

Informal Caring-Time and Informal Carer's Satisfaction*

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Abstract

We study the effect that the care decision process has on the amount of caring-time and on the informal carer's satisfaction. We develop a theoretical framework in which we compare three two-stage sequential games, each of which corresponds to a different care decision (family, informal, and recipient). We find cases of overprovision of informal care in both the family and the recipient decision models, since the caregiver is obliged to spend more time than he/she would prefer. We then use the Spanish Survey of Informal Assistance for the Elderly (1994 and 2004) to estimate a multinomial logit model which captures the relationship between the care decision processes and the time that informal carers devote to care activities, with the results confirming our theoretical hypotheses. We also find that, the probability of greater satisfaction decreases less for informal carers of working age, when the care is a result of a family decision, even when this decision requires them to become intensive caregivers.

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1 Introduction

The number of dependent individuals is predicted to considerably increase over the next 50 years. In 2000, the dependent population comprised 4-5% of the total population, or 7-8% of the population of working-age (World Health Organization, 1999). In developed countries, the number of dependent people will increase, on average, by 31% by 2040, with the expected increase being up to 20% in Europe and Japan, and 60% in North America and Australasia (Harwood et al. 2004). This process increases the demand for informal and formal care for the disabled population, with this increase being the result of growth in the proportion of elderly people during the last 30 years, and of changes in the health needs of the population, with noncommunicable diseases, mental illness and injuries becoming leading causes of disability (World Health Organization, 1999).

Simultaneously, female labour force participation increases and family patterns change as a result of lower marriage rates, higher divorce rates and declining fertility. The growth in female labour force participation began in the Nordic countries and in the United States, reaching a level of 80% of women aged 25-54 in 2001, with this being later extended to other countries, where the participation rates of women aged 25-54 are about 60% in countries such as Mexico, Turkey and the majority of Southern European countries (OECD Labour Market Statistics). These changes have given rise to concerns about the future viability of a care pattern relying on informal care. However, full-time workers have maintained or increased their efforts as primary caregivers (Spillman and Pezzin, 2000), which raises questions about the motivations of these individuals who spend time in informal care activities.

Policy makers in some developed countries prefer that care for the sick and the elderly takes place "in the community", which is reliant on home-based care, following the recommendation of the World Health Organization, as opposed to "in an institution", to diminish the impact on social welfare provision.¹

In this paper, we examine why individuals engage in care giving, and how care arrangements affect informal caring-time and the carer's level of satisfaction. With respect to the theoretical approach, we develop three two-stage sequential games to capture different interactions between care recipients and informal carers, under different care arrangements. We find cases of overprovision of informal care in both the family decision model and the care recipient decision model. In the first case, the informal carer can receive a compensation, with this taking the form of an increase in the fraction of residual non-labour income allocated to the informal carer, whereas in the second case, the care recipient decides the optimum informal caring-time. Such time is considered as free by him/her, and does not affect his/her budget constraint. Therefore, in both cases the caregiver is obliged to spend more time than he/she would prefer.

We then empirically study the factors determining informal caring-time, and analyse changes in the informal carer's satisfaction, using two comparable years of the Spanish Survey of Informal Assistance for the Elderly (*Encuesta de Apoyo Informal a los Mayores*), 1994 and 2004. The issue is of relevance in developed countries, and more specifically so in Spain, where the number of people requiring help has grown at an unprecedented rate. According to the Institute for the Elderly and Social Ser-

¹For instance, in Great Britain, there is an increased concern about the link between engaging in care and labour force participation, and developing policies to encourage schedule flexibility (Carmichael and Charles, 2003; Heitmueller, 2007). In the USA, public policies try to support informal care (Van Houtven and Norton, 2004). In Canada, public home care expenditure has increased (Stabile et al., 2006), and there is growing concern about the relationship between formal and informal care.

vices (*Instituto de Mayores y Servicios Sociales*), there were about 1 million informal carers in Spain, representing 6% of the population aged 18 or older, in 2004, and the number of elderly recipients of informal care is estimated at 1.3 million, 17% of the population aged 65 or older.²

To empirically analyse what motivates individuals to spend different amounts of informal caring-time, we use a multinomial logit model (MNL), with this allowing us to analyse how informal caring time changes, depending on how the informal care decision process has taken place. We find that informal caregivers devote more time to care activities when they are obligated to. Under both the family decision and the care recipient decision, it is more likely that the informal carer will tend to devote more time to informal care activities. The family decision has the largest effect on the selection of different amounts of caring-time.

As regards informal carer's satisfaction, to the best of our knowledge there is no relevant evidence analysing this level of satisfaction. The informal carer's decisions about whether to spend time caring for the elderly or the sick depend, in part, upon the informal carer's subjective evaluation of their current status. Thus, it is not always clear how, and by whom, informal care should be valued: the care recipient, the informal caregiver, or others. Registering changes in the well-being of informal caregivers constitutes a first source of evaluation. To study informal carer's satisfaction we compute an ordered logit model. Results show that being obligated to spend time engaged in care, by way of the family decision, decreases the probability of being more satisfied, since in most cases informal carers have to spend more time than they would prefer. For those informal carers of working-age, the probability of having greater satisfaction does not decrease any more than for non-working-age individuals, even when this decision requires them to devote more than five hours engaged in care.

This paper proceeds as follows. Section 2 briefly reviews the literature regarding the provision of informal care and household decision-making. Section 3 develops the theoretical model. Section 4 outlines the data used in the analysis. Section 5 presents our findings on informal caring-time, and Section 6 focuses on informal caregivers' satisfaction. Section 7 sets out our conclusions.

2 Literature

Even though this question is relevant to all developed countries, existing research on the study of informal care supply refers mainly to the US and the UK. Most of these studies analyse the influence of informal care responsibilities on the labour supply of informal caregivers, relative to non-caregivers, with the general conclusion being that informal carers are potentially more exposed to labour market disadvantage (see Carmichael and Charles, 1998, 2003; Heitmueller, 2007; Heitmueller and Inglis, 2007; Checkovic and Stern, 2002; Stern, 1995). As a consequence, the empirical literature is focused on studying the endogeneity of the caring decision with respect to labour market participation. As Heitmueller and Inglis (2007) ask "do carers choose to work fewer hours or do part time workers choose to provide informal care?". Carmichael and Charles (1998, 2003) and Barmby and Charles (1992) consider the provision of informal care to be an exogenous factor in the labour supply decision. Ettner (1995,

²This Spanish Survey specifically includes a question asking why informal carers engage in informal care activities, differentiating between the carer's own decision, a family decision and a recipient decision. Other Surveys, such as the HRS (Health and Retirement Study), do not include questions related to this issue. The SHARE (Survey of Health, Ageing and Retirement in Europe) does include some questions about the reasons, if any, why carers engage in such activities, but only accounts for the difference between the carer's own decision (to meet other people, to contribute something useful, for personal achievement,...), and the carer's sense of obligation.

1996) and Stern (1995) use an instrumental variable approach to consider the potential endogeneity of informal care on the labour supply of women. Heitmueller (2007) shows that caring and labour market participation may be endogenous, and that not accounting for this endogeneity can overestimate the impact that care responsibilities have on the labour market decisions of carers.

With respect to the theoretical background, several papers focus on analyzing the different ways of modeling the care decision-making process, e.g., which family members participate in the decision-making process, and which types of care and/or living arrangements are considered. Most of the existing theoretical models involve parent-child relationships in which only one child is considered in the decision-making process (see, for the case of living care arrangements, Kotlikoff and Morris, 1990).

Others papers extend this framework, considering that several family members, such as all children, play a role in care decisions (see Engers and Stern, 2002; Checkovich and Stern, 2002; Pezzin et al. 2007). More recent work has used game-theoretic bargaining models to examine family care arrangements, which involve separate utility functions for each family member. Pezzin and Schone (1999, 2002) assume that intrahousehold allocation is determined as the solution to a cooperative Nash bargaining game, in which the threat point is the Cournot-Nash equilibrium of a noncooperative game. Hiedemann and Stern (1999) and Engers and Stern (2002) develop game theoretic models of family bargaining to analyse long-term care. In this sense, Pezzin and Schone (1997) and Pezzin, et al. (2007) find that incentives exist for family members to behave in a strategic manner. Therefore, care decisions are often the result of numerous individual and joint decisions by family members (Heitmueller, 2007), which makes relevant the study of the family decision-making process when considering that "one model cannot capture all possible aspects of a family's long-term care and living arrangements" (Stern, 1999).

It is not well established whether care arrangements should be modeled as a cooperative or a noncooperative game. Modeling interactions as a cooperative game allows us to obtain Pareto efficient outcomes without specifying the rules of the game. On the other hand, noncooperative game theory assumes that the rules of the game are often crucial determinants of the outcome, in that the sequence of moves and the information available to each player at each move affects the game equilibrium. As Pezzin et al. (2007) stress, this kind of social interaction is difficult to model, since it is "complex, and loosely structured", with the modeling of family interactions as cooperative or noncooperative being a "research strategy".

3 The Framework

Given that our purpose is to analyse how informal caring-time varies depending on how the informal care decision process takes place, we capture different interactions between care recipients and the informal caregivers by considering three care decision models, with three participants: a disabled person and two potential carers, who can be two family members. In each of these models, we perform interactions as a two-stage game.³ The first stage of the game determines the optimum hours spent caring for disabled individuals. In the first model, the care recipient decides the hours that the caregiver devotes to care activities, *Care Recipient Decision*. In the second model, we consider that the caregiver takes the decision on his/her own, *Informal Carer Decision*. Finally, in the third model the care arrangement is obtained by way of a family decision, *Family Decision*. In the second stage of each of the three games,

³Both stages may contain substages, for instance, living arrangements, although the analysis of these substages is beyond the scope of this paper.

we determine the optimum behaviour of the other agents and determine resource allocation under each arrangement structure. These three two-stage sequential games are solved by backward induction.

We use the subscripts $\{1, 2, 3\}$ to indicate the decision process and the subscripts $\{r, m1, m2\}$ to indicate the care recipient, and the potential carers, respectively. For the sake of simplicity, we assume that the caregiver is $m1$. Thus, $C_{r,1}$ denotes private consumption by the recipient when the recipient is the one who decides the hours that the carer spends.

To construct the decision process, we begin by specifying the preferences of each of the agents.⁴ Let $U_{r,j}(u_{r,j}(\mathbf{C}_{r,j}), A_j)$ be the utility functions of the care recipient, where $u_r^j : \mathbb{R}_+^n \rightarrow \mathbb{R}$ is the care recipient's sub-utility function, and where \mathbb{R} is the set of real numbers. The argument $\mathbf{C}_{r,j} \in \mathbb{R}_+^n$ of the utility function is a vector of n goods consumed by the care recipient, A_j represents the ability of care recipients to perform activities of daily living (Stabile et al., 2006), and $U_{r,j}$ is twice continuously differentiable, strictly increasing, and strongly concave.

The care recipient's ability to perform activities is defined by:

$$A_j = A_j(A_{1,j}(H_j), A_{2,j}(t_{1,j}, t_{0,j}))$$

where H is the care recipient's health status, $t_{1,j}$ represents the hours that the informal carer spends on care activities, and $t_{0,j}$ indicates the hours of formal care. For the sake of simplicity, we assume that the care recipient's health status is separable from the time dedicated to care. When the care recipient is healthy, she can perform by herself the activities of daily living, but if she is less healthy, others must perform those activities for her.⁵

We suppose that both potential carers derive utility from the private consumption, the leisure time and the ability of the care recipient to perform activities. Therefore, $U_{mi,j}(C_{mi,j}, l_{mi,j}, A_j), i = 1, 2$ and $j = 1, 2, 3$, where $C_{mi,j}$ represents the private consumption of each member of the family, and $l_{mi,j}$ indicates the hours devoted to leisure activities. We assume that $U_{mi,j}$ is twice continuously differentiable, strictly increasing, and strongly concave. We suppose that each family member's utility function depends on the care recipient's health status by way of the effect of H_j on A_j , which also affects the care recipient's well-being.

