

**VOLUNTEER LABOR SUPPLY: EVIDENCE FROM PANEL STUDY OF
INCOME DYNAMICS (PSID)**

A Master's Thesis

**by
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September 2009**

To my beloved fiancé and indispensable family

VOLUNTEER LABOR SUPPLY: EVIDENCE FROM PANEL STUDY OF
INCOME DYNAMICS (PSID)

The Institute of Economics and Social Sciences
of
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by

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in

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September 2009

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ABSTRACT

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In this thesis, we present an analysis of determinants of the supply of volunteer labor and discuss the different motives that influence using the survey of Center on Philanthropy Panel Data. We find that; schooling, religion, health conditions, socio-economic environment, presence of children in the family union and marital status affect both the decision of the participant and the hours volunteered. Previous literature used cross-sectional data and found different results on the effect of wage and income on volunteer labor. These differences can be due to the implications of different motives of volunteer labor supply but they can also be a result of the omitted individual unobservable. This study uses first difference method to solve this problem of unobserved heterogeneity and obtain unbiased estimates. In addition we analyze the relationship between money and time donation, estimate these decisions jointly and conclude that they are complements.

Keywords: *volunteering, charitable giving, determinants, voluntary labor supply, motives of volunteering, first difference, probit, tobit*

ÖZET

PSID İSTATİSTİKSEL VERİLERİ DOĞRULTUSUNDA GÖNÜLLÜ İŞGÜCÜNÜ ETKİLEYEN FAKTÖRLERİN ANALİZİ ÖZGÜR, Zeynep

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Bu çalışma, gönüllü işgücüne etkisi olan belirleyici faktörleri ve aynı zamanda gönüllü işgücü ekonomisinde yer alan tüketim ve yatırım modellerinin PSID verisine uyumunu incelemiştir. Yapılan regresyonlar sonucunda, kişinin eğitim ve sağlık durumunun, din ve inançlarının, yaşadığı sosyal çevrenin, medeni halinin, ailede bulunan çocuk sayısının ve özelliklerinin, gerek kişinin gönüllü işgücüne katılım kararını gerekse saatlik olarak katılımını etkilediği görülmüştür. Bu konuda daha önce yapılmış araştırmalar genellikle kesit gözlemler esas alınarak sürdürülmüştür. Bu doğrultuda kişinin maaşı ve ailenin geliri faktörleri panel veri ile analiz yapan bu çalışmanın sonuçlarında farklılık göstermiştir. Bu farklılığa istinaden değişkenler birincil fark alma işlemi uygulanarak yeniden test edilmiştir. Bunların yanında gönüllü işgücü ve bağışlar beraber analiz edilmiş; bu ikilinin birbirini tamamlayan kararlar olduğu sonucuna varılmıştır.

Anahtar Kelimeler: Gönüllülük, Gönüllü işgücü, bağış, birincil fark alma, gönüllü işgücü modeli

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CHAPTER 1

VOLUNTEER LABOR SUPPLY: EVIDENCE FROM PANEL STUDY OF INCOME DYNAMICS (PSID)

1.1. Introduction

This thesis examines how marital status, health, disability and employment conditions, schooling, income, wage and presence of children in the family affect the contribution to volunteer labor using longitudinal data from the Panel Study of Income Dynamics (PSID). We will then examine how changes in these demographic variables affect the decision of the participant and the hours volunteered. Our data also contains information on the charitable giving of the families; both their participation decision and yearly amount given to special organizations. With this available knowledge, we will also be able to observe the effects of demographic variables on volunteering and charitable giving decisions together.

The second purpose of this paper is to analyze the theoretical models that explain different motives of volunteering such as *consumption model*: people treat volunteering as a normal consumption good and increase their utility by volunteering and *investment model*: people treat volunteering as “human capital” and aim to gain social contact, environment, knowledge and higher status by volunteering. Then,

based on these models, we will focus on the insights interpreted, and see whether these models can explain the concept of volunteer labor supply for our data.

Although this particular research has been studied before, empirical studies have been cross-sectional due to limitations in data. We contribute to this literature by using new survey panel data on volunteering from the 2003-2005¹ provided by the Center on Philanthropy Panel Study, a module within the PSID (Wilhelm, 2006). Previous cross sectional studies may not be able to satisfactorily control for individual specific effects and might result in biased coefficients. By the first difference regression analysis; we are able to control and remove these individual effects from the analysis and derive unbiased estimators. Moreover, we are able to observe how changes in the determinants of the supply of volunteer labor affect the volunteer activity.

