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# On Time and Money Donations

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## Abstract

This paper investigates the importance of two forms of ‘impure’ altruism (“warm glow” and reputational concerns) as potential determinants of both time and money gifts. We first develop a comprehensive behavioral model which accounts for both types of donations, as well as for decisions about domestic and market hours of work. We then provide an empirical test of these drivers for giving using survey data for Italy. Results suggest that, according to the theoretical predictions, proxies for ‘impure’ altruism are important determinants of donations. Moreover, the unobservable determinants driving money and time donations are positively correlated, suggesting a certain degree of complementarity between the two decisions. Our findings also stress the importance of considering a behavioral model accounting for a full set of time and income uses to better characterize individual decisions to donate.

*Key words:* Volunteering, Money donations, Household behavior, ‘impure’ altruism.

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Tutt'e tre stesero la mano verso colui che usciva [dall'osteria] con passo franco, e con l'aspetto rianimato: nessuno parlò; che poteva dir di più una preghiera? <<La c'è la Provvidenza!>> disse Renzo; e, cacciata subito la mano in tasca, la votò di que' pochi soldi; li mise nella mano che si trovò più vicina, e riprese la sua strada. La refezione e l'opera buona (giacchè siam composti d'anima e di corpo) avevano riconfortati e rallegrati tutti i suoi pensieri.

[A. Manzoni, *I promessi sposi*, Cap. XVII, 1840-42]

The three beggars stretched out their hands to Renzo, as he left the inn with a free step and reinvigorated air, but none of them spoke; what more could language have expressed? <<There's a God-send for you!>> said Renzo, as he hastily thrust his hand into his pocket, and, taking out his last pence, put them into the hand that was nearest to him, and went on his way. The refreshment, and this good work together (since we are made of both soul and body), had gladdened and cheered all his thoughts.

[A. Manzoni, *I promessi sposi* (The betrothed), Vol. XXI. The Harvard Classics. New York: P.F. Collier & Son, 1909-14; Bartleby.com, 2001]

## 1 Introduction

It is commonly observed that, while sharing an orientation toward democracy and a free market economy, Europe and U.S. differ widely in the role assigned to the State. One dimension in which differences are marked is in the blend of taxes, transfers and regulations that may be grouped under the label “Welfare State”, i.e. all the public activities devoted to helping and protecting the poor. Recent papers have argued that European and U.S. Welfare States differ because American society is more racially fragmented, and this - in turn - might have shaped individual beliefs about what determines income (Alesina et al., 2001). In particular, the authors suggest that according to data provided by the World Values Survey, U.S. citizens seem to believe personal income and wealth are mainly driven by individual effort, whereas Europeans are more prone to the idea that luck determines personal success. However, differences in attitudes between Europe and the U.S. emerge also when volunteering, giving, and not-for-profit organizations are taken into account. Comparative studies are quite rare, due to data constraints, and explanations of the huge variations across countries are often linked to differences in government social spending; see, e.g., the macro-structural approach discussed in Salamon and Sokolowski (2001), analyzing differences in volunteering. Exploring dissimilarities in money giving between U.S. and U.K., Wright (2001) claims that “philanthropy” (in the U.S.) differ from “charity” (in the U.K.) with respect to the level of donations, the characteristics of donors, and even the methods used to donate; in particular, while the overwhelming majority of donations

in the U.S. can be seen as a “planned activity” (with installments to be paid on a regular time base), giving in U.K. is more spontaneous and based on “spare change” methods. Once again, these differences are explained by the author with cultural diversities as for the role of the State and the attitudes toward money and wealth, as well as by the tax treatment of donations. More specifically, and according to the role assigned to the State, tax incentives for money giving are well established and of significant size in the U.S. tax code since the eighteenth century (e.g., Howard, 1997). On the contrary, until very recently, no general tax benefits for donors were available in the U.K., as in other European countries. Furthermore, according to survey data, Europeans do not give to charity in order to reduce their own tax bill, but for other more “intrinsic” rationales (e.g., Wright, 2001).

Coherently with these stylized facts, it is not surprising that a large body of the empirical literature on time and money donations - considering U.S. data - has been devoted to the estimation of the tax-price elasticity of money (and time) donations. The unavailability of European survey data on volunteering and money giving can at least partly explain why less attention has been devoted to developing a comprehensive behavioral model accounting for a full set of individual choices with respect to the allocation of income and time, more coherent with a “spare change” approach to giving (i.e., based more on individual preferences than on monetary/tax incentives).

In this paper we go in the direction of filling this gap, exploiting a rich dataset on households’ use of time and income in Italy. We first present an extended static labor supply framework accounting for both types of donations, different uses of time (labor, volunteering, housework and leisure), and income (consumption of private goods and donations). We show that - according to theory - giving should be positively associated to different forms of ‘impure’ altruism, like ‘warm glow’ and reputational concerns. Next, we test these predictions on a cross-section of individuals drawn from a survey (*Indagine Multiscopo*) run by the Italian National Statistical Office (ISTAT) in 2000, specifically designed to provide micro-level information on several aspects of everyday life of Italian households, from dwelling conditions to education, from health status to labor market behavior, including time and money giving. To test our predictions, we identify appropriate proxies for the different motives to donate, and build a system of simultaneous equations for limited dependent variables.

This paper contributes to the literature along several dimensions. First, we build up and estimate a model that accounts *simultaneously* not only for choices about the two types of giving, but also for choices about two other important activities - household and market work - that are likely to be fundamentally related with charitable gifts, because of their impact on available time and income. Second, we investigate empirical correlations between the individual propensity to donate time and money, and between giving and other

important uses of time and income at the household level. Third, we consider the role of different forms of ‘impure’ altruism as potential determinants of time and money donations.

Knowledge of the drivers of time and money donations at the individual level has relevant implications. From a positive point of view, it allows us to shed light on the determinants of individuals’ behavior into important fields, where economic factors and social norms, as well as cultural effects, are intrinsically interconnected, and of which much more needs to be known. From a normative point of view, a better understanding of the mechanisms through which people reallocate time and money resources between voluntary work and money donations may have important policy implications, e.g. for the design of an optimal fund-raising scheme.

Controlling for a set of observable individual characteristics - capturing individual tastes and economic constraints - as well as for the latent relationship between hours of work in the market and at home, main results confirm systematic gender differences in behavior, also in the case of donations, with men’s behavior less context-dependent than women and more related to the budget constraint. Voluntary work and money donations are however positively related for both genders, i.e., a positive shift of time donations brings about a shift of the same sign in money donations, suggesting that time and money donations are somewhat complements in the utility function of each subject. Moreover, our proxies for the different forms of ‘impure’ altruism are important determinants of time and money gift. Overall, then, these results point toward the importance of modelling giving activities together with all the other alternative uses of time and income.

The paper is organized as follows. In the next Section, we review the literature focusing on time and money donations, from different perspectives (i.e., from an economic, sociological and psychological point of view). The third Section introduces the theoretical framework and discusses some implications for the empirical analysis. Section 4 describes the data and discusses some descriptive facts about the relationship between volunteering and gifts of money, which are further investigated in Section 5, that presents, in sequence, the econometric model and the main results. Concluding remarks follow.

## **2 The drivers of time and money donations: A literature review**

The theoretical and empirical literature has identified several variables that can affect the amount of money donations and of time volunteered. In this Section we briefly review the relevant contributions, grouping together the works according to the variables they consider. In particular, we focus on

whether they consider individual preferences and attitudes, charities behavior, or government behavior as determinants of donations.

*Individual preferences and attitudes.* A first group of determinants of money and time donations is represented by people preferences and attitudes. However, identifying such variables within the utility maximization framework, and distinguishing between different explanations, is not an easy task. Indeed, in his review Andreoni (2005) suggests that philanthropy is one of the greatest puzzles for economics, because a science based on precepts of self-interested behavior does not easily accommodate a behavior of such clearly unselfish sort. How can one reconcile unselfish actions with self-interest? Andreoni proposes five answers: a) charitable giving is not unselfish at all, because giving is directed at buying a certain future service (e.g., donations to opera houses to obtain new and better performances in the future); b) ‘enlightened self-interest’ (a sort of “expected” reciprocity) suggests that people donate because they hope - in the event of being in needs in the future - to receive help from others; c) ‘pure’ altruism, i.e., people care about well-being of others in their local community/social network (or of society at large), and cooperate to finance public goods; d) ‘impure’ altruism, i.e., people get utility from the *act* of giving itself; e) moral motivations and moral codes of conduct, that make economics ill-suited to explain philanthropic activities.

All these variables - even the last one, that represents the “last refuge” for the economic theorist - have been considered in the literature by including additional terms to the utility function. For instance, (a), (b) and (d) above can be modelled by adding the amount of money donations (as, e.g., in Smith and Chang, 2002), and the amount of hours volunteered or the value of time volunteered (as, e.g., in Andreoni et al., 1996). Variable (c) can be included by considering the individual contribution to the provision of a public good (e.g., Duncan, 1999; Andreoni, 2005; Apinunmahakul and Devlin, 2008). The implicit assumption is that the utility of other people is directly influenced by the amount of public good supplied, or by the total amount of charitable giving. Finally, variable (e) is related to a richer model of human behavior, and can be taken into account by modelling “intrinsic motivation”, as in Benabou and Tirole (2003, 2006), building on psychological literature.

A great deal of theoretical research has been devoted in the last years by economists to include psychological factors as explanatory variables of philanthropic activity into a model of individual behavior. The idea that psychological factors might play a role in explaining non-selfish behavior is well grounded in the empirical literature. For instance, Lee et al. (1999) study similarities and differences in time, money and blood giving by referring to the concept of role-identity. The basic idea is that individuals have a role-identity as a donor, insofar as they are inserted in a network of social relationships. They identify several variables that can have an impact on role-identity: the



expectations of others on our behavior (which determines “social esteem”); the presence of a close parent acting as a “model”; the past receipt of help, that can activate reciprocal behavior; personal norms of moral obligations. All these variables influence individual preferences and attitudes, and impact on the utility people get from their decisions on how and to what extent they donate.

Perhaps the most comprehensive theoretical model of prosocial behavior is the one proposed by Benabou and Tirole (2006). The authors identify three different channels through which people can get utility from donations: intrinsic motivation, self-image, and social esteem. Intrinsic motivation refers to people being altruistic, i.e., people caring about the overall level of public good produced by a given organization. The interest in their self-image can be interpreted as a form of ‘impure’ altruism. In this way, individuals get satisfaction *per se* from the very act of giving, as in Andreoni (1990) and Menchik and Weisbrod (1987). Though a form of ‘impure’ altruism, social esteem is a more novel concept - at least in the economic literature - since it refers to people’s concerns for reputation, i.e., to the fact that they care about how the others perceive them (i.e., whether they consider them as being altruistic or not). In this framework, donations act as a “signal” and are driven by the desire to appear generous and to receive social approval (e.g., Harbaug, 1998; Ellingsen and Johannesson, 2003, 2008). Ellingsen and Johannesson (2003) show that the informational content of time and money donation is different; in particular, giving time is better than giving money when signalling is the primary goal. Moreover, Ellingsen and Johannesson (2008) suggest that people’s attitudes to appear prosocial is related to the specific relationship in which the signal is embedded. Finally, Benabou and Tirole (2006) study how monetary and non-monetary incentives interact with these three behavioral determinants. They show that heterogeneity in motivations creates a signal-extraction problem, so that the use of, e.g., monetary incentives affects the significance of observed behavior, and feeds back on individuals’ concerns for reputation.