3.1 The Second Stage Game

As stated, each game is solved by backward induction. We begin by analysing the second stage of each game as a bargaining or non-bargaining solution. For each of the three care decision models, depending on who decides at this stage, we determine the optimum level of private consumption and leisure time for the potential carers, or formal care in the case of the care recipient. We assume that the informal carer accepts whatever caring-time is decided by the care recipient in the first stage of the first model, and that the care recipient accepts whatever the informal carer or both potential carers have decided in the first stage of the game, in the second and third models, respectively.

3.1.1 Care Recipient Decision

We use here two approaches which assume that the informal carer accepts the decision taken by the care recipient in the first stage of the game. In this case, $t_{1,1}$ is fixed, since it is determined in the first stage of the game, thus A_1 is also fixed.

⁴We suppose that each agent has perfect knowledge of the preferences of the other.

⁵This ability to perform activities is defined here differently than by Stabile et al. (2006). In our case, we concentrate on the allocation of time, whereas they study the use of publicly and privately financed home care services.

A Non-Bargaining Solution In the first approach, we suppose that the potential carers decide separately the private consumption, the labour supply and leisure time.⁶ Formally:

$$\begin{aligned} & \underset{C_{mi,1}, l_{mi,1}, h_{mi,1}}{\text{Max}} && U_{mi,1}(C_{mi,1}, l_{mi,1}, A_1) \\ & \text{subject to} && \end{aligned}$$

$$\begin{aligned} C_{mi,1} &\leq Y_{mi} + w_{mi}h_{mi,1} \\ A_1 &= A_1(A_{1,1}(H_1), A_{2,1}(t_{1,1}, t_{0,1})) \end{aligned}$$

$$T_{mi,1} = l_{mi,1} + h_{mi,1} + t_{i,1}$$

with $i = 1, 2$, where Y_{mi} represents non-labour income, w_{mi} is the wage rate, $h_{mi,1}$ indicates the hours spent in paid work, and $T_{mi,1}$ represents the total time the agent mi can devote to care and non-care activities. We assume that the caregiver is the agent $m1$, therefore $t_{2,j}$ is equal to zero.

The associated first-order conditions imply that, at the equilibrium point, the individual's marginal rate of substitution (MRS) between individual i 's leisure and private consumption is equal to the wage rate:

$$\frac{\partial U_{mi,1}/\partial l_{mi,1}}{\partial U_{mi,1}/\partial C_{mi,1}} = w_{mi}, i = 1, 2. \quad (1)$$

Let $\tilde{l}_{mi,1}(w_{mi}, Y_{mi}, A_1, T_{mi,1})$, $\tilde{h}_{mi,1}(w_{mi}, Y_{mi}, A_1, T_{mi,1})$ and $\tilde{C}_{mi,1}(w_{mi}, Y_{mi}, A_1, T_{mi,1})$ $i = 1, 2$, be the solution of this stage.

From the envelope theorem, and given that $T_{mi,1} = l_{mi,1} + h_{mi,1} + t_{i,1}$ and (1), we may obtain in equilibrium that $\frac{\partial \tilde{h}_{m1,1}}{\partial t_{1,1}} < 0$, that is to say, an increase in the time devoted to care activities generates a decrease in the time devoted to labour activities. Given that $T_{mi,1} = l_{mi,1} + h_{mi,1} + t_{i,1}$, and supposing that $T_{m1,1}$ is fixed, if $\frac{\partial \tilde{h}_{m1,1}}{\partial t_{1,1}} = -1$, the leisure time does not change. However, when $\frac{\partial \tilde{h}_{m1,1}}{\partial t_{1,1}} < -1$, we can observe that $\frac{\partial \tilde{l}_{m1,1}}{\partial t_{1,1}} \leq 0$, that is to say, an increase in the time devoted to care activities can, or not, increase the time devoted to leisure.⁷

In this case, we have not considered a corner solution, that is to say, we do not consider that the agent i does not devote time to the labour market, and thus it is possible that this agent does not perceive the labour cost that the time devoted to care activities can produce.

A Collective Approach In the second approach, the caregiver can be the daughter of the disabled person, and the other potential carer can be her husband. Considering the usual strategy of collective models (Chiappori 1988, 1992), the decisions made by the household are Pareto-efficient. This is equivalent to assuming that household allocations are determined as solutions to the problem:

⁶For instance, a mother and her daughter, who lives independently. Pezzin and Schone (1999, 2002) explain that when the recipient and the family members co-reside, their interactions are cooperative, but when they live independently there is no bargaining solution for the game.

⁷For the non-caregiver, $t_{1,1}$ does not affect her time constraint. However, her utility functions depend positively on that argument. Therefore, we can observe that an increase in the time devoted to care activities, $t_{1,1}$, can generate an increase in the time devoted to the labour market. That is to say, given that the changes in her marginal utility of consumption, when the ability to perform activities of her parent, weighted for her wage rate, is greater than the changes in her marginal utility of leisure when the ability to perform activities of her parent changes, the time devoted to market activities increases, which diminishes the time devoted to leisure.

$$\begin{aligned} \max_{C_{m1,1}, l_{m1,1}, C_{m2,1}, l_{m2,1}} \Psi(C_{m1,1}, l_{m1,1}, C_{m2,1}, l_{m2,1}, A_1; \lambda) &= \lambda U_{m1,1}(C_{m1,1}, l_{m1,1}, A_1) + \\ &+ (1 - \lambda) U_{m2,1}(C_{m2,1}, l_{m2,1}, A_1) \end{aligned} \quad (2)$$

subject to

$$C_{m1,1} + C_{m2,1} \leq Y_m + w_{m2} h_{m2,1} + w_{m1} h_{m1,1}$$

$$A_1 = A_1(A_{1,1}(H_1), A_{2,1}(t_{1,1}, t_{0,1}))$$

$$T_{m1,1} = l_{m1,1} + h_{m1,1} + t_{1,1}$$

$$T_{m2,1} = l_{m2,1} + h_{m2,1}$$

where $Y_{m1} + Y_{m2} = Y_m$, the overall budget constraint is represented by

$$C_{m1,1} + C_{m2,1} \leq Y_m + w_{m1} (T_{m1,1} - l_{m1,1} - t_{1,1}) + w_{m2} (T_{m2,1} - l_{m2,1})$$

We assume that Ψ is a strictly concave function of $(C_{m1,1}, l_{m1,1}, C_{m2,1}, l_{m2,1})$ and has separability properties. It is possible to obtain some marginal rates of substitution which do not depend on λ , that is, the Pareto weight (see Blundell et al., 2005).

It is possible to solve the household problem (2) as a two-stage process. At stage 1, both spouses agree in determining the distribution of the residual non-labour income between them. At stage 2, both spouses choose their level of consumption, leisure time, and labour supply. Given that $\hat{l}_{mi,1}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1})$, $\hat{h}_{mi,1}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1})$ and $\hat{C}_{mi,1}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1})$ $i = 1, 2$ represent the solution of the household problem, we can define ρ_{mi} as:

$$\begin{aligned} \rho_{mi}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1}) &= w_{mi} \hat{l}_{mi,1}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1}) + \\ &+ \hat{C}_{mi,1}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1}) + w_{mi}(t_{i,1} - T_{mi,1}), \quad i = 1, 2. \end{aligned}$$

where $t_{2,1} = 0$. We suppose that both agents are potential carers, but finally there is only one caregiver, the agent $m1$, with ρ_{m1} and ρ_{m2} representing the sharing rule, which is the fraction of residual non-labour income allocated to the spouse mi . Both spouses share what is left after private consumption. Hence ρ_{mi} can be positive or negative. If we aggregate ρ_{m1} and ρ_{m2} :

$$\rho_{m1}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1}) + \rho_{m2}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1}) = Y_m$$

The functions $\hat{l}_{mi,1}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1})$, $\hat{C}_{mi,1}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1})$ and $\hat{h}_{mi,1}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1})$ can be obtained from the following maximization problem:

$$\max_{C_{mi,1}, l_{mi,1}, h_{mi,1}} U_{mi,1}(C_{mi,1}, l_{mi,1}, A_1)$$

subject to

$$C_{mi,1} \leq \rho_{mi}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1}) + w_{mi} h_{mi,1}$$

$$A_1 = A_1(A_{1,1}(H_1), A_{2,1}(t_{1,1}, t_{0,1}))$$

$$T_{mi,1} = l_{mi,1} + h_{mi,1} + t_{i,1}$$

with $i = 1, 2$. Therefore, the overall budget constraint is

$$C_{mi,1} \leq \rho_{mi}(w_{m1}, w_{m2}, Y_m, A_1, T_{m1,1}, T_{m2,1}) + w_{mi}(T_{mi,1} - l_{mi,1} - t_{i,1})$$

The first-order conditions imply that the individual's marginal rate of substitution between individual i 's leisure and private consumption is equal to the wage rate in equilibrium. We study the effects that an increase in $t_{1,1}$ has on both the hours spent in market work and the leisure time for both members of the family, obtaining results similar to those found in the non-bargaining solution. However, the changes in the labour supply when caring-time changes also depend on the changes produced in the sharing rule. Given $\frac{\partial \rho_{m1}}{\partial t_{1,1}} > 0$, an increase in the time devoted to informal care can generate labour cost, $\frac{\partial \hat{h}_{m1,1}}{\partial t_{1,1}} < 0$, under the same conditions as in the non-bargaining solution. For leisure time, and given that $T_{mi,1} = l_{mi,1} + h_{mi,1} + t_{i,1}$, we observe

similar results as in the non-bargaining solution. We also see that the impact of $t_{1,1}$ on $\hat{h}_{mi,1}$ is more likely to be greater, that is to say, the changes in the labour supply are more likely to be greater than in the non-bargaining solution, which is not conditioned on the changes in the sharing rule. When the fraction of residual non-labour income allocated to the spouse $m1$, ρ_{m1} , considerably increases when the time devoted to caring-time increases, that is, agent $m2$ compensates $m1$ for devoting time to care activities, we find that the hours devoted to the labour market decrease more than in the non-bargaining approach.⁸

3.1.2 Informal Carer Decision and Family Decision

We now consider that the care recipient accepts the decision taken by the informal carer, or the family decision, in the first stage of the game. Therefore, $t_{1,2}$ is fixed, which is determined in the first stage of the game, although A_2 is not fixed.

Therefore, the care recipient decides the optimum amount of hours of formal care and the level of her own private consumption. Assuming that $n = 1$, the care recipient optimization problem is:

$$\begin{aligned} & \max_{C_{r,2}, t_{0,2}} U_{r,2}(C_{r,2}, A_2) \\ & \text{subject to} \\ & A_2 = A_2(A_{1,2}(H_2), A_{2,2}(t_{1,2}, t_{0,2})) \\ & C_{r,2} + Pt_{0,2} \leq Y_{r,2} \\ & t_{1,2} + t_{0,2} = T_{r,2} \end{aligned}$$

with $T_{r,2}$ being the total time needed to perform daily living activities, and P the price of the formal care, which we assume equal to one. Given that $t_{1,2}$ is fixed, and that $T_{r,2}$ is also fixed, from $t_{1,2} + t_{0,2} = T_{r,2}$, we can easily obtain $\bar{t}_{0,2}$, that is, the formal caring-time in equilibrium. It is straightforward to obtain the level of private consumption in equilibrium, from the budget constraint, $\bar{C}_{r,2}$. Therefore, there is no maximization process due to the constraint exhibited by $t_{1,2}$. It is more likely that the levels of $\bar{C}_{r,2}$ and $\bar{t}_{0,2}$ are not the optimum solution for the maximization problem of the disabled person. In this situation, the equilibrium of our two-stage game can be Pareto inefficient, even when the first stage game is Pareto efficient.

