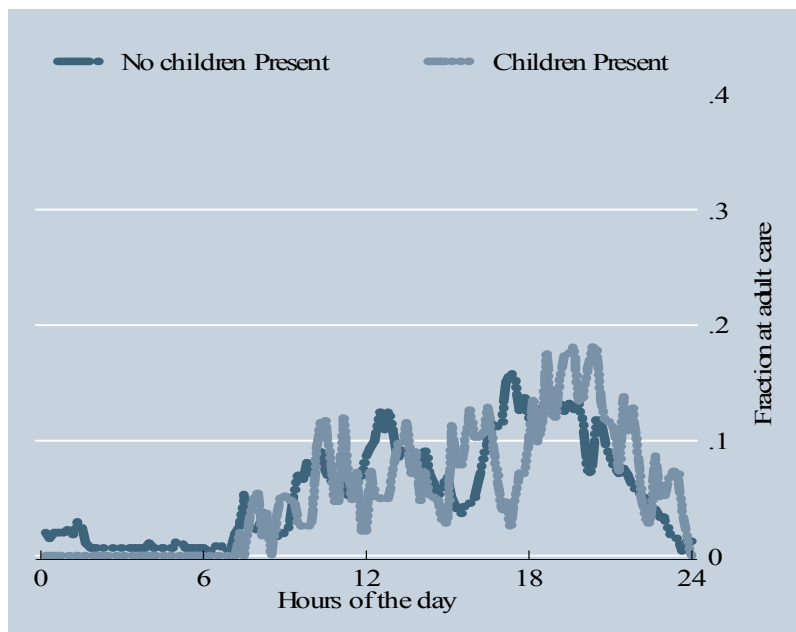## FIGURE 2: TIMING OF HOUSEWORK [1,2]
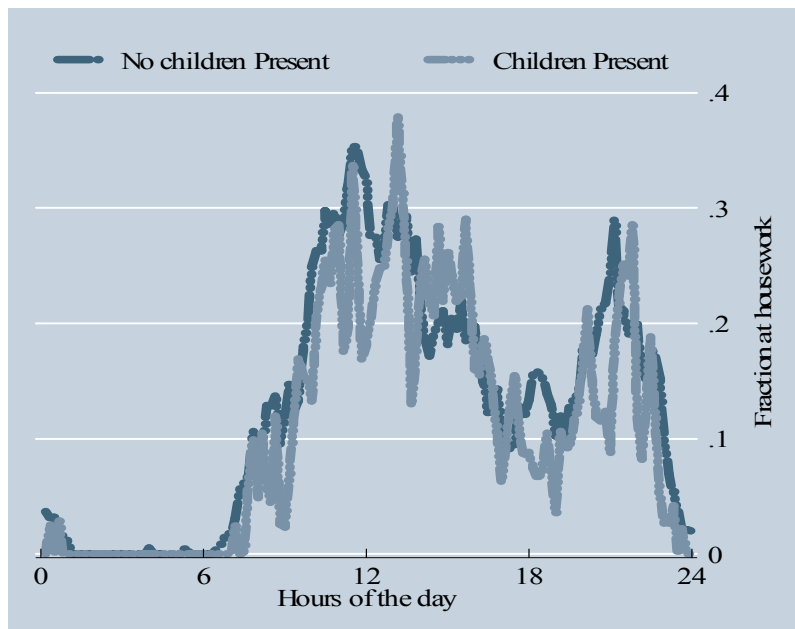
Notes: [1] Spanish Time Use Survey, 2002-2003 [2] The fraction at housework is defined as the proportion of people doing housework at this moment of the day.
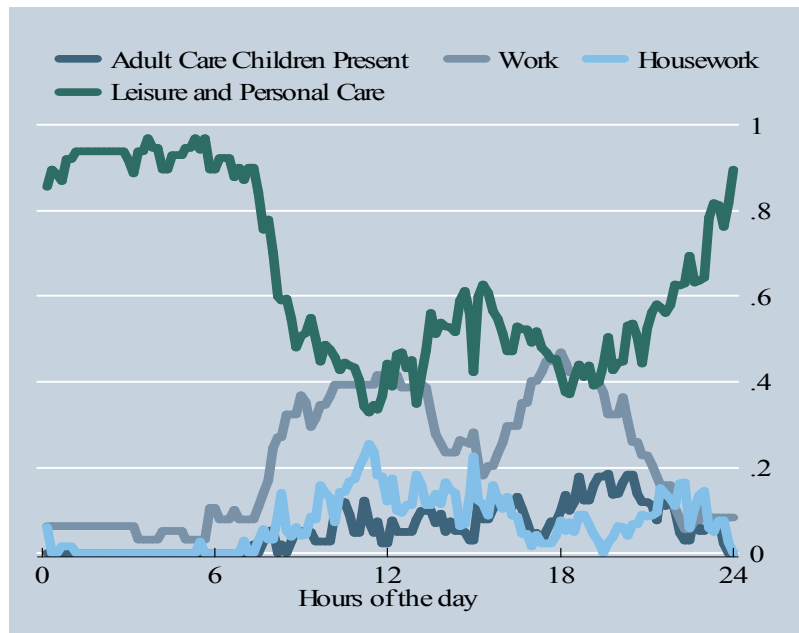
FIGURE 3: TIMING OF LEISURE/PERSONAL CARE [1,2]

Notes: [1] Spanish Time Use Survey, 2002-2003 [2] The fraction at leisure/personal care is defined as the proportion of people doing leisure/personal care at this moment of the day.

FIGURE 4: TIMING OF ADULT CARE [1,2]

Notes: [1] Spanish Time Use Survey, 2002-2003 [2] The fraction engaged in adult care is defined as the proportion of people doing housework at this moment of the day.

FIGURE 5: TIMING OF PARTNERS [1]

Notes: [1] Spanish Time Use Survey, 2002-2003