Taking an alternative but complementary perspective, Apinunmahakul and Devlin (2008) develop a model of time and money donations where social networks do not provide direct utility *per se*, but enhance utility stemming from the consumption of public goods. In particular, the consumption benefits of volunteering and money giving are enhanced by investments in networking, that result from time investments by individuals and from specific community’s investments in social infrastructure.

*Charities behavior.* A second group of determinants is represented by charities’ actions. The economic literature has analyzed two different strategies for increasing donations, one based on fund-raising expenditures, the other based on publicly reporting the amount of past donations. As for the first

strategy, Khanna and Sandler (2000) have suggested two countervailing effects of fund-raising expenditures: on the one hand, they can increase the amount of donations by giving relevant information to potential donors; on the other hand, individual contributions can decrease the higher is the fraction of donations spent for fund-raising, as this reduces their “effectiveness”. The empirical literature generally finds the first effect to dominate the second one (e.g., Khanna and Sandler, 2000). As for the second strategy, Harbaugh (1998) studies the optimal reporting scheme for not-for-profits organizations that want to maximize the volume of collected donations. Benabou and Tirole (2006) suggest that greater publicity has a counter effect on prosocial behavior, since it introduces additional noise in the “signal”, as donations become suspected of being motivated just by social esteem.

*Government behavior.* A third group of determinants of time and money donations is government behavior. Governments can influence individuals by using both sides of the public budget. On the one hand, a strand of literature has explored the crowding-out effect of government grants, on the premise that public and private donations are close substitutes. Khanna and Sandler (2000) have shown that - contrary to these expectations - public grants crowd-in private donations, since they can be considered a signal of quality for the services produced by not-for-profit organizations. In a similar vein, Day and Devlin (1996) find a crowding-in effect of government expenditure also for volunteering. On the contrary, Andreoni and Payne (2003) find a crowding-out effect of government grants, working through the impact on fund-raising efforts by not-for-profit organizations. Finally, considering both time and money donations, Simmons and Emanuele (2004) conclude instead that there exists a crowding-out effect, but its impact is only minimal.

On the other hand, many authors have considered the impact of tax deductibility on money donations, by calculating the elasticity to their tax price. For instance, Andreoni et al. (1996) - considering a static elasticity - have determined that eliminating tax deductibility in the U.S. would imply a 5.7% loss in donations. Notice however that the point estimates of donations’ elasticity to tax deductions widely differ across studies: for instance, considering the “permanent” component of a dynamic elasticity, Randolph (1995) reports a coefficient of -0.51, while Auten et al. (2002) of -1.26. In a more recent contribution, Feldman (2010) shows that changes in the tax-price of money donations may also affect time donations in two opposite ways. There is a substitution effect in consumption, and a complementarity effect induced by general tastes for charitable giving. Overall, the second outweighs the first, and a decrease in tax-price would increase both types of giving. In the almost unique study based on European data, Khanna and Sandler (2000) do not include tax rates in their price measure of giving, considering instead fund raising and administration expenditures. They motivate this choice by the very modest impact of tax deductibility in the U.K.. Apinunmahakal and Devlin (2008) present

evidence for Canada, which is interesting as Canada is often thought to stand somewhere in between U.S. "philanthropy" and U.K. "charity". They find a very modest impact of taxes and government expenditures on donations and volunteer hours.

While we recognize that, especially in the U.S., both government and charities behavior can have a sizeable impact on time and money donations for the presence of widespread tax incentives, in this paper we follow an approach where giving is primarily driven by individual preferences and attitudes, which reflects more what happens in Europe as well as in other countries where tax incentives are less important, or deemed to be so by individuals<sup>1</sup>. In the next Section, we introduce the theoretical framework, which enriches the standard model of labor supply to include charitable giving, and derive some predictions on individual behavior, which we bring next to the data.

### **3 The theoretical framework: a behavioral model of time and money giving**

A simple economic model may be useful to discuss the role of attitudes for giving on individual choices and to summarise the main implications for the empirical analysis. The focus will be on main ideas and intuitions. A formal derivation of the model and technical details are available in Appendix A.

Our reference theory is the standard textbook static labor supply framework, extended to account for both time and money donations, and for domestic work.<sup>2</sup> Based on the above discussion, charitable contributions of time and money can be thought as affecting utility through two different channels, both related to 'impure' altruism. First, from the very act of giving, which affects their 'warm glow' feelings and their self-image (e.g., Andreoni, 1990; Benabou and Tirole, 2006). Second, through a "social signal" or a "prestige motive", according to which giving is driven by the desire to appear generous and to receive social approval (e.g., Harbaug, 1998; Ellingsen and Johannesson, 2003; Benabou and Tirole, 2006).

Since we focus on a particular form of prosocial behavior which requires time

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<sup>1</sup> Evidence on this point is available through survey data. See, e.g., Wright (2001) for UK, showing that when individuals are asked on whether they would like to give to charity in order to reduce their own tax bill, 52% disagreed and only 14% agreed. Similar findings are observed also for Italy.

<sup>2</sup> About the links between labor market and philanthropy, important references are the seminal paper by Menchik and Weisbrod (1987) on volunteer labor supply and, more recently, the work by Apinanmahakul et al. (2009), who focus on the ties between paid market work and both time and money gifts.

(i.e., volunteering), we also account for the fact that time donation is not the sole relevant alternative to non-market labor. More specifically, we consider both hours volunteered and time devoted to domestic work (distinguished from leisure). In particular, we assume that housework is used to produce services that may have market substitutes (see, e.g., Gronau, 1977 for home production).

For simplicity, suppose first that people do not have specific preferences for time versus money donations (i.e., they consider the two forms of giving as *perfect substitutes*). A simple way to express individual preferences is then the following<sup>3</sup>:

$$U = U(c, t^l, d, q) \quad (1)$$

where  $c$  is the money value of a composite consumption good,  $t^l$  are hours of leisure,  $d$  is the total value of donations, and  $q$  is a non-tradeable “reputational good” or “social esteem”. We further assume that consumption goods can be either purchased on the market ( $c^m$ ) or produced within the household ( $c^h$ ) using a certain amount of time ( $t^h$ ). If we assume time and money donations as perfect substitutes, people care only about the *total* value of donations for their self-image:

$$d = v + m \quad (2)$$

where  $v$  is the value of time giving and  $m$  is the amount of money donations. We can think to the value of volunteering  $v$  as the product of hours of giving ( $t^v$ ) and their contribution to the production of the charity, i.e., the individual productivity of voluntary labor ( $\alpha$ ):

$$v = \alpha t^v \quad (3)$$

. Moreover, according to the literature on volunteering and money donations, “social esteem” is produced by both the (individual) value of time volunteered and charitable money contributions:  $q = q(v + m)$

Let  $t^n$  indicating paid working hours,  $w$  the (exogenous) wage rate, and  $y$  the (exogenous) unearned income. Assume for simplicity that the opportunity cost of volunteering, as well as of other non market activities (leisure and houseworking) is the market wage. Combining the above equations with time and budget constraints, defined as follows:

$$t^l + t^h + t^v + t^n = T \quad (4)$$

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<sup>3</sup> To simplify the notation, we suppress the individual-specific index  $i$ . We will make explicit account of individual heterogeneity in the empirical part of the paper.

$$c^m + m + w(t^l + t^h + t^v) = wT + y \quad (5)$$

where  $T$  is total time available for economic activities, utility maximization for each individual leads to demand functions for time uses and money donations based on optimality conditions (which can, of course, involve also corner solutions).

Accounting for the heterogeneity of preferences across individuals, the set of demand functions for the  $i$ -th individual may take the following form:

$$t^{j*} = t^{j*}(\alpha, w, y; Z_j, \varepsilon_j) \geq 0, \quad j = n, h, v; \quad (6)$$

$$m^* = m^*(\alpha, w, y; Z_m, \varepsilon_m) \geq 0 \quad (7)$$

where the  $Z$ 's are standard vectors of demographic factors accounting for heterogeneity of agents' preferences, and  $\varepsilon$ 's are individual-specific taste shifters, which are unobserved to the researcher and that influence optimal decisions<sup>4</sup>. According to this formulation, the set of observed choice determinants may not exactly overlap. Unobserved individual effects in (6) and (7) are assumed to be specific to each equation. However, since some unobserved preference shifters may be important determinants of each decision rule, errors may be correlated across equations. This is an important issue which will be directly addressed in the empirical analysis.

The key question is then what the model predicts in terms of optimal individual behaviors. In general, having a positive versus a zero amount of giving crucially depends, on the one hand, on the degree of substitutability between time and money donations; on the other hand, on the productivity of volunteer time relative to that of labor time (wage rate). We believe it is reasonable to assume that people's productivity when volunteering is lower than their productivity in the market, i.e., more formally,  $\alpha < w$ <sup>5</sup>. If this is true, the simple model above predicts that the optimal level of money donations will be non negative and volunteer time will be always zero. The intuition behind this result is rather straightforward: if individuals do not have specific tastes

<sup>4</sup> Variation in demographic characteristics and unobserved factors is aimed at capturing differential preferences in dimensions likely to affect supply decisions, whereby individuals with certain characteristics and preferences select different combinations of paid work, domestic work, donations and volunteering.

<sup>5</sup> For instance, if a physician decides to donate time, her productivity is lower than market productivity both when volunteering for Doctors Without Borders (because of lower availability of nurses or technical equipment) or for feeding homelesses in a not-for-profit organization. Evidence on this is hard to come by. However, Andreoni et al. (1996) provide support exactly to this hypothesis considering the Independent Sector survey for the U.S..

for one charitable activity against the other, preferences play a little role by definition, and decisions are purely a matter of opportunity costs.