3.2 The First Stage Game

We analyze here the first stage of each game for each of the three models. In the first model, the care recipient decides the hours of informal care; in the second, the caregiver decides by herself; and in the third model the hours spent on care are the result of a family decision.

3.2.1 Care Recipient Decision

In this game, it is the care recipient who decides the hours of informal and formal care, with this choice being based on the recipient's maximization problem:

⁸For the non-caregiver, and given that $t_{1,1}$ does not affect his time constraint. However, his utility function depends positively on this argument. Therefore, we can observe that an increase in the time devoted to care activities $t_{1,1}$ can generate an increase in the time devoted to the labour market, depending on the sign of the relationship between the sharing rule and the caring-time. If this relationship is positive, and given that the changes in his marginal utility of consumption when the ability to perform activities of the disabled person, weighted for his wage rate, is greater than the changes in his marginal utility of leisure when A_1 changes. This produces an increase in the time devoted to market activities, which diminishes the time devoted to leisure.

$$\begin{aligned}
& \max_{C_{r,1}, t_{0,1}, t_{1,1}} U_{r,1}(C_{r,1}, A_1) \\
& \text{subject to} \\
& A_1 = A_1(A_{1,1}(H_1), A_{2,1}(t_{1,1}, t_{0,1})) \\
& C_{r,1} + t_{0,1} \leq Y_{r,1} \\
& t_{1,1} + t_{0,1} = T_{r,1}
\end{aligned}$$

From the first order condition we obtain:

$$\frac{\partial U_{r,1}}{\partial C_{r,1}} = \frac{\partial U_{r,1}}{\partial A_1} \left[\frac{\partial A_1}{\partial t_{1,1}} - \frac{\partial A_1}{\partial t_{0,1}} \right] \quad (3)$$

At the equilibrium point, the individual's marginal rate of substitution between consumption and the care recipient's ability to perform activities of daily living is equal to the difference between the changes produced in the ability to perform activities of daily living of the care recipient, when the informal caring-time changes and the changes produced in the same ability when the formal caring-time changes.

From here, and given the time and budget constraints, we can determine the functions of $\tilde{t}_{1,1}(T_{r,1}, Y_{r,1}, H_1)$, $\tilde{C}_{r,1}(T_{r,1}, Y_{r,1}, H_1)$, and $\tilde{t}_{0,1}(T_{r,1}, Y_{r,1}, H_1)$.

$\tilde{C}_{r,1}$ and $\tilde{t}_{0,1}$, that is to say, the optimum value of private consumption of the care recipient and the formal caring-time in situation 1, respectively, can be equal to that obtained in the second stage of the game in situation 2, $\bar{C}_{r,2}$ and $\bar{t}_{0,2}$, when $\bar{t}_{1,2}$ satisfies (3). If the informal caring-time, $\bar{t}_{1,2} < \tilde{t}_{1,1}$ from the informal carer's perspective in situation 1, she must devote more time to care activities than she would prefer. From the care recipient's perspective in situation 2, she receives less informal care than she would prefer.

3.2.2 Informal Carer Decision - A Non-Bargaining Solution

In the second game, the caregiver decides the hours to devote to care activities by herself. We maintain the assumption that even though both agents are potential carers, only one is the caregiver, in our case agent $m1$. The maximization problem for each agent mi is represented by:

$$\begin{aligned}
& \text{Max}_{C_{mi,2}, l_{mi,2}, h_{mi,2}, t_{i,2}} U_{mi,2}(C_{mi,2}, l_{mi,2}, A_2) \\
& \text{subject to} \\
& C_{mi,2} \leq Y_{mi} + w_{mi} h_{mi,2} \\
& A_2 = A_2(A_{1,2}(H_1), A_{2,2}(t_{1,2}, t_{0,2})) \\
& T_{mi,2} = l_{mi,2} + h_{mi,2} + t_{i,2} \\
& \text{with } i = 1, 2, t_{2,j} \text{ is equal to zero.}^9
\end{aligned}$$

For the non-caregiver, we obtain similar behaviour to situation 1, in the non-bargaining approach. Therefore, the behaviour of the non-caregiver is not conditioned by the stage of participation.

The informal caregiver decides individually the private consumption, the labour supply, the leisure time and the informal caring-time. From the first order condition, and using the envelope theorem, we observe:

$$\frac{\partial U_{mi,2} / \partial l_{mi,2}}{\partial U_{mi,2} / \partial C_{mi,2}} = w_{mi}, i = 1, 2. \quad (4)$$

and:

$$\frac{\partial U_{m1,2}}{\partial C_{m1,2}} w_{m1} = \frac{\partial U_{m1,2}}{\partial A_2} \frac{\partial A_2}{\partial t_{1,2}} \quad (5)$$

⁹For example, a mother, agent $m1$, who decides for herself to care for her disabled husband, and the other member of the family is represented by her daughter.

Let $\bar{C}_{mi,2}(w_{mi}, Y_{mi}, t_{0,2}, T_{mi,2})$, $\bar{l}_{mi,2}(w_{mi}, Y_{mi}, t_{0,2}, T_{mi,2})$, $\bar{h}_{mi,2}(w_{mi}, Y_{mi}, t_{0,2}, T_{mi,2})$ and $\bar{t}_{1,2}(w_{mi}, Y_{mi}, t_{0,2}, T_{mi,2})$ be the solutions of the above maximization problem.

We can compare the time assigned to informal care activities in both situations, when the care recipient decides first, situation 1, with the informal caring-time being determined by the informal carer in situation 2. From (3), (4) and (5), we obtain a necessary condition to observe a similar informal caring-time in both situations:

$$\frac{\partial U_{r,j}/\partial C_{r,j}}{\partial U_{r,j}/\partial A_j} = \frac{\partial U_{m1,j}/\partial l_{m1,j}}{\partial U_{m1,j}/\partial A_j} \gamma \quad (6)$$

where $\gamma = \frac{\frac{\partial A_{2,j}}{\partial t_{1,j}} - \frac{\partial A_{2,j}}{\partial t_{0,j}}}{\frac{\partial A_{2,j}}{\partial t_{1,j}}}$ and $j = 1, 2$, with $\gamma > 0$, see (3), and that $\frac{\partial A_1}{\partial A_{2,1}} = \frac{\partial A_2}{\partial A_{2,2}}$ and $\frac{\partial A_{2,1}}{\partial t_{1,1}} = \frac{\partial A_{2,2}}{\partial t_{1,2}}$ in the non-bargaining solution. Therefore, when the care recipient's marginal rate of substitution between consumption and the ability to perform activities of daily living is equal to the marginal rate of substitution between leisure and the ability to perform activities of daily living, weighted by γ , then $\bar{t}_{1,2}$ is equal to $\bar{t}_{1,1}$. In this situation, there is no difference between the decision taken by the care recipient and that taken by the informal carer. However, in the case that the care recipient's ability to perform activities of daily living increases much more when the care recipient receives informal caring-time, than when he/she receives formal caring-time, this equality is less sustainable.

3.2.3 Family Decision - Collective Approach

In the third game, we model the family decision as an intra-family bargaining model, following the collective approach (Chiappori, 1988, 1992), since this takes into account the intra-family allocation of resources.

As we have explained above, in the collective approach, household allocations are determined by solving the following maximization problem:

$$\begin{aligned} \max_{C_{m1,3}, l_{m1,3}, C_{m2,3}, l_{m2,3}, t_{1,3}} \Psi(C_{m1,3}, l_{m1,3}, C_{m2,3}, l_{m2,3}, t_{1,3}; \lambda) = & \lambda U_{m1,3}(C_{m1,3}, l_{m1,3}, A_3) + \\ & + (1 - \lambda) U_{m2,3}(C_{m2,3}, l_{m2,3}, A_3) \end{aligned} \quad (7)$$

where $Y_{m1} + Y_{m2} = Y_m$, subject to the overall budget constraint and the ability of the care recipients to perform daily living activities:

$$\begin{aligned} C_{m1,3} + C_{m2,3} & \leq Y_m + w_{m1}(T_{m1,3} - l_{m1,3} - t_{1,3}) + w_{m2}(T_{m2,3} - l_{m2,3}) \\ A_3 & = A_3(A_{1,3}(H_3), A_{2,3}(t_{1,3}, t_{0,3})) \end{aligned}$$

The solution of the household problem can be obtained using a two-stage process. First, we determine the distribution of the residual non-labour income, ρ_{mi} :

$$\begin{aligned} \rho_{mi}(w_{m1}, w_{m2}, Y_m, t_{0,3}, H_3, T_{m1,3}, T_{m2,3}) = & w_{mi} l_{mi,1}^*(w_{m1}, w_{m2}, Y_m, t_{0,3}, H_3, T_{m1,3}, T_{m2,3}) + \\ & + C_{mi,3}^*(w_{m1}, w_{m2}, Y_m, t_{0,3}, H_3, T_{m1,3}, T_{m2,3}) + w_{mi}(-T_{mi,3}), i = 1, 2. \end{aligned}$$

with $l_{mi,3}^*(w_{m1}, w_{m2}, Y_m, t_{0,3}, H_3, T_{m1,3}, T_{m2,3})$, $h_{mi,3}^*(w_{m1}, w_{m2}, Y_m, t_{0,3}, H_3, T_{m1,3}, T_{m2,3})$ and $C_{mi,3}^*(w_{m1}, w_{m2}, Y_m, t_{0,3}, H_3, T_{m1,3}, T_{m2,3})$, $i = 1, 2$ indicating the solution of the household problem.

Aggregating ρ_{m1} and ρ_{m2} , we obtain:

$$\begin{aligned} \rho &= \rho_{m1}(w_{m1}, w_{m2}, Y_m, t_{0,3}, H_3, T_{m1,3}, T_{m2,3}) + \rho_{m2}(w_{m1}, w_{m2}, Y_m, t_{0,3}, H_3, T_{m1,3}, T_{m2,3}) = \\ &= Y_m - w_{m3}t_{1,3}^*(w_{m1}, w_{m2}, Y_m, t_{0,3}, H_3, T_{m1,3}, T_{m2,3}) \end{aligned}$$

Second, both spouses choose their level of consumption, leisure time, and labour supply. As Blundell et al. (2005) show, we can obtain the optimum values of ρ_{m1} , ρ_{m2} and $t_{1,3}$ solving:

$$\begin{aligned} &\max_{\rho_{m1}, \rho_{m2}, t_{1,3}} \lambda V_{m1}(w_{m1}, \rho_{m1}, t_{1,3}) + (1 - \lambda)V_{m2}(w_{m2}, \rho_{m2}, t_{1,3}) \\ &\text{subject to} \\ &\rho_{m1} + \rho_{m2} = Y_m - w_{m1}t_{1,3} \\ &\text{with } V_{mi}(w_{mi}, \rho_{mi}, t_{1,3}) \text{ being the individual indirect utilities.} \\ &\text{The solution gives:} \end{aligned}$$

$$\frac{\frac{\partial V_{m1}}{\partial t_{1,3}}}{\frac{\partial V_{m1}}{\partial \rho}} + \frac{\frac{\partial V_{m2}}{\partial t_{1,3}}}{\frac{\partial V_{m2}}{\partial \rho}} = \frac{w_{m1} \frac{\partial V_{m1}}{\partial \rho_{m1}}}{\frac{\partial V_{m1}}{\partial \rho}} \quad (8)$$

The aggregate individual marginal willingness of agent $m1$ to devote time to care is equal to the marginal willingness to increase the distribution of the residual non-labour income of agent $m1$, weighted by the wage rate of agent $m1$.