We also improve on existing cross-sectional studies on volunteering by estimating a bivariate probit regression analysis that allows us to analyze the related decisions on contributing money and time jointly. Assuming that “independent, identically distributed” errors are correlated (Greene, 2003); we are able to analyze the effects of demographic variables both on the volunteer labor and the charitable giving participation decisions together. Besides, by using Heckman Selection Model, we test the selection bias that might arise due to the unobservable in the data.

The paper is organized as follows. In section II, we present a literature survey on volunteering and present theoretical models of the volunteer labor with their predicted hypotheses. Next, we describe the data and discuss the methodology that will be followed during the analysis. In part V, we will present and discuss the summary statistics. Then, analyze probit and tobit regression results, discuss the

¹ 2001 wave is also available in PSID, but since the questions directed to the household members are different, it is not used in the paper.

consistency of our results to the theoretical models. Next, we follow the Heckman Selection Model, which takes account for the sample selection bias that can occur when hours volunteered are observed only for the individuals who decide to volunteer, but sample analysis is based on all individuals who decide to volunteer or not. In the econometric part of the paper (Part VII), we will focus on the unobserved heterogeneity-omitted variable bias problem and the way to fix it by first differencing the model. Finally with bivariate probit regression analysis (Part IX), we analyze the decision of participation in volunteer labor and charitable giving together. At last we make a summary of our results, and conclude.

1.2. Volunteering in the literature

1.2.1. The Theoretical Frameworks of Volunteer Labor Supply

Researchers have tried to answer the question of why people give. Under the theory of giving and volunteering, economists come up with different motives and models. Menchik and Weisbrod (1987) describe two different volunteer labor supply models as consumption model and investment model. In investment model, volunteer work is seen as ‘human capital’ and it is assumed that supplying volunteer hours increase future utility rather than today’s. The primary gain from volunteer work is experience, social contact and higher status. For youths, volunteering can be a possible mediator for job networking; for elder people, it might build a bridge to more social retirement conditions; for employers, it can be a productive activity for formation of human capital. (Gomez et al. 2003) Besides, in consumption model, volunteering is taken as a normal consumption good. The individual will maximize his utility subject to budget constraint where the wage rate, endowment of time and non-labor income are exogenous variables, and time to volunteer, time to market

labor, time to leisure and consumption are taken as endogenous variables of the model. Below we will discuss the implications of these models in detail and due to the empirical findings in the literature we will also examine relevance of their data on these motives.

1.2.1.1. The Consumption Model ²

We assume a well-informed, rational individual who seeks to maximize his utility which is assumed to be quasi-concave and increasing in all goods, subject to budget constraint where the wage rate, endowment of time, non-labor income are exogenous variables, and time to volunteer, time to market labor, time to leisure and consumption are taken as endogenous variables of the model.

The model is as follows:

$$\text{Max } U_i(t_l, t_v, c) \quad \text{s.t.} \quad c = w(T - t_l - t_v) + y \quad (1)$$

The variables t_l , t_v , t_m represent the hours of leisure time, the hours for voluntary work and hours of market labor, respectively. The variable c denotes conventional consumption expenditures, and y is the non-labor income. T is the endowment of available time where $t_l + t_v + t_m = T$.

Based on the consumption model the following hypotheses can be suggested:

Hypothesis₁: Wage rate has an indeterminate effect on the volunteer activity. (both the participation and the hours volunteered)

According to the literature, there are two effects of wage on volunteering: the first one is that higher wages increase participation in volunteering since it permits people to devote more time to volunteer (income or wealth effect), the second one is that they can also reduce participation since it increases the opportunity cost of time

² The consumption model will be constructed fully based on Menchik and Weisbrod (1987) paper, thus the assumptions are the same.

of volunteering (substitution effect) (Gomez et al. (2003)). Thus, the dominant effect depends on the magnitude of the each effect. In consumption model, it is also assumed that since wage rate is the opportunity cost of time and as people reach more professional careers, and earn more wage, they concentrate on working more, thus stop their participation in other activities. Menchik and Weisbrod (1987) and Boin et al. (1993) try to investigate this motive using United States and Netherlands data, and conclude that all other variables held constant, an increase in the wage rate will reduce the time devoted to the volunteer work, in which substitution effect dominates the income effect.