However, the simple model discussed so far neglects at least two important aspects. First, *ceteris paribus*, some individuals may not be totally indifferent between utility derived from volunteering and money donations for building their self-image. In particular, a direct involvement in the provision of services by a not-for-profit organization, through the supply of unpaid work, may deliver *per se* more utility (more ‘warm glow’) than the simple offering of a money gift. Second, as discussed in the previous Section, there are several reasons why signalling altruism through voluntary work or money does make a difference for individuals’ reputation: Ellingsen and Johannesson (2006) suggest that “time is not money”, since gifts of time are valued more by individuals than gifts of money because they are more powerful signals of altruism. Similarly, Lee et al. (1999) argue that voluntary work is more affected by others’ expectations than gifts of money. In a slightly different setting, Prendergast and Stole (2001) show that - in many circumstances - non monetary gifts (such as time gifts) are offered by a donor instead of more efficient cash transfers because the latter are seen as impersonal and carrying a “stigma effect” for reputation. Indeed, in equilibrium the signalling power of time gifts arise exactly because, in principle, they are *inefficient* relative to cash.

We can easily incorporate these considerations in our model by assuming that people may have specific preferences for volunteering (or for money donations). This means the two giving activities being different (i.e., imperfectly substitutable) goods. In particular, for some people volunteering may matter more than money donations for ‘warm-glow’ and reputation; for some others, money donations would be preferred to time donations. In these cases, if we still assume that productivity when volunteering is lower than the wage rate, we can now observe a positive amount of volunteering at the optimum when the net utility payoffs from volunteering offset its opportunity costs, i.e., when a monetary unit’s worth of volunteering provides more ‘warm glow’ or contributes more to social reputation (or both) than does a monetary unit of money donations. Otherwise, even in the case of specific preferences for volunteering, time donations would be zero. Of course, results obtained with the ‘baseline model’ are strengthened for agents with specific preferences for money donations: for these people only money donations would be observed in equilibrium.

In particular, these results suggest different behavioral patterns for both time and money donations, according to individual preferences with respect to warm-glow and social prestige motivation, two forms of ‘impure’ altruism. Consider optimality conditions discussed so far. If  $\alpha < w$ , as we argue is the more common case, then the theory suggests that it should be more likely to observe a positive amount of time and money donations whenever an individ-

ual has specific preferences for the two forms of ‘impure’ altruism, self-image and reputation. In turn, self-image and reputation concerns may have observable counterparts: for example, we may expect that an agent who cares about the others and/or belongs to a social network may be more likely to consider social esteem as an important determinant of satisfaction, which would then imply a higher probability to choose a positive amount of donations because of the reputation rationale. In the empirical Section of the paper, we provide proxies for both the rationales to donate. To this purpose, the next Section contains an introductory descriptive analysis, which will be integrated and completed by the econometric investigation in Section 5.

## 4 Data and Descriptive Statistics

The data used in this paper originate from the year 2000 wave of the *Indagine Multiscopo sulle famiglie - Aspetti della vita quotidiana* (literally, a Multi-purpose Households Survey on everyday life issues), a cross-sectional survey yearly administered in February by the Italian National Statistical Office (ISTAT) to a representative sample of the Italian population. To the best of our knowledge, only Fiorillo (2009) considers a different wave of the same survey to study the determinants of time donations.

The sampling unit is the household, and the information is available both at the family level, and at the level of each component<sup>6</sup>. The survey is especially designed to provide micro-level information on several aspects of everyday life of Italian households, from dwelling conditions to education, health status, labor market behavior, and time use. Each year, a sample of nearly 20,000 households (about 60,000 individuals) is interviewed (see also ISTAT, 2001). For the purposes of the present paper, the estimation sample has been restricted to household heads and spouses aged 25-60 if men and 25-55 if women. The resulting sample includes 11,331 men and 11,038 women. The employment rates are 85% and 54% respectively. As for women, 39% of the sample reports being a housewife. Looking at domestic work, ninety-seven percent of the females report doing domestic work while only fifty-seven percent of the males do.

The survey enables identification of individual time and money donations thanks to specific items of the questionnaire included in a Section called

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<sup>6</sup> Questions about personal characteristics are directly addressed to each family component: some of them were asked and collected by the interviewer, part were answered directly by the family component filling a provided form. When the person was absent for whatever reason at the moment of the direct interview and it was not feasible to arrange a telephonic one, the information is provided by another family component (proxy interview).

"Social participation". On the money donations front, individuals are asked whether they have given any money to associations or charities over the 12 months prior to the interview. The exact phrasing of the question is: "Did you give money to associations or charities in the last 12 months (yes/no)?" The survey contains a similar but separate question on whether interviewed individuals gave money to political parties, and we do not count these as cases of money donations. As for time donations, the survey asks individuals: "Did you work without being paid for volunteering associations and/or non-volunteering associations?" (over the last 12 months). A similar question was also asked for unpaid work for political parties or trade unions, but again we exclude the two latter possibilities from our definition of volunteering. We also experimented using a restrictive definition of volunteering (i.e., volunteering for associations only) and found results to be robust to the change in definition. Throughout the paper, we refer to results obtained using the enlarged definition of volunteering only.

This choice is supported also by results in Fiorillo (2009), who uses the 1997 wave of the Multiscopo Survey, and distinguishes between *Organizzazioni di Volontariato* ('official volunteer services' associations defined by the law 266/91) and other types of associations. Using a bivariate probit model approach, the results show that the coefficients are substantially similar across the two volunteering equations (for official vs unofficial associations), and that there exists a positive and significant correlation between the corresponding error terms. Notice that for standard controls - like education, gender, and age - estimates in Fiorillo (2009) are comparable to our results for the same variables in the time donation equation. This consistency suggests that results obtained from the Multiscopo Survey are not influenced by the choice of a specific wave used for the empirical analysis.

Our definitions of donations are grounded in the previous literature, and are aimed at isolating charitable behavior from donations that are more likely to bring some indirect monetary reward to the individual, e.g., by "investing" in representation. In each case, we are only able to observe whether donations took place (like, e.g., in Feldman, 2010), but not the amounts contributed or the hours volunteered. We also note that issues related to religious participation are excluded from our definition of charitable giving, as they are asked in a different Section of the questionnaire.

The survey also reports detailed information on aspects of the individual use of time and - as we have discussed in the theoretical Section - such information plays a crucial role in characterizing donations, as long as individuals decide whether or not to donate while managing also other dimensions of their life, namely time in the labor market and time at home. Both variables are recorded in the ISTAT survey in terms of (average) weekly hours of market and domestic work, separately. In particular, the latter includes both housework



Table 1  
Sample probabilities of time and money donation

<i>Probabilities</i>	<i>Women</i>	<i>Men</i>
$\Pr(t^{v^*} > 0)$	9.95	12.88
$\Pr(m^* > 0)$	19.30	21.71
$\Pr(m^* > 0, t^{v^*} > 0)$	5.70	7.78
$\Pr(m^* = 0, t^{v^*} = 0)$	76.45	73.20
$\Pr(m^* > 0, t^{v^*} = 0)$	13.61	13.92
$\Pr(m^* = 0, t^{v^*} > 0)$	4.25	5.10
$\Pr(m^* > 0   t^{v^*} = 0)$	15.11	15.98
$\Pr(m^* > 0   t^{v^*} > 0)$	57.29	60.42
$\Pr(t^{v^*} > 0   m^* = 0)$	5.26	6.51
$\Pr(t^{v^*} > 0   m^* > 0)$	29.52	35.85

and caregiving activities.

Table 1 provides some descriptive statistics on time and money donations in our sample, separately for men and women. Money donations are more frequent than time donations, and men donate more than women do. By looking at the two outcomes in conjunction, the Table indicates that the vast majority of the two sub-samples does not donate, whereas some 13 percent chooses to donate money but not time. Looking at conditional frequencies suggests that donations on the two fronts are somewhat positively associated: the incidence of money donations rises by approximately four times if one compares individuals who do not donate time with those who do, and the increase in time donations is nearly six-fold contrasting non-donors with donors of money.

The selection of independent variables to be included in the econometric model has been based on the theoretical framework developed in the previous Section, as well as on existing research and data availability. In particular, we assume that observed outcomes of optimally behaving agents reflect both individual characteristics affecting preferences and economic constraints, as well as variables proxying for their work status.

First, to provide a formal test of our two working hypotheses, we included indicators for whether the individual attends services or other religious celebrations, and meets friends regularly. More specifically, for religious participa-

tion individuals are asked about the frequency of their visits to places of cult (e.g., churches, synagogues or mosques). We define the dummy *church\_rare*, which takes value one when the answer is either ‘never’ or ‘few times per year’. This variable captures the ‘public practice’ dimension of religiosity. According to Reitsma et al. (2006), ‘public practice’ stands for integration into a religious network; and more integrated people are more likely to adhere to religious norms. As it is well known, religious norms stress the importance of benevolence towards people in need.<sup>7</sup> A potential problem is that we include participation in religious institutions to capture ‘impure’ altruism, but this may simply reflect religious attachment. Many studies have found an effect of religious affiliation or attachment on time and money donations. Brown and Ferris (2007) use different measures for religiosity and participation to religious institutions to disentangle the individual contribution to donations of social networks and of religiosity. They find that when measures of religious participation are included in the empirical analysis, they can explain a substantial share of giving, so that the explanatory power of religiosity decreases. This suggests that the social dimension of religiosity is more important than religiosity itself for donations. Attending religious celebrations should then measure both the degree of ‘impure’ altruism for building a self-image (‘warm glow’ effect) and the concern for social reputation.

Brown and Ferris (2007) show that not only religiosity, but also several other dimensions of social capital are important determinants of giving. Among the others, social networks play a key role. We measure here the importance of social networks with the dummy *rare\_friends*, defined starting from the frequency of meeting friends. If respondents indicated meeting with friends less than once per month, they are coded as *rare\_friends*. In the light of our theory, this variable proxies only for  $q(\cdot)$ : individuals who fraternize more often with friends are likely to have more extensive social networks and to place a higher weight on the social reputation aspect of giving (e.g. Brooks, 2005). This view is supported by a number of empirical results. For example, in the work of Brown and Ferris (2007) the overall index of social network is the first principal component extracted from a list of several measures of social capital, including how trusting individuals are, how embedded they feel in the community, and so on: they show that, among the items used for its construction, the social network index is correlated especially with the measures of personal association and friendships. Freeman (1997) finds people to volunteer more when asked by someone in their social network (including friends).<sup>8</sup>

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<sup>7</sup> Think for instance to the *zakat* in Islam, or the Good Samaritan parable in the Christian tradition. Not surprisingly, Reitsma et al. (2006) finds a positive effect of attendance on donations to secular causes (poor in third world countries). We then expect a negative coefficient on our variable *church\_rare*.

<sup>8</sup> The finding that people in social and religious networks are likely to donate more

We then included a full set of variables accounting for individual characteristics, such as age, education, household size, marital status, living areas (distinguishing both geographical location and city size) and health. Unfortunately, we do not observe any direct measure of wage in the data, which is of course a problem in the estimation of our labor supply equation. Thus, coefficients associated to the above mentioned variables will capture both their direct effect on hours worked and their indirect effect through the wage, of which they are some of the main determinants. In addition, although we do not explicitly present a family labor supply and volunteering model, we include among the regressors the employment status of the partner - in order to account for the role of the household in influencing individual choices. We also account for holding health/life insurances, to capture some kind of individual wealth effects and, perhaps, also attitudes toward risk. Non labor income and the influences of economic conditions are controlled for by including variables related to the individual's judgement about the adequateness of household economic resources and the occurrence of any difficulties in purchasing necessary items (such as foods or drugs).