If the level of informal care determined by the recipient in the first stage of the game, $\tilde{t}_{1,1}$, satisfies (8), then the informal carer will be indifferent to these two forms of obligation. If not, we find cases of overprovision of informal care in the family decision model, since the informal carer can receive a compensation by way of an increase in ρ_{m1} , which produces an increase in the time spent on care.

We also analyse the differences between, $\bar{t}_{1,2}$ and $t_{1,3}^*$. We find that $t_{1,3}^*$, that is to say, the optimum hours devoted to care activities in the family decision, is likely to be greater than $\bar{t}_{1,2}$, the optimum hours devoted to care activities in the informal carer decision, when agent $m2$ considerably compensates $m1$ by way of increasing ρ_{m1} , the fraction of residual non-labour income allocated to the spouse $m1$ for spending more time on care.

The remainder of the paper empirically studies the effects that these care decision processes have on the time spent on care activities, and on the level of satisfaction of the informal carer. As explained above, we determine whether, depending on the care decision process, informal caregivers must devote more time to care activities than they would prefer. Under the family decision situation, we are more likely to observe that the informal carer tends to devote more time to informal care activities. In the care recipient decision model, since the care recipient considers informal caring-time to be unpaid, time spent on care is considerably increased, which can result in the informal caregiver devoting more time to informal care activities than he/she would prefer.

4 Data

We use data from the Spanish Survey of Informal Assistance for the Elderly (*Encuesta de Apoyo Informal a los Mayores*), 1994 and 2004. The two surveys were developed by the Institute for the Elderly and Social Services (*Instituto de Mayores y Servicios Sociales*) of the Spanish Ministry of Employment and Social Services. The surveys contain information on individuals 18 years and older, residing in Spain, and devoting time to informal care activities. These surveys exclude the formal caregivers who receive the equivalent of a salary, but leave open the possibility of informal carers

receiving monetary compensation. They include any kind of assistance with activities that the care recipient can no longer do for herself, excluding those tasks that were done for the care recipient by others, prior to the current need for care.¹⁰ We have a sample of 1,212 carers in 1994 and 1,219 in 2004.

Mean and standard deviations for the main variables used are presented in Table 1. Columns (1) and (3) report values for the whole sample in 1994 and 2004, respectively. Comparing both columns, we observe that informal caregivers are older in 2004 (52.2 vs. 52.8). However, this difference is not statistically significant. Those who report spending time on care of less than two hours are the youngest in both 1994 and 2004 (47 and 48 years old, respectively), and the oldest are those who report time spent on care of more than five hours (about 55 years old in both periods). Informal caregivers are mainly women, about 82.6% in 1994 and 84.3% in 2004. Therefore, the number of women engaged in caring activities has increased, even as women have become more involved in the labour market, but the difference is not statistically significant. The majority informal carers have a low level of education in both periods (38.5% and 43.3%, respectively). The number of higher educated careproviders has significantly increased during this decade, consistent with the overall gradual increase in the levels of education. About 70% of caregivers in 1994 are the spouse or the son/daughter of the care recipient, with this rising to 74 % in 2004. Hence, care for disabled people continues to be largely provided by family members, with the son/daughter of the care recipient mainly providing this caring-time, 54.1% in 1994 and 59.3% in 2004. These care providers are mainly married/cohabiting, about 78% in both periods. The number of children of the care provider has significantly decreased between these dates, from 2.21 to 1.02, consistent with the overall decrease in the number of children of Spanish families.

There are no important differences with regard to the size of the city of residence. In 1994, the percentage of care providers is greater, 36.9%, in cities with more than 100,000 inhabitants, whereas in 2004 the greater percentage, 40.2%, appears in cities with 10,000 to 100,000 inhabitants. In the case of cities with less than 10,000 inhabitants, the percentage of carers has decreased from 31.5% to 29%, with this difference being statistically significant. In cities with 10,000 to 100,000 inhabitants, the percentage of carers has considerably increased, due to the increase of carers engaged in those activities for between 3 and 5 hours per day. For those who report devoting from 3 to 5 hours, and more than 5 hours, to care, the percentage of carers in cities with more than 100,000 inhabitants has considerably decreased, from 43% and 35% in 1994 to 34% and 26% in 2004, respectively.

Workers have increased their efforts as caregivers during this period, from 21% to 26.8%, increasing more for those who report spending time on care for less than two hours per day (33.3% vs 42.3%) and for those who report spending time on care for between 3 and 5 hours, (20.4% vs 32.9%), and increasing less for those who report spending more than 5 hours on care (16.1% vs 20.7%). Therefore, we observe that workers have increased their efforts as caregivers between those dates. The percentage of homemakers devoting time to care activities has decreased from 50.7% to 45.7%, and has decreased in all the intervals considered, with this difference being statistically significant. However, there continue to be those who devote time more intensively to care, more than five hours, representing 49.26% of homemakers in 2004.

Analyzing the different kinds of care, and the decision process variables, we find that the number of those who report spending time on care of less than two hours has decreased (22.3% vs 15.6%), the difference between both periods being statistically

¹⁰For instance, in the case of housework, only the additional part of housework due to the illness or disability of the care recipient should be seen as informal care.

significant. However, the informal carers who report spending time more intensively have increased. Such care is usually classified into two groups, depending on the needs of the care recipient. The informal caregiver can be engaged in Instrumental Activities of Daily Living (IADL), such as cleaning, ironing, making lunch, and administrative tasks such as shopping, visits to the doctor, to the bank, or in Personal Activities of Daily Living (ADL), such as bathing or showering, grooming, dressing, eating, etc, which are more time-consuming. As we can observe in Table 1, informal caregivers are more intensive, since the number of those who report that time spent in ADL has increased up to 76.4%, and those who spend more than 5 hours on care are engaged in more ADL, 85% in 2004 vs. 75.8% in 1994.

The number of primary caregivers also increased during these ten years, from 81.2% to 82.2% due to the increase in those who spend more hours in care activities. The primary caregivers who spend fewer hours have decreased from 70.8% to 59.52% and the number reporting spending from 3 to 5 hours on care has decreased from 81.53% to 76.9%. About 75.4% of carers are engaged in permanent care for the disabled person in both periods. Given that different living arrangements are likely to affect the amount of care, we include in this analysis the travel distance between the informal carer and the care recipient, which has increased by about 4 minutes. The number of care recipients who cohabit with a relative has decreased from 73.1% to 57%, therefore, extra-residential care has increased. About 37.2% of carers in 1994, and 32.3% in 2004, receive monetary compensation from the care recipient. We also include other variables to control for whether other people are looking after any particular care recipient, that is, whether informal and formal care is supplied by people other than the respondent. Overall, 14.3% of the informal carers report that the care recipients receive formal help. Specifically, intensive carers, those who engage in care for more than 5 hours, report that the amount of formal help has increased from 5.7% to 12.9%; those who spend less than 2 hours on care report that this increase has gone from 6.4% to 18.7%, and those who spend from 3 to 5 hours, report an increase from 7.4% to 14.84%. Care supplied by family members has decreased from 58.9% to 51.6% during this period, since it has considerably decrease for those who report spending less than 2 hours, from 59.13% to 39.72%.

Considering the care decision process, our key variables, we observe that the decision to care is taken by the carers in about 59.8% of the sample in 1994 and in 62% in 2004, by the family in 32.8% and in 32.5%, respectively, and by the care recipient in 4.3% and 5.5%, respectively. Caregivers decide for themselves in a greater percentage in all the intervals, but the informal carer decisions decrease with the intensity of the caring-time. However, the family decision increases with the intensity of the caring-time. The percentage of care recipient who decide for themselves has also increased in all the intervals considered, but the relationship between intensive caring-time and the care recipient decision is negative.¹¹

Observing the Recipient Demographic Characteristics, a typical care recipient is an 80 year old woman, with a low level of education, receiving a pension and not married in either period. In 2004, she is more educated and has more health problems than in 1994 (95.2% vs 84.6%).

In summary, we observe that a typical carer is a middle-aged woman, married, with a lower educational level in both periods. In 2004, she lives in a city of 10,000 to 100,000 inhabitants, works more and has fewer children than in 1994. She is the

¹¹In previous researches, the data used do not account for how the decision processes have taken place, which can have an effect on the caring-time, since those carers who do not decide for themselves the hours devoted to care activities can be forced to spend more hours than those who do decide for themselves.

primary caregiver, does these tasks every day and decides on her own whether to care.

5 Informal Caring-Time: Empirical Model And Results

5.1 Empirical Model

With respect to informal caring-time, we must first define the variable used to measure this individual caring time. Respondents are asked how many hours they devote, on an average day, to informal care activities: less than two hours, from three to five hours, or more than five hours.¹² We consider what motivates individuals to choose between different amounts of informal caring-time, using a multinomial logit model (MNL), with this allowing us to analyse how informal caring time varies, depending on the informal carer's demographic characteristics, the recipient's demographic characteristics, and how the informal care decision process occurs.¹³

In the MNL, we estimate a separate binary logit for each pair of outcome categories. Formally, the MNL can be written as:

$$\ln \phi_{m|b} = \ln \frac{\Pr(K=m|\mathbf{x})}{\Pr(K=b|\mathbf{x})} = \mathbf{x}'\beta_{m|b} \quad \text{for } m = 1 \text{ to } J$$

where b is the base category, $J = 3$ and \mathbf{x} is a vector of the demographic characteristics of the informal carer, and of the recipient, and of the decision process variables.¹⁴

The variables capturing the demographic characteristics of the informal caregiver include her age, her gender, her educational level, her marital status, her number of children, her work status, the population of her city of residence, and whether she receives monetary compensation for care activities. With respect to the care

¹²Both 1994 and 2004 surveys asked informal caregivers the hours they spent caring for the dependent person, in four categories: less than 1 hour, from 1 to 2 hours, from 3 to 5 hours and more than 5 hours. We computed a test for combining alternatives to test whether the categories are indistinguishable, that is to say, if none of the independent variables significantly affect the odds of alternative m versus alternative n (Anderson, 1984). In our case, we compute Wald tests and LR tests, and we cannot reject the hypothesis that categories "less than 1 hour" and "less than 2 hours" are indistinguishable and, in consequence, we combine these two categories in our estimations.

¹³Even though our outcome can be considered as partially ordered, in which case, we should have used an Ordinal Model, we have checked by testing the parallel regression assumption, implicit in the Ordinal Model. This is performed by comparing the estimate from the $J - 1$ binary regressions,

$$\Pr(u \leq m | \mathbf{x}) = \Phi(\mu_m - \mathbf{x}'\beta) \quad \text{for } m = 1, 2, \dots, J - 1$$

where the β s are allowed to differ across the equations. This parallel regression assumption implies that $\beta_1 = \beta_2 = \dots = \beta_{J-1}$. We compute the approximate likelihood-ratio test of proportionality of odds across response categories (chi-squared(35)=62.76(0.003) in 1994, chi-squared(35)=74.9(0.000) in 2004), and we conclude that we have evidence that the parallel regression assumption has been violated at the 1% level of significance. We have also compared the predictions from ordered logit and multinomial logit, obtaining that probabilities predicted for one of the categories ended abruptly in the case of ordered logit predictions. This abrupt truncation of the distribution for the ordered logit model is substantively unrealistic (see Long and Freese, 2006). Moreover, these surveys include the category "don't know", which probably does not correspond to the middle category in a scale. Therefore, when the proper ordering is ambiguous, the models for nominal outcomes can be considered and, in these circumstances, we use the Multinomial Logit Model (MNL).