The set of regressors used in the empirical analysis and summary statistics is presented in Appendix C, Table C.1. To ease the interpretation of results, the second column contains the description of each variable.

## 5 Econometric Model

The results in Table 1 may not be fully informative about the correlations between time and money donations because of compositional effects that plague descriptive statistics. A deeper understanding of these relationships requires a multivariate analysis. This Section presents the simultaneous equations model that we use to investigate the four processes of interest discussed in the previous Section: money donations ( $m$ ), volunteering ( $t^v$ ), hours of market work ( $t^n$ ), hours of domestic work ( $t^h$ ). Since, as discussed in Section 4, we have information on the continuous variable in the last two cases, but only on the (discrete) decision whether to donate time and/or money, the model consists of two probit and two tobit equations, and we allow for free cross-processes correlations in the unobservables. Following previous literature, market and domestic working hours are expressed in log terms.

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must be interpreted with care: due to reverse causality and endogeneity problems, in general this positive association cannot be interpreted as a causal effect (Durlauf, 2002). A causal analysis would require a rigorous identification strategy and the use of exclusion restrictions not available in most of the previous studies as well as in our cross-section data.

The four latent outcomes for individual  $i$  are:

$$\begin{aligned}
t^{j*} &= \alpha_j + \gamma_j church\_rare_j + \delta_j rare\_friends_j + X_j \beta_j + \varepsilon_j, \quad j = n, h, v \\
m^* &= \alpha_m + \gamma_m church\_rare_m + \delta_m rare\_friends_m + X_m \beta_m + \varepsilon_m \quad (8) \\
\varepsilon &= (\varepsilon_n, \varepsilon_h, \varepsilon_v, \varepsilon_m) \sim MVN(\mathbf{0}, \mathbf{\Omega})
\end{aligned}$$

where the vector of errors  $\varepsilon$  is assumed to follow a multivariate normal distribution ( $MVN$ ) of dimension 4 with covariance matrix  $\mathbf{\Omega}$ . Equations in (8) are linear specifications of the demand functions in (6), where the vector of regressors is subdivided into two components: (i) the  $X$ 's vectors, which contain both individual characteristics and proxies for labor and non labor income; (ii) the variables  $church\_rare$  and  $rare\_friends$ , that proxy for the *absence* of 'im-pure' altruism (both in terms of building a self-image and of the concerns for social reputation). According to Hypothesis 1 and 2 and to discussion above, we expect these last two variables to be negatively correlated with donations, while having no significant effect on market and domestic labor supply. Moreover, to the extent to which volunteering is more valued than money gift, we expect a stronger association with the former. All the remaining variables affecting individual choices are included in the unobservable terms  $\varepsilon$ 's.

The mapping between latent propensities and observed behavior is as follows. For processes  $t^v$  and  $m$  (volunteering and money donations) we only know whether the action took place, a 0 – 1 variable. Therefore, we observe

$$D^v = I(t^{v*} > 0); \quad D^m = I(m^* > 0)$$

where  $I(\cdot)$  is an indicator function which takes value 1 whenever its argument is true, and zero otherwise. In the remaining two processes we observe continuous hours of work (either in the market and at home) but with a mass point at zero. According to the labor supply model developed in the previous Section, we can interpret these mass points as corner solutions in a welfare maximization problem in which the unconstrained optimum would be negative. Therefore the observational rule is the following:

$$H^j = \max \{t^{j*}, 0\}, \quad j = n, h$$

where  $H$  stands for the (log of) observed working hours. The above implies that the first two variances in  $\mathbf{\Omega}$  must be normalized to 1. The remaining coefficients in  $\mathbf{\Omega}$  are free. A detailed description of the likelihood function for the model is in Appendix B. Taken together, the relationships above describe a system of seemingly unrelated regression equations for limited dependent variables, two probits and two tobits.

## 6 Empirical Results

Since factors and tastes underlying time allocation decisions typically have a strong gender component (e.g., Croson and Gneezy, 2009), the analysis is conducted separately for men and women. The complete set of estimates of our four equation model is reported in Table 2, Panel A (Women) and Panel B (Men). We report both marginal effects and coefficients for the probit equations (volunteering and money donations). We only report coefficients for the tobit equations (domestic and paid work); since the dependent variables are in logs, tobit coefficients can be directly interpreted as percentage changes.

Overall, our findings are consistent with the existing evidence (e.g. Menchik and Weisbrod, 1987; Brown and Lankford, 1992; Freeman, 1997, Fiorillo, 2009). Key observable characteristics have similar effects on the two types of giving and across genders, see probit results in Table 2 col. Eq. 1 and Eq. 2. First, the coefficients on the two variables intended to capture individual motivations and tastes in the provision of voluntary work and money donations are significant and with the expected negative sign. In particular, *rare\_friends* is associated with lower incentives to contribute, and the effect is stronger for volunteering than for money donations: rarely meeting friends decreases the probability to volunteer by 4.5% in the case of women, and by 6.2% in the case of men; the probability to donate money by 2.9% for women, and by 5.3% for men. This result is in line with findings by Freeman (1997), who showed that people are more likely to volunteer when asked, because of a ‘social pressure’ to donate. Thus, reputational concerns seem to matter in the provision of charitable contributions: *ceteris paribus*, a person tied to a social network has a higher probability to volunteer and give money, providing support to our previous Hypothesis 2. However, it is hard to think at this effect as causal, as those who are intrinsically less motivated in giving (either for altruistic or egoistic motivations) may also have been less likely to develop (or to be concerned about) social interactions.

Similar results hold for the variable built on religious participation, and capturing both forms of ‘impure’ altruism. While we are not able to disentangle the single contribution of  $d$  and  $q$ , these findings suggest that their overall contribution is not negligible<sup>9</sup>. The variable *church\_rare* decreases: the probability to donate time by 2.7% in the case of women, and by 3.5% in the case of men; the likelihood of donating money by 3.5% for women, and by 3.1% for men. Interestingly, for both men and women, while social networks’ ties are

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<sup>9</sup> Using a unique dataset combining experimental measures of altruism, survey measures of other factors (like reputational concerns), and the number of hours volunteered by volunteer firefighters, Carpenter and Myers (2010) move in the direction of disentangling these three possible determinants of donations. They find a significant positive effect of altruism and reputational concerns.

Table 2

Results for a two probit-two tobit simultaneous model: simulated maximum likelihood estimates

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INSERT TABLE 2 ABOUT HERE

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always more important than religious participation in the case of volunteering, the difference between the two coefficients is not statistically significant in the case of money donations<sup>10</sup>.

Second, looking at the impact of other covariates, the probability of positive charitable gifts is generally increasing in schooling and age (with a concave profile) for both men and women, with much higher the marginal effects for schooling than for age. Moreover, people from Northern (richer and more developed) regions are more likely to donate (and especially to volunteer) than people from the South, a result fairly common in Italy where large differences exist in the level of income as well as in the presence of not-for-profit organizations across regions. Fiorillo (2009) interpret these differences in terms of social capital: regions with higher levels of social capital do provide on average significantly more volunteer labor. Also living in urban areas is positively associated with giving, but there is a U-shaped relationship between both volunteering and money donations, and the size of the area<sup>11</sup>. Interestingly, holding a life/health insurance have a positive impact on giving, probably capturing a wealth/income effect more than individual attitudes toward risks. This is supported by marginal effects of the corresponding variables, higher in the money donation equation than in the volunteering one. The negative impact associated with the three “time commuting” variables in the gender-specific volunteering equations reveal the importance of this time constraint on individual decisions<sup>12</sup>. Time spent travelling to the job place is negatively related also to money donations, but significant only for men. The interpretation of this last result is not straightforward, since in principle commuting time is a choice variable. However, this negative effect may be the result of commuting time proportionally reducing income available for consumption goods. Judging to have adequate economic resources (one of our measures of the financial and economic situation of the households) matters for money donations, coefficients taking the expected sign for both men and women. Moreover, only for the former, we also find a positive impact of an adequate economic situation

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<sup>10</sup> This results is based on testing the equality of the two coefficients on *rare\_friends* and *church\_rare* separately in the equations for volunteering and money donations. The p-values for the LR tests statistics are the following: LR(men, volunteering)  $\Pr(\chi_{(1)})=0.021$ ; LR(men, money don.)  $\Pr(\chi_{(1)})=0.231$ ; LR(women, volunteering)  $\Pr(\chi_{(1)})=0.108$ ; LR(women, money don.)  $\Pr(\chi_{(1)})=0.662$ .

<sup>11</sup> Notice that, in our framework, the geographical variables included in regressions pick up also the effect of local not-for-profit and government behaviour.

<sup>12</sup> Not surprisingly, time spent commuting is negatively associated also with the other alternative uses of time, i.e., paid and domestic work.

on volunteering, a result hinting at possible gender differences in the pattern of donations.

The significant negative signs on the difficulty of purchasing basic goods variables (such as food and health care services) attached to men's donations is hardly surprising. If basic items cannot be purchased, there is no cash left for donations. On the contrary, a similar pattern does not emerge for women, especially in the case of the supply of voluntary labor, which seems to be less affected by economic contingencies, and driven more by intrinsic motivations. About other individual characteristics, results are less clear-cut: having a partner is overall negatively related to donations only for women. Moreover, while there exists an inverse-U-shaped relationship between the number of children and volunteering for men, the same pattern does not emerge for women; in particular, the impact is negative but almost never statistically significant at the usual confidence levels. These ambiguous findings probably depend on two forces working in opposite directions: on the one hand, having more children reduces available time and income; on the other hand, people more altruistic (i.e., that are likely to donate more) may have preferences for having more children.<sup>13</sup> As for the employment status of the partner, a variable accounting for choices at the household level, results show clear gender differences. Having a spouse employed significantly increases the probability of money donations for men, while - all else equal - an employed partner has a negative effect (only marginally statistically insignificant) on the probability of volunteering for women.

Finally, we briefly comment tobit results in Table 2 col. Eq. 3 and Eq. 4 for domestic and market working hours; First, for standard controls in labor supply equations (e.g., education, age, regions, ...) the results are unsurprising and in line with previous studies. In addition, we report a negative sign for dummies aimed at capturing difficulties in purchasing necessary goods, but in this case there is a clear reverse causality problem. Interestingly, we find that as the number of children in the household increases, men optimally react by working more, while women reallocate more time to child care and domestic work. This is consistent with our behavioral predictions (see Remark 1 in the Appendix), i.e., that there is a negative correlation between working at home and in the market. Accordingly, agents allocate time to the one or the other activity depending on the existence of a comparative advantage, with women being more productive at home (or being more discriminated at work) than men. Gender differences emerge also considering the employment status of the partner. On the one hand, having a spouse employed significantly increases the number of both hours of paid work and of domestic work for men. On the other hand, an employed partner has a positive impact on the number of

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<sup>13</sup> Such kinds of results for the number of children are not novel in the literature: see, e.g., Vaillancourt (1994) and Carlin (2001). See also Fiorillo (2009) for Italy.

Table 3  
Cross equation errors covariances

	<i>Women</i>		<i>Men</i>	
	<i>Coef.</i>	<i>z-stat</i>	<i>Coef.</i>	<i>z-stat</i>
$Cov(\varepsilon_m, \varepsilon_{tv})$	0.523	25.02	0.556	30.28
$Cov(\varepsilon_{tn}, \varepsilon_{tv})$	-0.009	-0.75	-0.039	-2.14
$Cov(\varepsilon_{th}, \varepsilon_{tv})$	0.017	1.42	0.041	1.48
$Cov(\varepsilon_{tn}, \varepsilon_m)$	-0.050	-0.97	-0.007	-0.35
$Cov(\varepsilon_{th}, \varepsilon_m)$	0.012	0.70	0.328	4.89
$Cov(\varepsilon_{tn}, \varepsilon_{th})$	-0.096	-9.67	-0.671	-15.75
$Var(\varepsilon_{tn})$	1.511	21.74	1.095	23.25
$Var(\varepsilon_{th})$	0.419	35.61	10.710	31.82

Note:  $\varepsilon_m, \varepsilon_{tv}, \varepsilon_{tn}, \varepsilon_{th}$  are the error terms in the money donations, volunteering, paid labor and household labor equations, respectively. Also note that  $Var(\varepsilon_{tm}) = Var(\varepsilon_m) = 1$

hours of domestic work for women, while the negative effect on the number of hours of paid work is only marginally statistically significant.

In order to investigate the inter-relationships between time and money donations, Table 3 reports the whole set of cross-equations errors' covariances, separately for men and women<sup>14</sup>. First, we notice that the errors in time and money donations appear strongly and positively correlated. An unobserved effect that shifts the supply of volunteering up will, on average, be associated with a positive error in money donations. This evidence suggests that, at least from the point of view of unobserved attitudes, the two types of giving do not compete with each other, but - on the contrary - they appear activities which are undertaken in quite strong conjunction. We also notice that the correlation has a similar magnitude for both men and women, and is quite close to estimates by Brown and Lankford (1992) and Feldman (2010). Using a bivariate tobit regression for time and money donations, Apininmahakul and Devlin (2008) find a correlation of 0.18 for females and 0.35 for males<sup>15</sup>. It must be

<sup>14</sup> As we normalised variances to 1 in the probit equations, for time and money donations the estimated covariances coincide with correlation coefficients.

<sup>15</sup> These observations strengthen our results. However, covariances between unobservables pick up all the determinants we were not able to control for in our model, hence their sign can be influenced by a misspecified model. An example of omitted variable that could induce a positive covariance between time and money donations



stressed that a positive comovement does not imply the complementarity in consumption between the two forms of giving, at least in the traditional microeconomic sense. Indeed, the correlation coefficient captures both a general taste for giving, as well as substitution effects induced by changes in relative prices. However, a separate identification of the two effects is in general possible only in specific circumstances, e.g., assuming a specific utility function. Feldman (2010) suggests that in the US, time and money donations are substitute in the standard microeconomic sense, but that there are strong direct complementarity patterns via specific tastes for giving, that make the net effect positive.

Back to Table 3, other covariances are statistically significant. In particular, we observe a negative association between domestic and paid work, greater in magnitude for men than for women<sup>16</sup>. The variance in hours of domestic work for the men sub-sample is more than 20 times greater than the one characterizing the women sub-sample, while variances are very close in the case of market work. Results also show a positive (somehow statistically weak) association between housework and volunteering, again for both genders. By converse, results for other covariances seem to differ between the two sub-samples; moreover, covariances are significant only for men. In particular, for this sub-sample, we find a negative association between market work and volunteering, and a positive correlation between hours of domestic work and money donations. To justify our simultaneous equation approach we also run a formal test aimed at capturing the separability between the unobservable determinants of giving decisions and the set of other time uses (domestic and market work). Results are reported in the last rows of Table 3. Quite interestingly, strong gender differences emerge: the two set of processes are not separable for men, while they are for women. Overall, the whole set of estimated covariances suggests that the budget constraint is more important for men, while the time constraint matters more for women. In other words, men seems to allocate their time uses considering only two opportunities, both paid and unpaid work, and leisure (the item excluded here), but do not adjust across different types of work (whether paid or unpaid). On the contrary, women’s choices distinguish between leisure and work, as well as within the two dimensions of work (paid and unpaid, domestic and voluntary labor). Our results then confirm systematic differences by sex found in the previous literature, with men more likely to react to changes in the “opportunity costs” of giving than women, and women’s behavior more context-dependent than

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is the productivity parameter  $\alpha$ .

<sup>16</sup> About the latter result, also Kalenkosky et al. (2005) report a negative correlations between market hours of work and housework, although their analysis is restricted to childcaring activities.

that of men <sup>17</sup>.

The estimates can also be used to predict joint and conditional probabilities of money and time donations, further reinforcing the evidence stemming from marginal effects. Predictions for an individual endowed with mean characteristics are reported in the first column of Table 4. By fixing personal attributes, such an exercise allows dealing with the compositional effects that blur descriptive statistics <sup>18</sup>. We find that, for both men and women, the probability to volunteer is positive, but lower than the probability to donate money. As for joint densities, obtained controlling for the correlation between unobserved determinants of both giving processes, it seems that - among the various potential combinations - the one in which people do not give at all is by far the most likely. Interestingly, while the joint likelihood of giving both time and money is less than 10%, there is a probability of around 15% of money donations and no volunteering. Moreover, although small, there is a share of people who are expected to contribute with only time donations. Moving to conditional probabilities, we notice that, consistently with our theoretical predictions, donating money is positively associated with the probability of volunteering.

In order to gauge the associations between personal attributes and outcomes, **Table 4** also presents predicted probabilities for different stylized individuals, who are similar to the one endowed with mean characteristics, except for some relevant aspects. Column (2) shows that if we remove participation to religious celebrations and to a network of friends (our proxies for ‘impure’ altruism), marginal probabilities of donations sharply decrease (-61% for volunteering; -32% for money gifts). A similar pattern emerges for both joint and conditional probabilities. This gives a quantitative measure of the importance of motivations to explain giving behaviors. In column (3) we experiment how giving is affected by the economic situation and the economic constraint. In this case, the difference between the base and the individual in financial difficulties is given by the fact that for the former it is difficult to purchase a number of necessary goods. Results show that, while the probability of volunteering decreases to a small amount, there is a sharp drop in that of giving money, and in the likelihood to contribute with both time and money. In other words, the economic situation of the household matters for individual giving decisions,

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<sup>17</sup> See, e.g., Andreoni and Vesterlund (2001) and Croson and Gneezy (2009). The finding that women’s charitable behaviour is less influenced by the opportunity cost of living is also consistent with Carlin (2001) who only finds the opportunity cost of giving (i.e. the price of giving) significant in a less preferred specification for married women.

<sup>18</sup> Again, the use of estimated coefficients to compute predicted probabilities under different counterfactual situations should not be given a causal interpretation: as discussed above, some of the individual characteristics (e.g., motivations) may be endogenous to the outcomes.

Table 4  
 Predicted probabilities: Base and stylised individuals

	<i>Base indiv<sup>a</sup></i>		<i>Base&amp;No motiv<sup>b</sup></i>		<i>Base&amp;Fin diff<sup>c</sup></i>		<i>Base&amp;Risk av<sup>d</sup></i>	
	<i>(1)</i>		<i>(2)</i>		<i>(3)</i>		<i>(4)</i>	
<i>Probabilities</i>	<i>women</i>	<i>men</i>	<i>women</i>	<i>men</i>	<i>women</i>	<i>men</i>	<i>women</i>	<i>men</i>
$\Pr(t^{v^*} > 0)$	8.54	11.28	3.25	4.37	6.89	11.45	12.95	14.35
$\Pr(m^* > 0)$	16.20	24.76	10.98	17.28	8.44	16.56	25.99	34.11
$\Pr(m^* > 0, t^{v^*} > 0)$	4.13	7.15	1.53	2.74	2.31	5.70	7.66	10.31
$\Pr(m^* = 0, t^{v^*} = 0)$	79.39	71.09	87.29	81.08	86.97	77.68	68.71	61.84
$\Pr(m^* > 0, t^{v^*} = 0)$	12.06	17.61	9.44	14.54	6.13	10.85	18.32	23.80
$\Pr(m^* = 0, t^{v^*} > 0)$	4.40	4.13	1.72	1.63	4.58	5.74	5.29	4.03
$\Pr(m^* > 0   t^{v^*} = 0)$	13.19	19.85	9.76	15.21	6.58	12.26	21.05	27.79
$\Pr(m^* > 0   t^{v^*} > 0)$	48.44	63.35	47.15	62.67	33.51	49.82	59.14	71.87
$\Pr(t^{v^*} > 0   m^* = 0)$	5.25	5.49	1.93	1.97	5.00	6.88	7.15	6.12
$\Pr(t^{v^*} > 0   m^* > 0)$	25.53	28.87	13.99	15.86	27.36	34.44	29.48	30.23

*a*: individual endowed with mean characteristics. *b*: base + no motivations (has not friends, does not go to church).

*c*: base + financial difficulties (five items of difficult purchasing). *d*: base + risk aversion (health and life insurance).

more for money than for time donations. Finally, we also investigate how charitable behaviors are influenced by the decision to subscribe a life/health insurance, which can proxy both for income/wealth and for preferences toward risk. According to Column (4) in Table 4, both time and money donations of more wealthy and/or more risk averse individuals are significantly higher than the average. There are at least two potential explanations. One simple story is that more wealthy individuals have more resources to dedicate to giving, especially money donations. This is consistent with the finding that insured individuals have a relatively higher probability to donate money with respect to time than baseline individuals. A second alternative explanation could be that those who dislike risk may be more favorable to redistribution: indeed, since they typically attach more weight than the average to the chance as a determinant of individual wealth and income, they may also be more inclined to donate as a form of reciprocity towards those who have been less lucky.

## 7 Concluding Remarks

In this paper we propose a general framework for understanding individual prosocial behaviors, where utility for giving time and/or money stems from two forms of ‘impure’ altruism, “warm-glow” and social esteem. In particular, we first derive theoretical predictions from a comprehensive behavioral model of time and money donations, including also labor supply and the time devoted to household production among the set of individual choices. We then provide an empirical test of the ‘impure’ altruism drivers for giving using survey data for Italy.