¹⁴The MNL makes the assumption known as the independence of irrelevant alternatives (IIA).

In this model:

$$\frac{\Pr(K=m|\mathbf{x})}{\Pr(K=n|\mathbf{x})} = e^{\mathbf{x}'(\beta_{m|b} - \beta_{n|b})}$$

where the odds do not depend on other available alternatives. Thus, adding or deleting alternatives does not affect the odds among the remaining alternatives. The independence assumption follows from the initial assumption that the disturbances are independent and homoscedastic. We consider two of the most common tests developed for testing the validity of the assumption, the Hausman's specification test (Hausman and McFadden, 1998), and Small-Hsiao test (Small and Hsiao, 1985). In this estimation, we cannot reject the null hypothesis, that is to say, odds are independent of other alternatives in both 1994 and 2004. We find similar results even with a different base category.

recipients' characteristics, we observe her age, her gender, her educational level, and her health status.¹⁵ In the help variables, we control for the kind of task developed, that is IADL and ADL activities, and the travel time between the carer and the recipient. Moreover, sharing the same household may lead to a greater obligation of family members to engage in care, and so we include a variable to control whether the care recipient lives with a relative. We also include variables to control for the frequency and permanency of the care, and if the care recipient receives formal help or help from another family member. We control for the care decision processes by using the carer decision as the variable of reference.

We study how the variables affect the odds of a person to select one amount of caring-time over another. Holding other variables constant, the changed factor in the odds of outcome m versus outcome n , as x_i increase by δ , equals:

$$\frac{\phi_{m|b}(\mathbf{x}, x_i + \delta)}{\phi_{n|b}(\mathbf{x}, x_i)} = e^{\beta_{i,m|n} \delta}$$

5.2 Results

This model includes many coefficients, which present difficulties of interpretation of the effects on all pairs of outcome categories. We have developed odds-ratio plots to analyse both periods, Figure 1 and Figure 2 (see Long and Freese, 2006).¹⁶ To analyse the effect of each variable on the change in the probability of devoting different amounts of caring-time, we present Table 2, where columns (1) and (2) show the average absolute change in the probability of devoting different amounts of caring-time by informal carers without considering care recipient characteristics, and taking into account recipient characteristics, respectively.

The variables of interest are the family decision and the recipient decision. In this estimation, we capture the relationship between the care decision processes and the change in the probability of devoting different amounts of caring-time. In this way, we analyse which variables have more impact on changing the decision of devoting more (or less) time to informal care activities. In Column (1), we do not control for care recipient characteristics. This approach yields an unbiased estimate of the effect of the care decision processes, as shown in Column (2). The variations in the average change in the probability of devoting different amounts of caring-time are not significant for the family decision variable in the year 1994. However, for the year 2004 this average change decreases from 8.22 to 7.6 percentage points, which suggests that omitting care recipient characteristics results in an overestimation of the effect of the family decision on the probability of devoting different amounts of caring-time, even though the poor health status of the care recipient is the only significant characteristic. In the case of the recipient decision, the decrease is greater in 1994, from 2.89 to 2.11 percentage points, suggesting that omitting care recipient characteristics results in an overestimation of the effect of the recipient decision variable, but this

¹⁵We do not include the income of the carer and the care recipient, since respondents are not asked about these variables in 2004. However, we have also estimated our models with income variables defined by some characteristics of the agents. Results are quite similar, and are available upon request.

¹⁶In the odds-ratio plot, the independent variables are represented on a separate row. The horizontal axis indicates the relative magnitude of the β coefficients associated with each outcome. The numbers correspond to the outcome categories, that is, "1" denotes less than two hours of caring-time, which corresponds to the base category, "2" indicates from three to five hours of caring-time, and "3" corresponds to more than five hours of caring time. The additive scale on the bottom axis measures the value of $\beta_{k,m|n}$ s. The multiplicative scale on the top axis measures $\exp(\beta_{k,m|n})$ s. The distance between a pair of outcomes indicates the magnitude of the effect. Statistical significance is added by drawing a line between categories for which there is no significant coefficient.

continues to be not significant. As we have specified in our theoretical analysis, the utility function of the carer depends on the ability of the care recipient to perform activities of daily living, which is controlled by the recipient’s characteristics in our empirical analysis.¹⁷

The specification in Column (3) controls for care decision processes when the informal carer reports being employed in the labour market. We observe that the average change in the probability of devoting different amounts of caring-time is greater for those who engage in care as a result of a family decision, and are not employed. It is more likely these individuals will spend more hours on care. This result is maintained in both periods. The recipient decision variable affects the probability of devoting different amounts of caring-time in a different way, since the average change in the probability is greater for those who report being employed, and since they engage in care as a result of a care recipient decision. This variable is not significant in 1994, and in 2004, it has even less weight, and there are no differences between being employed or not.

Column (4) in Table 2 includes recipient age dummies to account for the differences in care recipient needs at different periods of their lives, showing that the effect of the age variable has significantly increased, but by the same amount, for the three intervals considered (under 65 years, between 65 and 80, and over 80 years). The average changes in the probability of devoting different amounts of caring-time that produce the care decision processes, have not appreciably varied. We observe that the odds of choosing more than five hours, versus less than two, and versus from three to five hours, are 54% and 75% greater, respectively in 2004, and 48% and 73% greater, respectively, in 1994. Analysing the average absolute change in the probability of choosing different amounts of caring-time, we observe similarities in both periods considered (0.073 vs 0.076). In the case of the care recipient’s decision, we observe that the odds of choosing more than five hours, versus less than two hours, and versus from three to five hours, are greater, but this variable is not significant in both periods. The average absolute change in the probability of choosing different amounts of caring-time has increased the weight of the care recipient’s decision, but it continues to be not significant.

(Figures 1 and 2 about here)

Comparing the recipient demographic characteristics between 1994 and 2004, we observe in Figures 1.1 and 2.1 that an increase of one year in the age of the recipient, in the three intervals considered, is only significant in 1994 and that the odds of choosing more than five hours of caring-time, versus less than two hours, or versus from three to five hours, were 0.54 and 0.49 times smaller, respectively. However, those effects are not permanent, since the coefficients of age squared are opposite to the coefficients of age. The average absolute change in the probability of choosing different amounts of caring-time, when age of the recipient increases by one year, has decreased, from around 0.10 in 1994 to 0.05 in 2004 (see Table 2). Therefore, an increase in the age of the recipient carries less weight in the decision to choose different amounts of caring-time.¹⁸

The gender of the recipient is only significant in 2004, where the odds of choosing more than five hours of caring-time, versus from three to five hours, are 35.5% greater for female care recipients than for male care recipients. However, the average absolute

¹⁷Results are presented for the joint sample of men and women. Tests reject separate specifications by gender.

¹⁸We have considered three intervals of the age of the recipient, since we try to control for those who are more dependent. We have also evaluated these effects without considering different intervals of the age of the recipient, obtaining similar results. Results are available upon request.

change in the probability of choosing different amounts of caring-time, when being female, is only 0.03 and is not significant in either period (see Table 2).

The odds of choosing from three to five hours, versus more than five hours of caring-time, are 67% greater for illiterate care recipients. However, in 2004, the odds of choosing from three to five hours, versus more than five hours, of caring-time are 0.5 times smaller for illiterate care recipients. The marital status of the care recipient is only significant in 1994. For those who are married/cohabiting the odds of choosing more than five hours of caring-time, versus less than two hours, are 71.5% greater. The average absolute change in the probability of choosing different amounts of caring-time decreases from one period to the other. For those who receive a pension, we observe that only in 2004 are the odds of choosing more than five hours, versus from three to five hours, greater and significant.

As we have outlined in the descriptive analysis, informal assistance to the care recipient, in 2004, is considerably more focused than in 1994, for people of poorer health status. That variable is only significant in 2004, in which the odds of choosing from three to five hours, versus less than two hours, of caring-time are 0.37 times smaller. The average absolute change in the probability of choosing different amounts of caring-time for a recipient with poorer health status, increases to 0.07 in 2004 (see Table 2).

Considering the informal carer's demographic characteristics, Figures 1.2 and 2.2 show that the age of the carer is not significant in 2004. However, in 1994 the odds of choosing more than five hours, versus less than two hours, are 0.92 times smaller. Those effects are not permanent, since the coefficients of age squared are opposite to the coefficients of age. The gender of the carer is only significant in 2004, where the odds of choosing from three to five hours, versus choosing less than two hours, or versus more than five hours, increased among female carers. The average absolute change in the probability of female carers choosing different amounts of caring-time has increased up to 0.06 in 2004. The level of education is not significant in the choice of different amounts of caring-time in 1994. However, in 2004, for carers who report having a degree or a medium level of education, the odds of choosing to devote from three to five hours to caring time, versus less than two, are 0.42 and 0.6 times smaller, respectively. Marital status is not significant in determining the hours of caring-time in either period. The number of children of the carer is significant in 1994, the odds of choosing more than five hours, versus from three to five hours, are 0.85 times smaller. In 2004, the odds of choosing more than five hours, versus less than two hours, were 0.83 times smaller and significant. The city of residence of the informal caregiver is significant in determining the hours of caring-time only in 1994. For those who live in cities of 10,000 to 100,000 inhabitants, the odds of choosing more than five hours, versus from three to five hours, are 46% greater, and the odds of choosing from three to five hours, versus less than two hours, are 61.9% greater. The average absolute change in the probability of choosing different amounts of caring-time has considerably decreased for those living in cities of 10,000 to 100,000 inhabitants.

When we analyse the work status of the caregivers, we observe that the odds of choosing less than two hours, versus from three to five, and versus more than five, are significant and greater for those who report spending time in the labour market in both periods. In the descriptive analysis, we have observed that workers have increased their efforts as caregivers between those dates. Studying the average absolute change in the probability of choosing different amounts of caring-time in both periods, for those who report being involved in the labour market, we find that it is higher in 1994 than in 2004, 9.21% versus 8.7%, respectively. Considering the carers who are homemakers, in 1994 and 2004, we clearly find that the average

absolute change in the probability of choosing different amounts of caring-time has increased from 0.017 to 0.047, respectively, with this being significant in 2004.

Therefore, being female and a homemaker has larger effects on choosing different amounts of caring-time in 2004, making it more likely that the informal carer will spend from three to five hours of caring-time. As expected, when the caregiver has a degree and is employed, it is more likely that he/she will spend fewer hours on care. The effect of this variable has been maintained from 1994 to 2004. The same occurs when we consider the number of children of the carer. However, the population of the city of residence of the carer has considerably less weight in 2004 than in 1994.

Finally, we compare both periods for the help and decision variables, observing that for those who report engaging in IADLs, the odds of choosing more than five hours, versus the other alternatives, are higher and significant in 1994. However, in 2004, the odds of choosing from three to five hours, versus the other alternatives, are also higher and significant. Analysing the ADLs, we observe similar results, the odds of choosing more than five hours, versus the other alternatives, are higher and significant in both periods considered. Comparing the average absolute change in the probability of choosing different amounts of caring-time, in both periods, for those who report being engaged in IADLs, we observe that this variable has greater weight in deciding the amounts of caring-time, 0.15 versus 0.08, but for those who report being engaged in ADLs we observe that this variable has less weight in 2004, 0.13 versus 0.18. If the carer is the primary caregiver, the odds of spending from three to five hours, or more than five hours, versus less than two hours, is higher in both periods considered. The average absolute change in the probability of choosing different amounts of caring-time, for those who are primary caregivers, is greater in 2004 than in 1994, 0.13 versus 0.10. For those who report having permanent caring obligations, the average absolute change in the probability of choosing different amounts of caring-time has considerably increased from 0.027 in 1994 to 0.054 in 2004, which is significant.