Results from the empirical model - that simultaneously accounts for individual decisions over money donations, volunteering, hours of market work, and hours of domestic work - support comparative static predictions from the theory, and show that money and time donations correlates positively. Confirming previous literature, there is a different pattern of correlations across genders, as for the time uses and giving, stressing the importance of considering a behavioral model to fully characterize individual decisions to donate. In particular, men are more likely to react to changes in the “opportunity costs” of giving than women. Finally, most of the variables that the literature deems to be important determinants of individual behavior turn out to be significantly associated with the decision on whether or not to donate. In particular, proxies for ‘impure’ altruism significantly affect the probabilities of giving, and underline the importance of taking into account also the impact of reputational concerns in the analysis of individual decision making.

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## Appendix A: The Theoretical Model

In this appendix, we discuss a formal derivation of the models presented in Section 3. We assume well-informed and rational individuals who seek to maximize their utility subject to a time constraint and an (endogenous) budget constraint<sup>19</sup>. Differently from other authors (e.g., Feldman, 2010), and to keep the discussion as general as possible, we do not impose here any specific functional form for the utility function. Individual preferences may be represented by the following utility function<sup>20</sup>:

$$U = U(c, t^l, d, q) \tag{1}$$

where  $c$  is the money value of a composite consumption good,  $t^l$  are hours of leisure,  $d$  is the total value of donations, and  $q$  is a non-tradeable “reputational good” or “social esteem”. We assume that the utility function  $U$  is

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<sup>19</sup> In our theoretical framework we do not model explicitly the behaviour of charities, i.e. the demand side of volunteering and money donations. We assume that not-for-profit organisations are willing to assume as many volunteers as supplied at the prevailing wage. This implies that we can treat observed hours of volunteering as coming from optimal supply decisions and not from a mixture of demand and supply forces. We argue that this simplifying assumption might be plausible if the cost of volunteers was zero. We also note that, in practice, the behaviour of charities seems to be primarily driven by the availability of volunteers, so that an excess of supply in volunteering is quite rare. Moreover, as Duncan (1999) has shown, not-for-profit organisations will never be “constrained”, i.e. receive more time donations than they actually require. In our consumption model we also abstract from investments motives in time donations as in Menchik and Weisbrod (1987), a point explored empirically by, e.g., Day and Devlin (1998), and, for Italy, by Fiorillo (2010).

<sup>20</sup> To simplify the notation, we suppress the individual-specific index  $i$ .

continuous, twice differentiable, and (strictly) quasi-concave. We further assume that consumption goods can be either purchased on the market ( $c^m$ ) or produced within the household ( $c^h$ ) using a certain amount of time ( $t^h$ ), given the (strictly) concave function  $f(\cdot)$ :

$$c = (c^m + c^h) = [c^m + f(t^h)] \quad (2)$$

Thus,  $c^m$  and  $c^h$  are perfectly substitutable, and housework hours do not provide utility *per se* to the individual - as it would be, for example, in the case of childcaring activities - but only to the extent that they provide a substitute for market goods<sup>21</sup>. As in Duncan (1999), we also assume that people care only about the *total* value of donations for their self-image:

$$d = v + m \quad (3)$$

where  $v$  is the value of time giving and  $m$  is the amount of money donations (i.e., time and money donations are perfectly substitutable). The value of volunteering  $v$  is given by the product of hours of giving ( $t^v$ ) and their contribution to the production of the charity, i.e., the individual productivity of voluntary labor ( $\alpha$ ):

$$v = \alpha t^v \quad (4)$$

In particular, we assume that  $\alpha < w$ , i.e., that people's productivity when volunteering is lower than their productivity in the market. Moreover, according to the literature on volunteering and money donations, "social esteem" is produced by both the (individual) value of time volunteered and charitable money contributions:

$$q = q(v + m) \quad (5)$$

where  $q$  is assumed to be a (strictly) quasi-concave function.

The assumption that agents are interested in the total value of altruistic activities, and not in the way in which they are allocated to their money and time components, makes our setting similar to the one proposed, among others, by Duncan (1999) in his public-private consumption model of money and time gifts. Differently from him, we explicitly recognize that, in addition to 'warm-glow' feelings, reputation mechanisms may be important determinants of donations as a *private* consumption good, besides *public* consumption good.

Individual choices are subject to time and money constraints as follows:

$$t^l + t^h + t^v + t^n = T \quad (6)$$

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<sup>21</sup> The extension to the case in which domestic work yields directly utility it is quite straightforward. See Kooreman and Kaptein (1987) for a model where housework also contribute to leisure.



$$c^m + m + w(t^l + t^h + t^v) = wT + y \quad (7)$$

where  $T$  is total time available for economic activities (hence net of the amount of time devoted to commuting),  $t^n$  are paid working hours,  $w$  is the (exogenous) wage rate,  $y$  is the (exogenous) unearned income. For simplicity, we assume that the opportunity cost of volunteering, as well as of other non market activities (leisure and houseworking) is the market wage. The wage rate is individual-specific, as we claim that individuals are heterogeneous in both their preferences and their productivity in the labor market. Since consumption of market goods and services will not be explicitly treated in the empirical analysis, for simplicity we also assume that  $c^m$  is strictly positive at the optimum. The other individual choice variables - labor supply, hours of domestic work, volunteering, and money donations - can be either zero or positive at the optimum, depending on preferences and exogenous parameters (wages, productivity when volunteering, and non labor income). An explicit allowance for corner solutions will be made both in the theoretical and in the empirical analysis. Substituting (2)-(5) in (1), the individual utility maximization problem can be stated as follows:

$$\begin{aligned} \max_{\{c^m, t^h, t^n, t^v, m\}} & U(c^m + f(t^h), t^l, \alpha t^v + m, q(\alpha t^v + m)) \\ \text{s.t. } & c^m = w(T - t^l - t^h - t^v) + y - m \\ & t^l = T - (t^h + t^v + t^n) \\ & 0 \leq t^l + t^h + t^v \leq T, \quad t^l, t^h, t^v, m \geq 0 \end{aligned} \quad (\text{A.1})$$

Plugging the budget constraint into the utility function and using the time constraint to express utility in terms of hours of paid, domestic and volunteer work, utility appears as follows:

$$U(wt^n + y - m + f(t^h), T - t^h - t^v - t^n, \alpha t^v + m, q(\alpha t^v + m))$$

FOCs from the maximization problem are the following:

$$[t^h]: \quad U_c \frac{\partial f(t^h)}{\partial t^h} \leq U_{t^l} \quad (\text{A.2})$$

$$[t^n]: \quad U_c w \leq U_{t^l} \quad (\text{A.3})$$

$$[t^v]: \quad \alpha (U_d + U_q) \leq U_{t^l} \quad (\text{A.4})$$

$$[m]: \quad U_d + U_q \leq U_c \quad (\text{A.5})$$

where  $U_k$ , which indicates marginal utility of  $k = c, t^l, d, q$ , is a function of all the variables affecting utility levels. Equality conditions hold whenever the corresponding variable is strictly positive at the optimum. However, non-negativity constraints may be binding for some individuals leading to corner

solutions. Starting from FOCs, we are able to show the following Proposition and Remark.

**Proposition 1.** If  $\alpha < w$ ,  $t^{v*} = 0$ , while  $m^* \geq 0$ .

**Proof.** Assume  $\alpha < w$ . Denoting the marginal utility of donations as  $A = U_d + U_q$ , suppose first that (A.5) holds with inequality:  $A < U_c$ . Thus, the marginal utility of money donations is lower than that of goods and services, so that  $m = 0$ . But then  $wA < wU_c$  and also  $\alpha A < wU_c$ . Using (A.3) this means that, no matter what the agent decides about working in the market or not (either  $U_c w = U_\mu$  or  $U_c w < U_\mu$ ), it is always true that  $\alpha A < U_\mu$ . But then, by the (A.4), the optimal supply of voluntary work is zero. The opposite cannot be true: suppose that  $\alpha A = U_\mu$ . (i.e.  $t^v > 0$ ). Then,  $wA > U_\mu$ , which contradicts the condition for  $m = 0$ . Assume now  $m > 0$ , so that  $wA = wU_c$ . But then,  $\alpha A < wU_c \leq U_\mu$ , which means that hours volunteered will be always zero. Notice that it can also be that money donations are positive and hours of paid work are zero.

By converse, if  $\alpha < w$  there are no equilibria with positive volunteering and zero money donations. Our results are similar to Duncan (1999), except for the fact that here we explicitly account for an additional rationale to donate (i.e., signalling altruism to receive social approval)

**Remark 1.** People do not work in the market but work at home only if they are more efficient in the latter than in the former activity.

**Proof.** Using (A.2) and (A.3), we have that  $U_c \frac{\partial f(t^h)}{\partial t^h} \leq U_\mu$  and  $U_c w \leq U_\mu$ . Suppose  $\frac{\partial f(t^h)}{\partial t^h} < w$ : then whenever  $U_c w = U_\mu$  ( $t^n > 0$ ) it must be that  $U_c \frac{\partial f(t^h)}{\partial t^h} < U_\mu$  ( $t^h = 0$ ), and viceversa. If  $\frac{\partial f(t^h)}{\partial t^h} = w$ , then  $t^n > 0$  and  $t^h > 0$ .

Not surprisingly, we find that, given the perfect substitutability between home-produced and purchased services, in equilibrium agents work at home to the extent that their marginal productivity of an hour of this type of work is higher than an hour's market wage:  $\partial f(t^h)/\partial t^h > w$ ; otherwise they are better off by earning labor income to purchase goods and services in the market<sup>22</sup>. As in the standard labor supply model, paid work decisions are driven by the comparison of total marginal costs (in terms of leisure reduction) and benefits (the value of goods consumption): denoting  $U_k$  the first derivative of the utility function with respect to the generic  $k - th$  argument, for individuals offering a positive amount of hours we have  $U_\mu = wU_c$ ; otherwise  $U_\mu > wU_c$  and time for paid work is zero.

<sup>22</sup> However, if an individual prefers consuming self-produced goods and services (think for instance to caregiving), she may work at home even if her productivity at home is lower than in the market.

*The extended model.* The extended model possess a more complex structure of preferences, which can be summarized by the following utility function:

$$U\left(c\left(c^m, f\left(t^h\right)\right), t^l, v, m, q(v, m)\right)$$

while, of course, time and budget constraints are the same as in the baseline model. In this case, conditions for an optimum take the following form

$$[t^h]: \quad U_c \frac{\partial c}{\partial c^h} \frac{\partial f(t^h)}{\partial t^h} \leq U_{t^l} \quad (\text{A.6})$$

$$[t^n]: \quad U_c w \leq U_{t^l} \quad (\text{A.7})$$

$$[t^v]: \quad \alpha \left( U_v + U_q \frac{\partial q}{\partial v} \right) \leq U_{t^l} \quad (\text{A.8})$$

$$[m]: \quad U_m + U_q \frac{\partial q}{\partial m} \leq U_c \quad (\text{A.9})$$

We now use these conditions to prove the following Proposition:

**Proposition 2.** Assume  $\alpha < w$ . Suppose first that  $U_v > U_m$  and  $\partial q / \partial v > \partial q / \partial m$ . Then  $t^{v*} \geq 0$  and  $m^* \geq 0$ . In particular, we can have four different combinations: a)  $t^{v*} > 0$ ,  $m^* > 0$ ; b)  $t^{v*} > 0$ ,  $m^* = 0$ ; c)  $t^{v*} = 0$ ,  $m^* > 0$ ; d)  $t^{v*} = 0$ ,  $m^* = 0$ . Suppose now that  $U_v < U_m$  and  $\partial q / \partial v < \partial q / \partial m$ . Then  $t^{v*} = 0$  and  $m^* \geq 0$ .

**Proof.** Directly from combining (A.7), (A.8), and (A.9). Let

$$B = \left[ \alpha \left( U_v + U_q \frac{\partial q}{\partial v} \right) - w \left( U_m + U_q \frac{\partial q}{\partial m} \right) \right]$$

the value of the marginal utility gain from volunteering from "warm-glow" and social esteem. Then, case (a) requires  $B = 0$ . Case (b) arises when  $B > 0$ . Case (c) requires  $B < 0$ . Finally, case (d) requires both (A.8) and (A.9) to hold with strict inequality. The second claim of the proposition follows immediately from the assumption  $\alpha < w$ ,  $U_v < U_m$  and  $\partial q / \partial v < \partial q / \partial m$ , just by inspecting FOCs.

Quite intuitively, agents with specific preferences for volunteering (or for whom donating time is more effective for building both their self-image and their social esteem) may now find optimal to volunteer even if the opportunity cost of time is higher than the value of money contributions. However, this is just a necessary but not a sufficient condition for observing a positive amount of time donations. It is shown that this happens whenever voluntary work possesses a larger total utility pay off in terms of both intrinsic preferences and signaling

motives than the difference in opportunity costs between paid and unpaid work.

## Appendix B: The Likelihood function

In order to derive the likelihood function of this model it is useful to define the following set of indices:

$$\begin{aligned} k_v &= 2D^v - 1; & k_m &= 2D^m - 1 \\ k_j &= 2I(H^j > 0) - 1; & j &= n, h \end{aligned}$$

where  $D_i^v$  and  $D_i^m$  are observed binary indicators for volunteering and money donations respectively: and where  $H_i^n$  and  $H_i^h$  are paid and housework hours. For individuals on a corner solution in both work time and domestic time supply, the contribution to the likelihood function are as follows:

$$L_1 = \Phi_4(\Xi; \Sigma)$$

where  $\Phi_p$  denotes the cumulative density function (c.d.f.) of the multivariate normal distribution of dimension  $p$ ,  $\Xi$  is a vector of upper integration points with typical element  $k_j x'_j \beta_j$ ,  $j = v, m, n, h$ ;  $\Sigma = K\Omega K$ , and  $K$  is a diagonal matrix with non-zero elements equal to the  $k$  indices defined above. For ease of notation, here the linear combination  $x'_j \beta_j$  includes all the regressors of equations 8 in the main body.

When only the optimal hours of work (process  $H^n$ ) are positive, we observe their optimal amount in the data. We can therefore condition the probability for the remaining three outcomes on the observed hours of work, and thence write the joint probability as the product of the conditional probability and the unconditional probability of the conditioning variable:  $\Pr(D^m, D^v, H^h, H^n) = \Pr(D^m, D^v, H^h | H^n) \times \Pr(H^n)$ . Likelihood contributions take the following form:

$$L_2 = \Phi_3(\Xi_{-} H^n; \Sigma_{-} H^n) \phi(\varepsilon_n)$$

where  $\phi(\cdot)$  denotes the density function of the univariate normal distribution, a  $_{-} H^n$  suffix indicates conditioning on hours of work, and the arguments of the multivariate normal CDF are derived from the moments of the conditional multivariate normal distribution. Likelihood contributions for the case in which only hours of domestic work are positive ( $L_3$ ) take an analogous form.

Finally, when the optimal hours of both market and domestic work are positive, the sequential conditioning can be expressed as follows:

$$\Pr(D^m, D^v, H^h, H^n) = \Pr(D^m, D^v | H^h, H^n) \times \Pr(H^h | H^n) \times \Pr(H^n)$$

Resulting likelihood contributions are of the form:

$$L_4 = \Phi_2(\Xi_{-} H^h H^n; \Sigma_{-} H^h H^n) \phi(\varepsilon_h | \varepsilon_n) \phi(\varepsilon_n)$$

Given a sample of size  $N$  indexed by  $i$ , and defined  $j_i = I(k_{ji} > 0)$ ,  $j = n, h$ ; the log-likelihood of the model is:

$$\sum_i [n_i h_i \log L_{1i} + (1 - n_i) h_i \log L_{2i} + (1 - h_i) n_i \log L_{3i} + (1 - n_i)(1 - h_i) \log L_{4i}]$$

Note that our model is analogous to Seemingly Unrelated Regression except we use a nonlinear estimation technique to account for lower limit constraints and partial observability. The computational burden posed by evaluation of multivariate normal integrals is tackled by means of simulation-based estimation.

## Appendix C: Variables' description

Table C.1: Variables description and summary statistics

Variable description		Women	Men
Volunteer	Dummy for unpaid work either to volunteering and non volunteering associations (last 12 months)	0.099	0.129
Money donor	Dummy for money given to associations (last 12 months)	0.193	0.217
weekly hours of paid work	N. hours paid work	19.124	36.732
weekly hours of domestic work	N. hours of domestic work	34.186	6.311
Age	Age in years	41.142	44.362
Children:	Set of dummies for the number of children		
Has no children		0.663	0.565
has 1 child		0.090	0.115
has 2 children		0.167	0.217
has 3 children		0.061	0.079
has 4 children or more		0.018	0.024
has partner	Dummy for having a partner	0.836	0.842
has partner * partner employed	Dummy for the partner being employed	0.716	0.399
Max schooling degree:	Set of dummies for the highest level of attained education		
Has no/elementary education		0.178	0.173
has BA		0.088	0.100
has high school		0.312	0.290
has junior high school		0.079	0.067
has lower degree		0.343	0.369
Lives in:	Set of dummies for the size of the place of residence (town/city)		
Inner city		0.151	0.150
outer city		0.129	0.128
town with size<2000		0.057	0.064
town with 2.001 <size< 10.000		0.246	0.251
town with 10.001 <size<50.000		0.256	0.248
town with size >50.000		0.160	0.157
not employed	Dummy for non-employment	0.472	0.152
Region:	Set of dummies for the geographic area		
North west		0.272	0.278
North east		0.186	0.190
Centre		0.194	0.189
South		0.234	0.229
Islands		0.115	0.115
Commuting costs:	Set of variables for the time of commuting from home to place of work (or study) – mutually exclusive		
Commuting time variable	Dummy for commuting time variable during the week	0.032	0.129
Commuting time missing	Dummy for missing answer commuting time	0.495	0.182
Commuting time (minutes)	Minutes of commuting time (if does not vary in the week)	9.249	15.345
Economic situation:	Set of dummies for the perceived economic situation of the family		
Worst than last year		0.250	0.237
as last year		0.617	0.627
better last year		0.133	0.135
Economic resources adequate	Dummy for family economic resources considered adequate	0.709	0.728

Number of basic goods of difficult purchasing:	Set of dummies for the number of basic goods of difficult purchasing last year given the economic resources		
0 basic goods diffic. purchase	No difficulties	0.833	0.850
1 basic good diffic. purchase	Difficulty in purchasing 1 item among: food, clothes, medicines, pay bills	0.070	0.064
2 basic goods diffic. purchase	Difficulty in purchasing 2 items among: food, clothes, medicines, pay bills	0.045	0.042
3 basic goods diffic. purchase	Difficulty in purchasing 3 items among: food, clothes, medicines, pay bills	0.035	0.028
4 basic goods diffic. purchase	Difficulty in purchasing 4 items among: food, clothes, medicines, pay bills	0.017	0.015
Preferences and social attitudes:			
Health insurance	Dummy for having an health insurance	0.168	0.283
Life insurance	Dummy for having a life insurance	0.262	0.357
Perceives bad health	Dummy for perceived bad health	0.043	0.042
Meets rarely friends	Dummy for meeting friends never of few times a year	0.134	0.110
Goes rarely to church	Dummy for going to church never of few times a year	0.097	0.171
N. observations		11,038	11,331



Table 2: Results for a Two tobit simultaneous model: Simulated maximum likelihood estimates

Panel A – Women

Dep. Var	Eq. 1: probit		Eq. 2: probit		Eq. 3: tobit		Eq. 4: tobit			
	volunteer	money donor	hours paid work	hours domestic						
Age	Mg. eff. 0.004	Coef. 0.003	z 0.1	Mg. eff. 0.016	Coef. 0.067	z 2.79	Coef. 0.072	z 2.33	Coef. 0.057	z 5.82
Age squared	0.00003	0.000	0.58	-0.0001	-0.001	-2.37	-0.001	-2.47	-0.001	-5.64
has 1 child	-0.011	-0.072	-0.87	0.084	0.310	4.25	0.135	1.46	0.031	0.96
has 2 children	-0.013	-0.089	-1.19	0.025	0.103	1.56	0.109	1.25	0.118	4.3
has 3 children	-0.023	-0.158	-1.55	-0.018	-0.081	-0.92	0.149	1.37	0.145	4.36
has 4 children or more	-0.011	-0.072	-0.42	-0.025	-0.115	-0.73	0.308	1.54	0.093	1.57
has partner	0.001	0.007	0.09	-0.034	-0.134	-1.92	0.032	0.32	0.278	9.64
has partner * partner employed	-0.020	-0.127	-1.89	0.002	0.007	0.12	-0.130	-1.71	0.057	2.58
has BA	0.152	0.861	9.79	0.236	0.899	11.76	0.008	0.08	-0.192	-5.61
has high school	0.085	0.585	7.99	0.156	0.663	10.78	0.033	0.44	-0.055	-2.38
has junior high school	0.053	0.416	4.55	0.091	0.434	5.6	-0.067	-0.59	0.003	0.09
has lower degree	0.021	0.195	2.75	0.030	0.170	2.84	-0.032	-0.47	0.001	0.03
North east	0.034	0.164	3.02	0.020	0.069	1.45	0.099	1.6	0.060	2.86
Centre	-0.028	-0.164	-2.75	-0.033	-0.123	-2.43	0.026	0.41	0.033	1.45
South	-0.062	-0.443	-6.98	-0.107	-0.459	-8.5	-0.140	-2.04	0.130	6.04
Islands	-0.046	-0.297	-3.93	-0.106	-0.453	-7.18	-0.364	-3.84	0.091	3.29
outer city	0.037	0.285	3.28	0.055	0.241	3.39	0.100	1.23	0.106	3.58
town with size<2000	0.056	0.399	4.04	0.055	0.242	2.84	0.099	0.95	0.093	2.66
town with 2.001 <size< 10.000	0.066	0.454	6.03	0.069	0.295	4.82	0.198	2.64	0.122	4.76
town with 10.001 <size<50.000	0.024	0.199	2.62	0.048	0.215	3.51	0.025	0.33	0.079	3.1
town with size >50.000	0.024	0.198	2.43	0.013	0.064	0.94	-0.070	-0.84	0.039	1.39
Commuting time variable	-0.014	-0.092	-0.79	-0.024	-0.095	-0.96	-0.073	-0.69	-0.011	-0.25
Commuting time missing	-0.003	-0.018	-0.32	-0.043	-0.176	-3.64	-4.321	-96.68	0.491	23.11
Commuting time (minutes)	-0.001	-0.005	-2.85	-0.001	-0.002	-1.24	-0.001	-0.63	-0.001	-1.54
Economic situat. as last year	0.011	0.071	1.32	-0.003	-0.014	-0.3	0.014	0.28	-0.100	-5.53
Economic situat. better last year	0.017	0.111	1.54	0.010	0.037	0.61	0.181	2.7	-0.140	-5.5
Economic resources adequate	0.009	0.060	1.1	0.027	0.113	2.37	0.033	0.59	0.011	0.56