The place of residence, whether the care recipient cohabits with a relative or not, is clearly significant in both periods, with the odds of choosing more hours, versus the other alternatives, being greater in 2004 than in 1994. The average absolute change in the probability of choosing different amounts of caring-time for those who are primary caregivers, is greater in 2004 than in 1994, 0.20 versus 0.18. For the care recipient who does not cohabit with the caregiver, we have analysed the distance (in minutes of travel time) between their homes. This variable is only significant in 1994, and has clearly decreased in weight, in the choice of different amounts of caring-time, by 2004.

For carers who are the spouse of the care recipient, we observe similar results in both periods, with the odds of choosing more than five hours, versus from three to five hours, being higher and significant, but the odds of choosing from three to five, versus less than two, are smaller. In the case of the son/daughter of the care recipient, we observe significant results in 2004, where the odds of choosing more than five hours, versus less than two hours, are 67.7% higher. Studying the average absolute change in the probability of choosing different amounts of caring-time, we observe that the son/daughter has clearly increased their weight from 0.01 to 0.06 in 2004, with this being significant.

The monetary compensation received by the carers from the care recipient, and the formal help that the care recipient receives, are not significant in either period considered. However, the help received by other family members is significant in that the odds of choosing more hours, versus less than two hours, are higher, which may indicate that family members' assistance, and the informal care we are analysing,

are complementary. This variable carries less weight when we observe the average absolute change in the probability of choosing different amounts of caring-time.

In summary, as expected, cohabitation with a relative produces the largest effect, cohabitation increases the likelihood that the carer will spend more time on caring, in both periods. This result is maintained if the carer is the primary caregiver, increasing in weight in 2004, making it more likely that the informal carer will spend more time on caring. The same occurs if carer is engaged in ADLs, that is, more time-consuming activities, but this variable decreases in weight in 2004. However, when the informal carer reports that he/she spends time in IADLs we observe that, in 2004 it is more likely that he/she spends from 3 to 5 hours, versus the other alternatives. This is not the case in 1994, when it is more likely that he/she spends more than five hours, even when devoting time to less time-consuming activities. Considering the relative of the care recipient, we have found that it is more likely that the spouse of the care recipient will spend more than five hours, or less than two, versus from three to five hours. The son/daughter of the care-recipient has a larger effect on choosing different amounts of caring-time in 2004 than in 1994, increasing the probability of devoting more than five hours to care. We have also found that other family members' assistance, and informal care, are complementary, since this assistance is more likely when the informal carer spends more than five hours on care, although this variable has decreased in weight during this period.

Depending on the care decision process, informal caregivers devote more time to care activities when they do not decide for themselves. As expected, under both the family decision and the care recipient decision variables, it is more likely that the informal carer will tend to devote more time to informal care activities. The family decision variable has the largest effect on the choice of different amounts of caring-time, increasing the odds of devoting more hours to informal care activities.

5.3 Informal Carer's Satisfaction: Empirical Model and Results

5.4 Empirical Model

The use of the care satisfaction information may help to explain informal carers' behaviour, in the same way that the job satisfaction information is used to measure the worker's well-being. This may help policy makers to design strategies to increase the satisfaction of informal carers.

We compute an ordered logit model (OLM) to analyse the effects that care decision processes have on the level of satisfaction of the informal caregiver, controlling for informal carer characteristics, informal caring-time, labour, leisure and health costs.¹⁹

In 2004, respondents are asked whether engaging in care provides them with great satisfaction. This variable is considered representative of the level of satisfaction of the informal caregiver. This question provides the response categories of strongly disagree (SD), disagree (D), neither disagree nor agree (ND), agree (A), and strongly agree (SA). The models for ordinal outcomes account for the different distance between two responses, for example, the distance between strongly agreeing and agreeing might not be the same as the distance between agree and disagree. In

¹⁹We do not include these variables in the previous analysis. Respondents are asked whether they have supported labour, leisure and health costs through their participation in informal care activities. Therefore, these variables are not exogenous factors in the estimation of the time devoted to care activities.

this case, although the outcome is discrete, the multinomial logit model would fail to account for the ordinal nature of the dependent variable. The responses are coded 1,2,...,5.²⁰

In order to analyze such responses, ordinal regression models have become common. The model is built around a latent regression, with u^* being the latent variable:

$$u_i^* = \mathbf{x}'_i \beta + \varepsilon_i$$

where u is logistically distributed, i is the observation, ε is a random error, and \mathbf{x} is a vector of demographic characteristics of both the caregiver and the care recipient, and includes variables to control for the care decision process.

As usual, u^* is unobserved. What we do observe is $u_i = m$ if $\mu_{m-1} \leq u^* < \mu_m$, for $m = 1, \dots, 5$. Thus, when the latent u^* crosses a cutpoint μ , the observed category changes. The μ s are unknown parameters to be estimated with β . The respondents have their own intensity of satisfaction, which depends on \mathbf{x} and certain unobservable factors ε . We assume that ε is normally distributed across observations. We normalize the mean and variance of ε to zero and one, respectively. The probability of observing $u = j$ for given values of the x s is:

$$\Pr(u = j | \mathbf{x}) = \Pr(\mu_{m-1} \leq u^* < \mu_m | \mathbf{x}) = \Phi(\mu_m - \mathbf{x}' \beta) - \Phi(\mu_{m-1} - \mathbf{x}' \beta)$$

5.5 Results

Columns (1) and (2) in Table 3 show the results for the estimates of the carer's satisfaction for the whole sample. Since the objective of this analysis is to study the effects of care decision processes on the carer's satisfaction, in Column (1) we include the family decision and the recipient decision, with the carer decision being the variable of reference. In Column (2), we not only control for the care decision processes, but we also interact these variables with the informal caring-time, in such a way that we capture the impact of the caring-time on the informal carer's satisfaction, when informal carers are obliged, by the family or by the care recipient, to devote time to informal care activities. We observe that the family decision affects the odds of having more care satisfaction, which are 0.69 times smaller and significant. Recipient decision increases the odds of having greater care satisfaction, when we consider the whole sample, but this effect is not significant. Considering those intensive caregivers, that is to say, those who engage in care for more than 5 hours, we show that the odds of having greater care satisfaction are only 0.776 times smaller. This implies that, for those intensive caregivers, greater satisfaction is more likely than for those non-intensive caregivers, in both cases, when the informal carer devotes time to carer activities as a consequence of a family decision. The same occurs for those informal carers who are obliged by the care recipient to engage in care, but this variable is not significant.

Columns (3) and (5) present the odds of the ordered logit estimation, for those carers of working age, and for those of working age who devote time to care activities every day, respectively. In both estimations, we restrict the sample to those who are of working age, to capture the effects of care decision processes on the level of carer's satisfaction, since being obliged to care may produce labour market disadvantages. For those who report being engaged in care activities by way of a family decision, the odds of having greater satisfaction are smaller, but the size of the effect of the family decision on the informal carers of working age is less than the effect when we consider the whole sample. This implies that those of working age do not decrease the probability of having greater satisfaction when they are obliged by way of a family

²⁰We compute the approximate likelihood-ratio test of proportionality of odds across response categories (chi-squared(72)=88.10(0.096)), and we conclude that this test provides evidence that the parallel regression assumption cannot be rejected at the 5% level.

decision, even when this decision requires them to become intensive caregivers (see Column (4) in Table 3). We obtain the same results when we consider those informal carers of working age who devote time to care activities every day (see Columns (5) and (6)). On the other hand, the care recipient decision increases the odds of having greater satisfaction for those of working age, maintaining the effect that we have observed in the whole sample, but this decision changes the effects on the level of satisfaction when we restrict the sample to those who engage in daily care, as we observe in Column (5). This change in the effect, which decreases the odds of having a greater level of satisfaction, is not maintained for those intensive carers who spend more than five hours engaged in care (see Column (6)). For them, the odds of having greater satisfaction increase more than for the less intensive carers, when both are obliged by the care recipient to engage in care, but these variables are not significant.

As we can see in Table 3, Carer Demographic Characteristics remain stable across all specifications and are not significant in all the estimations considered. The odds of having greater care satisfaction are only higher and significant when the carer resides in a city of less than 10,000 inhabitants, holding all other variables constant. For those carers who spend from three to five hours engaged in care, we observe that the odds of having greater care satisfaction are 26.4% smaller. When the help is permanent, the odds of having greater satisfaction increase by 38.2 percentage points. However, if the care recipient and the carer cohabit, the odds of having greater satisfaction are smaller, but this variable is not significant. For close family members (the spouse or the son/daughter of the care recipient), the odds of having greater satisfaction considerably increase. Formal help decreases the level of satisfaction of the informal carers.²¹ However, for those intensive carers who engage in daily care, and who report that the care recipient has a domestic employee, the odds of having greater care satisfaction are considerably greater.

Surprisingly, labour cost does not significantly affect the level of care satisfaction. The effect of this variable changes when we restrict the sample to those informal carers of working age, when the odds of having greater care satisfaction are smaller, but not significant. However, for those carers who support leisure and health costs, the odds of having greater satisfaction are 0.78 and 0.62 times smaller, respectively, and significant, with these odds being smaller for those carers of working age. The results suggest that, if informal caregivers feel themselves to be less healthy, the level of carer's satisfaction decreases even more than the decrease in the level of satisfaction produced by the leisure costs.

²¹In the informal carer satisfaction estimations, formal help does not include the cases in which the care recipient receives help from a domestic employee. We control for the presence of having a domestic employee separately, to examine whether formal home-based care generates a greater level of satisfaction for the carer.

6 Conclusions

This work first studies the time carers spend on informal care, controlling for how the care decision process takes place and, second, it analyses the factors that affect the informal carer's level of satisfaction. We develop a theoretical framework in which we explain how the care decision processes take place. We show that it is more likely that informal carers must devote more time to care activities, when the obligation is a result of the family or the recipient decision, than the carer would prefer. The family decision significantly increases the time spent on care by informal carers, due to a possible monetary compensation, arising from changes in the fraction of residual non-labour income allocated to the informal carer.

We use Spanish data to estimate a multinomial logit model which allows us to analyse the effect that care decision processes have on the amount of caring-time. As expected, under both the family decision and the care recipient decision, it is more likely that the informal carer will devote more time to informal care activities, which confirms our theoretical hypotheses. The family decision has the greatest effect on the choice of different amounts of caring-time, increasing the odds of devoting more hours to informal care activities.

Why do informal carers make these efforts? To design and evaluate formal care policies, a greater understanding of the process by which family members come to assume caring responsibilities is necessary, but the study of informal carers' satisfaction can also be a useful tool in designing policies, given that this analysis can be a useful predictor of informal carers behaviour. Results show that living in a city with less than 10,000 inhabitants or being the spouse or the son/daughter of the care recipient, increases the likelihood that the informal carer will report feeling greater satisfaction. As the informal caring-time increases, informal carers are more likely to feel less satisfied. The same occurs if they report suffering leisure and health costs. Supporting labour cost is not significant in the analysis, and the decrease in the probability of being less satisfied is less than the decrease in this probability produced by leisure and health costs. Therefore, one way to increase informal carer's satisfaction, who support health costs which considerably decrease their level of satisfaction, consists of policy makers' concern for these informal carers. Another way to increase informal carer's satisfaction is by increasing the respite time of carers, by way of an increase in other assistance, such as formal help. Surprisingly, this kind of formal help considerably decreases the probability of greater satisfaction for informal carers. This may imply that informal carers feel more satisfied when they engage in care tasks by themselves, or that this formal help does not increase their respite time, since it is complementary help.

Finally, as expected, being obligated to spend time on caring activities, by way of the family decision, decreases the probability of greater satisfaction, since, in most cases, informal carers must spend more time than they would prefer. However, the probability of greater satisfaction decreases less for intensive carers, even when they are of working-age.

Table 1: SUMMARY STATISTICS

	1994		2004		Difference	p-value
	Mean	Std. Dev.	Mean	Std. Dev.		
Carer Demographic Characteristics						
Age	52.228	(14.163)	52.831	(13.652)	0.603	(0.369)
Gender	0.826	(0.379)	0.843	(0.364)	0.017	(0.123)
Illiterate	0.294	(0.456)	0.165	(0.371)	-0.129	(0.000)
Low Education	0.385	(0.487)	0.433	(0.496)	0.048	(0.211)
Medium Education	0.257	(0.437)	0.332	(0.471)	0.075	(0.000)
High Education	0.051	(0.221)	0.070	(0.255)	0.019	(0.005)
Homemaker	0.507	(0.500)	0.457	(0.498)	-0.050	(0.097)
Employed	0.210	(0.407)	0.268	(0.443)	0.058	(0.005)
Spouse	0.163	(0.370)	0.155	(0.362)	-0.008	(0.610)
Son/Daughter	0.541	(0.499)	0.593	(0.491)	0.053	(0.004)
Marital Status	0.789	(0.408)	0.783	(0.413)	-0.007	(0.775)
< 10,000 Inhabitants	0.315	(0.465)	0.290	(0.454)	-0.025	(0.000)
10,000 – 100,000 Inhabitants	0.316	(0.465)	0.402	(0.490)	0.086	(0.001)
> 100,000 Inhabitants	0.369	(0.483)	0.309	(0.462)	-0.061	(0.003)
N Children	2.208	(1.664)	1.019	(1.022)	-1.189	(0.000)
Recipient Demographic Characteristics						
Age	79.391	(8.633)	80.330	(8.298)	0.938	(0.002)
Gender	0.700	(0.459)	0.701	(0.458)	0.002	(0.960)
Illiterate	0.593	(0.491)	0.630	(0.483)	0.037	(0.574)
Low Education	0.311	(0.463)	0.324	(0.468)	0.014	(0.214)
Medium Education	0.022	(0.145)	0.030	(0.171)	0.009	(0.074)
High Education	0.009	(0.095)	0.015	(0.123)	0.006	(0.034)
Health Status	0.846	(0.362)	0.952	(0.214)	0.107	(0.000)
Pension	0.920	(0.272)	0.927	(0.260)	0.008	(0.929)
Marital Status	0.336	(0.472)	0.341	(0.474)	0.005	(1.000)
Help and Decision Variables						
Caring-time < 2 hours	0.223	(0.417)	0.156	(0.363)	-0.067	(0.000)
Caring-time 3 – 5 hours	0.200	(0.400)	0.239	(0.427)	0.039	(0.026)
Caring-time > 5 hours	0.577	(0.494)	0.605	(0.489)	0.028	(0.141)
IADL	0.691	(0.462)	0.972	(0.166)	0.281	(0.000)
ADL	0.661	(0.473)	0.764	(0.425)	0.102	(0.000)
Primary Caregiver	0.812	(0.391)	0.822	(0.383)	0.010	(0.252)
Permanent Help	0.754	(0.431)	0.755	(0.431)	0.000	(0.914)
Relative Cohabitation	0.731	(0.444)	0.570	(0.495)	-0.161	(0.000)
Travel Time	5.233	(16.269)	9.241	(31.596)	4.008	(0.001)
Monetary Compensation	0.372	(0.483)	0.323	(0.468)	-0.049	(0.104)
Formal Help	0.062	(0.242)	0.143	(0.350)	0.080	(0.000)
Family Member Help	0.589	(0.492)	0.516	(0.500)	-0.074	(0.003)
Carer Decision	0.598	(0.491)	0.620	(0.486)	0.022	(0.523)
Family Decision	0.328	(0.470)	0.325	(0.469)	-0.002	(0.648)
Recipient Decision	0.043	(0.202)	0.055	(0.227)	0.012	(0.443)
Observations	1212		1219			

Source: Spanish Survey of Informal Assistance for the Elderly (IMSERSO).

Table 2: AVERAGE ABSOLUTE CHANGE IN THE PROBABILITY OF CHOOSING DIFFERENT AMOUNTS OF CARING-TIME

	1		2		3		4	
	1994	2004	1994	2004	1994	2004	1994	2004
Recipient Demographic Characteristics								
Age			0.0685***	0.0382	0.0686***	0.0385		
Age Recipient < 65							0.1049***	0.0472
Age Recipient 65 – 80							0.1029***	0.0467
Age Recipient > 80							0.1025***	0.0464
Age Recipient Square			0.0467***	0.0233	0.0468***	0.0235	0.0676***	0.0277
Gender			0.0293	0.0377	0.0293	0.0371	0.0287	0.0381
Illiterate			0.0728	0.0975	0.0731	0.0986	0.0702	0.0963
Low Education			0.0648	0.0451	0.0613	0.0453	0.0638	0.0442
Marital Status			0.0601*	0.0077	0.0598*	0.0077	0.0583*	0.0089
Poor Health Status			0.0089	0.0697*	0.0091	0.0691*	0.0098	0.0661*
Pension			0.0748	0.0763	0.0747	0.0762	0.0713	0.0783
Carer Demographic Characteristics								
Age	0.0088	0.0023	0.0080	0.0024	0.0079	0.0025	0.0081	0.0023
Age Square	0.0106**	0.0021	0.0093*	0.0020	0.0092	0.0021	0.0094*	0.0019
Gender	0.0378	0.066**	0.0300	0.0625**	0.0315	0.0626**	0.0261	0.0614**
Medium Education	0.0156	0.0298*	0.0175	0.0313	0.0186	0.0313	0.0170	0.0313
High Education	0.0199	0.059*	0.0448	0.0471*	0.0478	0.0476*	0.0466	0.0493*
Marital Status	0.0222	0.0213	0.0255	0.0161	0.0208	0.0146	0.0257	0.0145
N Children	0.0212***	0.0194	0.0207***	0.0195	0.0207***	0.0195	0.0202***	0.0198
< 10,000 Inhabitants	0.0276	0.0298	0.0313	0.0184	0.0311	0.0183	0.0314	0.0188
10,000 – 100,000 Inhabitants	0.0595**	0.0181	0.0617***	0.0131	0.0609***	0.0146	0.0622***	0.0140
Homemaker	0.0143	0.0452**	0.0153	0.0458**	0.0163	0.0468**	0.0175	0.0467**
Employed	0.1047***	0.0999***	0.0908***	0.0865**	0.0648	0.0918**	0.0921***	0.0870**
Help and Decision Variables								
IADL	0.0725***	0.1486***	0.0797***	0.1481***	0.0783***	0.1483***	0.0776***	0.1478***
ADL	0.193***	0.1305***	0.1808***	0.1262***	0.1818***	0.1271***	0.1836***	0.1263***
Primary Caregiver	0.0909***	0.1316***	0.101***	0.1297***	0.1022***	0.13***	0.1013***	0.1296***
Permanent Help	0.0180	0.0565***	0.0275	0.0552***	0.0284	0.055***	0.0267	0.0542***
Frequency	0.0239	0.0131	0.0290	0.0147	0.0290	0.0147	0.0320	0.0147
Relative Cohabitation	0.1714***	0.2099***	0.1762***	0.2046***	0.1755***	0.2064***	0.1762***	0.2050***
Travel Time	0.0015**	0.0004	0.0016**	0.0004	0.0015**	0.0004	0.0016**	0.0004
Spouse	0.0868**	0.0663	0.0908*	0.0847	0.0901*	0.0845	0.0879**	0.0868
Son/Daughter	0.0135	0.0552	0.0142	0.0577*	0.0132	0.0586*	0.0151	0.0581*
Monetary Compensation	0.0066	0.0158	0.0052	0.0175	0.0048	0.0171	0.0047	0.0175
Formal Help	0.0508	0.0070	0.0697	0.0043	0.0698	0.0040	0.0681	0.0027
Family Member Help	0.0467**	0.0367*	0.0441*	0.0368*	0.0437*	0.0357*	0.046**	0.0372*
Family Decision	0.0765***	0.0822***	0.0755***	0.076***	0.079**	0.067**	0.0733***	0.0761***
Recipient Decision	0.0289	0.0454	0.0211	0.0457	0.0357	0.0631	0.0200	0.0440
Work x Family Decision					0.0703*	0.0259		
Work x Recipient Decision					0.1152	0.0645		
Observations	1212	1219	1212	1219	1212	1219	1212	1219

Notes: ¹ Source: Spanish Survey of Informal Assistance for the Elderly (IMISERSO). ² ***Significant at the 1% level **Significant at the 5% level *Significant at the 10 % level