Table 2 PANEL A: - Continued -

1 basic good diffc. purchase	0.013	0.080	0.94	-0.001	-0.005	-0.07	-0.171	-2.31	-0.015	-0.54
2 basic goods diffc. purchase	0.014	0.086	0.82	-0.004	-0.018	-0.19	-0.029	-0.24	-0.023	-0.65
3 basic goods diffc. purchase	0.026	0.151	1.12	0.11	0.043	0.36	-0.081	-0.52	-0.050	-1.25
4 basic goods diffc. purchase	-0.017	-0.121	-0.56	-0.081	-0.405	-1.92	-0.726	-2.27	-0.172	-2.52
Health insurance	0.031	0.182	3.65	0.053	0.203	4.58	0.087	1.34	-0.024	-1.18
Life insurance	0.020	0.123	2.76	0.062	0.238	6.09	0.004	0.08	-0.037	-2.1
Perceives bad health	-0.001	-0.004	-0.04	0.018	0.071	0.84	-0.018	-0.19	-0.033	-0.89
Meets rarely friends	-0.044	-0.343	-5.32	-0.029	-0.122	-2.35	-0.072	-1.11	0.068	3.21
Goes rarely to church	-0.027	-0.193	-2.82	-0.035	-0.152	-2.65	0.051	0.77	-0.107	-4.06
Constant		-2.272	-4.17		-2.823	-5.96	1.956	3.27	1.722	8.88
$Cov(\mathbf{e}_g, \mathbf{e}_m)$		0.523	25.02							
$Cov(\mathbf{e}_{hp}, \mathbf{e}_{rv})$		-0.009	-0.75							
$Cov(\mathbf{e}_{hp}, \mathbf{e}_{rv})$		0.017	1.42							
$Cov(\mathbf{e}_{hp}, \mathbf{e}_m)$		-0.050	-0.97							
$Cov(\mathbf{e}_{hp}, \mathbf{e}_m)$		0.012	0.7							
$Cov(\mathbf{e}_{hp}, \mathbf{e}_{hb})$		-0.096	-9.67							
$Var(\mathbf{e}_m)$		1.511	21.74							
$Var(\mathbf{e}_{hb})$		0.419	35.61							

Test of model separability into giving decisions  
and other time uses (§)

Log pseudolik  $\chi^2(4) = 3.72$   
Number obser. Prob  $> \chi^2 = 0.4455$   
Wald  $\chi^2(36)$  434.2

Panel B – Men

Dep. Var.	Eq. 1: probit		Eq. 2: probit		Eq. 3: tobit		Eq. 4: tobit			
	volunteer	money donor	hours paid work	hours domestic	z	z	z	z		
Age	Mg. eff. Coef	z	Mg. eff. Coef	z	Coef	z	Coef	z		
Age squared	0.005	0.028	1.32	0.013	0.044	2.31	0.089	6.67	0.036	1.4
has 1 child	-0.0005	0.000	-1.15	-0.001	0.000	-1.67	-0.001	-7.9	0.000	-1.19
has 2 children	0.018	0.093	1.32	0.006	0.021	0.33	-0.017	-0.39	0.072	0.84
has 3 children	0.034	0.172	2.84	-0.003	-0.011	-0.2	0.114	2.9	-0.060	-0.79
has 4 children or more	0.038	0.190	2.4	-0.011	-0.041	-0.56	0.092	1.8	-0.278	-2.41
has partner	0.032	0.160	1.2	-0.034	-0.122	-0.98	0.389	4.11	-0.112	-0.52
has partner * partner employed	0.004	0.023	0.4	-0.001	-0.004	-0.08	-0.079	-2.16	-0.435	-6.8
has BA	0.007	0.036	0.89	0.046	0.158	4.41	0.081	3.31	0.180	3.65
has high school	0.176	0.850	10.86	0.239	0.794	11.83	0.126	2.55	0.005	0.05
has junior high school	0.106	0.596	9.22	0.155	0.562	10.33	0.028	0.72	-0.004	-0.04
has lower degree	0.084	0.504	6.24	0.092	0.364	5.05	-0.065	-1.31	0.197	2.03
North east	0.040	0.284	4.59	0.045	0.195	3.76	-0.016	-0.44	0.024	0.3
Centre	0.046	0.189	3.73	0.037	0.116	2.52	0.058	1.86	-0.047	-0.87
South	-0.024	-0.116	-2.05	-0.001	-0.004	-0.09	-0.034	-1	-0.042	-0.69
Islands	-0.072	-0.414	-7.15	-0.087	-0.324	-6.45	-0.092	-2.65	-0.137	-1.96
outer city	-0.044	-0.228	-3.32	-0.060	-0.212	-3.52	-0.138	-3.22	-0.196	-2.19
town with size<2000	0.034	0.252	2.88	0.063	0.249	3.62	0.033	0.7	-0.014	-0.17
town with 2.001 <size< 10.000	0.143	0.752	8.3	0.092	0.347	4.32	-0.082	-1.59	-0.012	-0.11
town with 10.001 <size<50.000	0.107	0.615	8.23	0.112	0.411	6.88	0.020	0.52	0.002	0.02
town with size >50.000	0.066	0.428	5.68	0.074	0.285	4.79	-0.031	-0.79	-0.002	-0.02
Commuting time variable	0.024	0.189	2.31	0.029	0.123	1.91	-0.081	-2.03	0.088	1.17
Commuting time missing	-0.038	-0.216	-3.2	-0.061	-0.224	-3.99	-0.078	-2.78	-0.066	-0.99
Commuting time (minutes)	0.012	0.058	0.94	-0.032	-0.114	-2.08	-2.903	-43.76	-1.281	-14.04
Economic situat. as last year	-0.0004	-0.003	-2.04	-0.0004	-0.002	-1.54	-0.002	-3.22	-0.002	-1.68
Economic situat. better last year	-0.013	-0.065	-1.32	-0.025	-0.086	-2.03	0.023	0.76	-0.019	-0.33
Economic resources adequate	-0.011	-0.057	-0.85	-0.008	-0.026	-0.45	0.082	2.1	-0.038	-0.56
	0.021	0.108	2.01	0.038	0.134	3.03	0.079	2.53	0.125	2.03

Table 2 PANEL B: - Continued -

1 basic good diffc. purchase	-0.003	-0.015	-0.18	0.005	0.017	0.24	-0.015	-0.28	0.046	0.45
2 basic goods diffc. purchase	-0.023	-0.125	-1.18	0.018	0.060	0.67	-0.048	-0.61	0.127	0.98
3 basic goods diffc. purchase	-0.016	-0.084	-0.6	-0.068	-0.262	-2.18	-0.178	-2.37	-0.135	-0.72
4 basic goods diffc. purchase	0.002	0.012	0.07	-0.069	-0.268	-1.38	-0.400	-3.13	-0.237	-1.01
Health insurance	0.027	0.134	3.25	0.048	0.161	4.35	0.128	5	-0.029	-0.66
Life insurance	0.017	0.088	2.16	0.067	0.227	6.41	0.079	3.23	-0.046	-1.07
Perceives bad health	-0.024	-0.130	-1.25	-0.010	-0.038	-0.43	-0.218	-3.14	-0.172	-1.34
Meets rarely friends	-0.062	-0.382	-5.7	-0.053	-0.195	-3.61	0.039	1.05	-0.064	-0.86
Goes rarely to church	-0.034	-0.188	-3.66	-0.031	-0.110	-2.5	-0.028	-0.99	-0.041	-0.77
Constant		-2.630	-5.6		-2.625	-6.36	1.789	6.23	1.477	2.84
$Cov(\epsilon_{tr}\epsilon_{tm})$		0.556	30.28							
$Cov(\epsilon_{tr}\epsilon_{tr'})$		-0.039	-2.14							
$Cov(\epsilon_{tr'}\epsilon_{tr'})$		0.041	1.48							
$Cov(\epsilon_{tm}\epsilon_{tm})$		-0.007	-0.35							
$Cov(\epsilon_{tr'}\epsilon_{tm})$		0.328	4.89							
$Cov(\epsilon_{tr}\epsilon_{tr'})$		-0.671	-15.75							
$Var(\epsilon_{tm})$		1.095	23.25							
$Var(\epsilon_{tr'})$		10.710	31.82							

Test of model separability into giving decisions  
and other time uses (§)

$\chi^2(4) = 36.02$   
Prob >  $\chi^2 = 0.0000$

Log pseudolik  
Number obser.  
Wald  $\chi^2(36)$

-61.02  
11.331  
574.89

Note: the 4-equation model is estimated simultaneously using simulated maximum likelihood methods. For the two probits we report both marginal effects and coefficients, as well as z-stats relative to the latter ones. Since the dependent variable in the two tobit is in logs, the coefficients can be directly interpreted as percentage changes. Excluded categories are: has no children, no or primary education, lives in inner city, north-west, economic situation worst than 1 year before, one out of five subsistence goods of difficult purchasing.

§:  $H_0$  is  $Cov(\epsilon_{tr}\epsilon_{tr'}) = Cov(\epsilon_{tr'}\epsilon_{tr'}) = X\Omega(\epsilon_{tm}\epsilon_{tm}) = Cov(\epsilon_{tr}\epsilon_{tm}) = 0$