Table 3: ESTIMATION OF CARER SATISFACTION

	1	2	3	4	5	6
	All Sample	All Sample	Carers<65	Carers<65	Carers<65- every day	Carers<65- every day
Age	0 .986 (0 .028)	0.983 (0.028)	0 .944 (0 .047)	0.940 (0.047)	0 .954 (0 .054)	0.949 (0.054)
Age Square	1 .015 (0 .028)	1.018 (0.028)	1 .068 (0 .059)	1.072 (0.059)	1 .055 (0 .065)	1.059 (0.066)
Gender Carer	1 .119 (0 .195)	1.112 (0.194)	1 .083 (0 .231)	1.071 (0.229)	1 .013 (0 .250)	1.012 (0.251)
Medium Education	1 .016 (0 .132)	1.003 (0.131)	0 .955 (0 .133)	0.940 (0.132)	0 .883 (0 .260)	0.990 (0.153)
High Education	1 .255 (0 .302)	1.241 (0.299)	1 .114 (0 .279)	1.104 (0.276)	1 .010 (0 .156)	0.874 (0.258)
Work	0 .955 (0 .135)	0.966 (0.138)	0 .965 (0 .141)	0.978 (0.143)	0 .990 (0 .164)	0.998 (0.166)
< 10,000 Inhabitants	1 .709*** (0 .273)	1.737*** (0.279)	1 .806*** (0 .327)	1.847*** (0.336)	1 .700*** (0 .333)	1.732*** (0.341)
10,000 – 100,000 Inhabitants	1 .182 (0 .150)	1.196 (0.152)	1 .231 (0 .175)	1.253 (0.179)	1 .254 (0 .197)	1.275 (0.201)
Gender Recipient	1 .319** (0 .173)	1.343** (0.177)	1 .252 (0 .180)	1.274* (0.185)	1 .198 (0 .191)	1.230 (0.197)
Pension	0 .651* (0 .153)	0.656* (0.154)	0 .500** (0 .143)	0.509** (0.145)	0 .472** (0 .168)	0.469** (0.166)
Caring-Time < 2	0 .790 (0 .143)	0.785 (0.174)	0 .788 (0 .155)	0.784 (0.189)	0 .756 (0 .178)	0.797 (0.230)
Caring-Time 3 – 5	0 .736** (0 .103)	0.921 (0.160)	0 .771* (0 .121)	0.999 (0.197)	0 .725* (0 .125)	0.914 (0.201)
Permanent Help	1 .382** (0 .219)	1.347* (0.214)	1 .430** (0 .237)	1.390** (0.231)	1 .275 (0 .256)	1.234 (0.249)
Cohabitation	0 .901 (0 .137)	0.910 (0.139)	0 .891 (0 .143)	0.911 (0.147)	0 .982 (0 .172)	1.006 (0.177)
Spouse	1 .788** (0 .453)	1.811** (0.460)	2 .439** (0 .997)	2.414** (0.988)	1 .994 (0 .858)	2.032* (0.874)
Son/Daughter	1 .771*** (0 .247)	1.752*** (0.245)	1 .910*** (0 .289)	1.887*** (0.286)	1 .794*** (0 .302)	1.826*** (0.310)
Formal Help	0 .585*** (0 .121)	0.595** (0.123)	0 .591** (0 .144)	0.601** (0.147)	0 .601* (0 .185)	0.627 (0.192)
Domestic Employee	2 .158 (1 .098)	2.271 (1.162)	2 .561 (1 .590)	2.658 (1.650)	3 .494* (2.607)	3.408* (2.538)
Family Member Help	0 .953 (0 .111)	0.935 (0.109)	1 .080 (0 .142)	1.053 (0.139)	1 .108 (0 .159)	1.094 (0.158)
Labour Cost	1 .033 (0 .130)	1.024 (0.129)	0 .984 (0 .140)	0.977 (0.140)	0 .899 (0 .141)	0.880 (0.139)
Leisure Cost	0 .777** (0 .100)	0.776** (0.100)	0 .696** (0 .102)	0.695** (0.102)	0 .654*** (0 .106)	0.650** (0.107)
Health Cost	0 .616*** (0 .077)	0.617*** (0.077)	0 .594*** (0 .083)	0.595*** (0.084)	0 .546*** (0 .084)	0.548*** (0.084)
Family Decision	0 .690*** (0 .085)	0.776* (0.119)	0 .724** (0 .100)	0.836 (0.148)	0 .744* (0 .115)	0.835 (0.158)
Recipient Decision	1 .125 (0 .291)	1.631 (0.599)	1 .109 (0 .303)	1.530 (0.594)	0 .880 (0 .267)	1.336 (0.533)
Caring-time < 2 x Family Decision		1.138 (0.408)		1.139 (0.441)		1.130 (0.535)
Caring-time < 2 x Recipient Decision		0.584 (0.388)		0.690 (0.489)		0.241 (0.222)
Caring-time 3 – 5 x Family Decision		0.569** (0.164)		0.524** (0.167)		0.589 (0.210)
Caring-time 3 – 5 x Recipient Decision		0.388 (0.232)		0.413 (0.260)		0.424 (0.290)
μ_1	-4 .661*** (0 .800)	-4.739*** (0.806)	-5 .797*** (1 .166)	-5.862*** (1.176)	-6 .151*** (1 .366)	-6.266*** (1.377)
μ_2	-3 .118*** (0 .773)	-3.191*** (0.779)	-4 .299*** (1 .144)	-4.357*** (1.154)	-4 .500*** (1 .336)	-4.609*** (1.348)
μ_3	-1 .769** (0 .767)	-1.837*** (0.772)	-2 .948*** (1 .138)	-3*** (1.147)	-3 .114** (1 .328)	-3.217*** (1.340)
μ_4	-0 .013 (0 .764)	-0.074 (0.770)	-1 .156 (1 .133)	-1.202 (1.142)	-1 .297 (1 .324)	-1.400 (1.335)
Observations	1186	1186	946	946	774	774

Notes: ¹ Odds ratio and Standard errors in parenthesis ² μ_i , $i = 1, \dots, 4$ are the cutpoints. ³ ***Significant at the 1% level **Significant at the 5% level *Significant at the 10 % level

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Figure 1

Figure 1.1 Recipient Demographic Characteristics

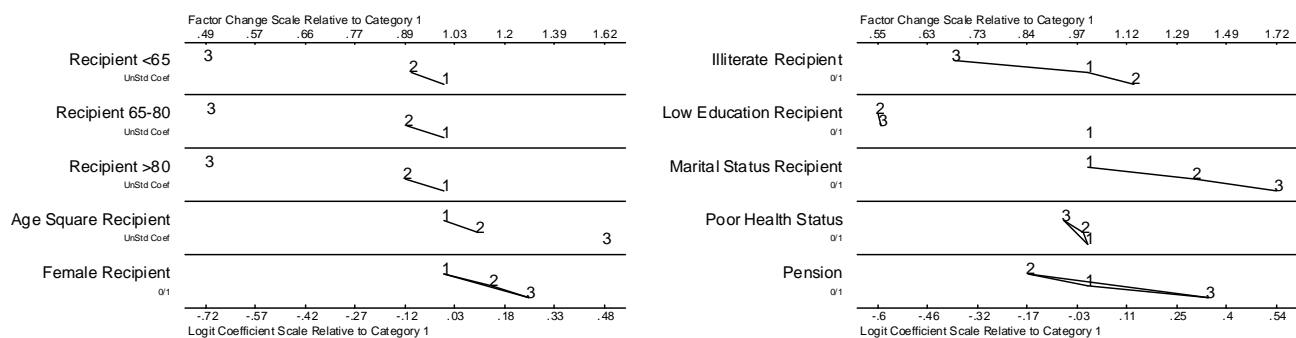


Figure 1.2 Carer Demographic Characteristics

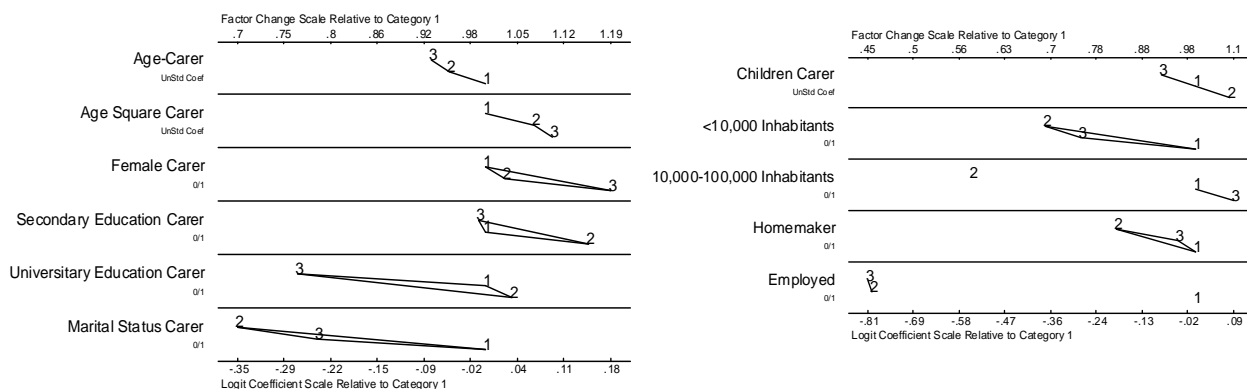


Figure 1.3 Help and Decision Variables

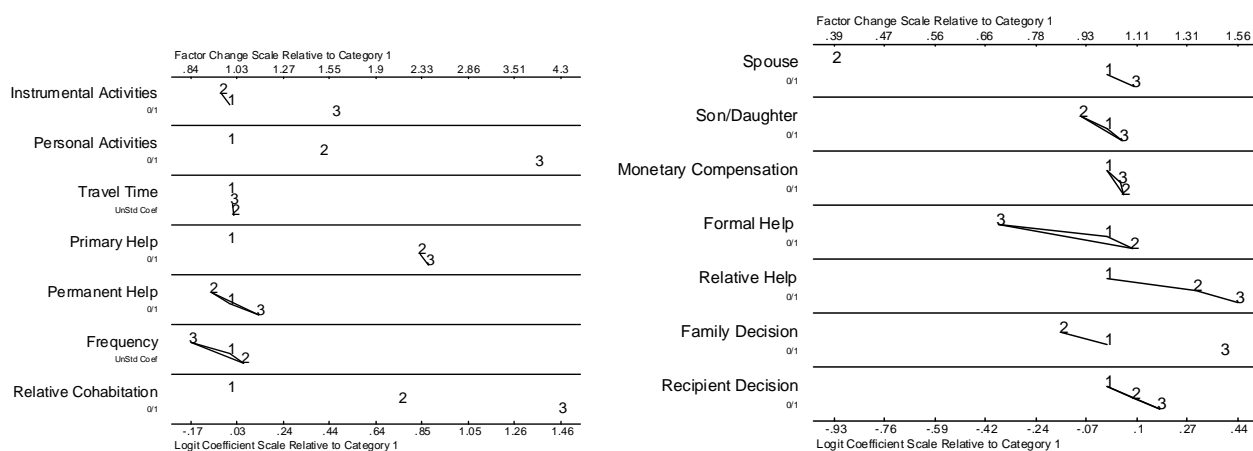


Figure 2

Figure 2.1 Recipient Demographic Characteristics

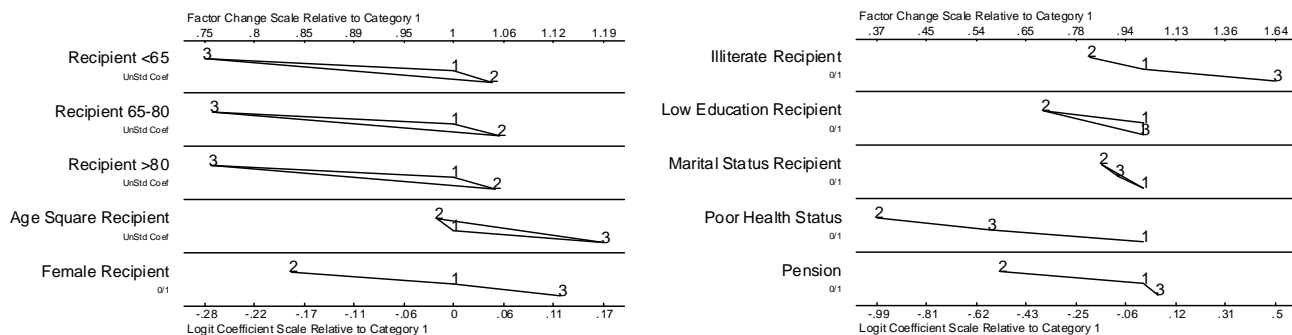


Figure 2.2 Carer Demographic Characteristics

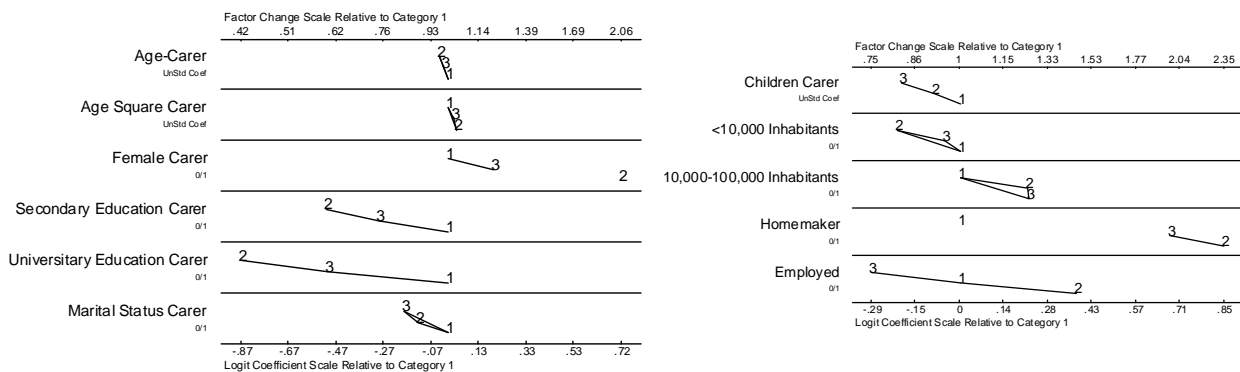


Figure 2.3 Help and Decision Variables