Hypothesis₂: An increase in the income is more likely to increase both the participation and the hours devoted to the voluntary work.

For Menchik and Weisbrod (1987), income is an index of purchasing power and thus can show the amount of volunteer labor an individual is willing to consume. Since in consumption model volunteering is assumed to be a normal good, both the participation and hours volunteered increases with income. Freeman (1997) and Boin et al. (1993), in their paper find out that people with higher income volunteer more.

Hypothesis₃: Age follows a life-cycle pattern.

According to the consumption model, age is expected to follow a life-cycle pattern. At young ages, people want to spend more of their time with leisure, at middle-ages they try to shape their life so give importance to different kinds of volunteering activities and then due to the physical constraints, at older ages people do not prefer to join volunteer activities. Besides, this may vary with the type of volunteering. As expected, in Boin et al. (1993)'s Netherlands data, age gives a life-cycle pattern both for the participation probability and the hours volunteered. For

Freeman (1997), volunteers are people mostly in 39-54 age groups and then participation in volunteering decreases.

Hypothesis₄: People who choose not to work are more prone to do volunteer work.

Since wage is the opportunity cost of time and since people who choose not to work do not hold a wage, the cost of volunteer labor is lower and thus consuming volunteering as a normal good should increase the utility more. Boin et al. (1993) found that, the probability of participation and hourly volunteering varies inversely with the hours of paid work. However, for Freeman (1997) volunteers are mostly people who are employed.

1.2.1.2. The Investment Model

According to this motive of Menchik and Weisbrod (1987), people only engage in volunteering to increase their potential future earnings, social contact and experience. Volunteer labor is human capital in this model. Based on investment model, following hypotheses can be extracted:

Hypothesis₁: Special intentions for volunteering can offset the effect of opportunity cost of time (wage).

Due to the investment model, the primary gain from volunteer work is experience, social contact and higher status, thus today's wage is not an important determinant of the volunteer labor today. In fact, possible future wage is more effective on the decision of today's volunteering; people volunteer today to increase their potential future earnings. Thus, it is more common to observe a zero effect of today's wage on volunteering, in which substitution and income effect offset each other. According to Hackl et al. (2005), the coefficient of wage in the regression

remains insignificant. Thus we can conclude the validity of this hypothesis for their data.

Hypothesis₂: Investment to volunteering is higher at younger ages.

The reason for this implication is that, people usually gain social contact, work experience and possibility for higher status in their younger ages. Thus, they volunteer more to establish these opportunities when they are young and invest for their future lives. In most of the literature we observe that age follows a life-cycle pattern which somehow also validates this hypothesis, like the consumption model hypothesis₃. As mentioned above, Boin et al. (1993), Carlin (2001), Freeman (1997) are some examples.

Hypothesis₃: People who are willing to enter labor market or employed people who want to gain more social contact can volunteer more.

To benefit from the potential network and experience, unemployed and people who are willing to enter the labor market should volunteer more according to investment motive, since this social contact and increased skills will help to find a job. Also, some qualified jobs may require volunteering to specific organizations such as education and health. Then, these employed people should be more willing to volunteer. For Boin et al. (1993), working men and men job-searchers show the highest probability of participation. Also for Freeman (1997), among men, employment is positively related with the participation in volunteering. These empirical results validate the hypothesis among men.

Hypothesis₄: Participation in volunteer works and hours volunteered is higher for a higher level of education.

According to the investment motive of Menchik and Weisbrod (1987) model, a higher education is more likely to increase participation and hours supplied in the

volunteer labor. Following hypothesis₃, since higher education level increases the possibility of a higher status and experience, people need to volunteer more to some specific volunteer activities. Boin et al. (1993) and Freeman (1997)'s estimation results indicate that, higher education is more likely to increase both the participation rate and the supply of hours. Hence, validate the hypothesis of investment model.

Hypothesis₅: Presence of school-aged children increases the probability of volunteer work, whereas families with younger children participate and volunteer less.

It is expected that families having younger children who need extra care devote less time to volunteering because bringing up a child is a tough work and needs time. But for the families having school aged children devote more of their time to volunteering. The reason is that, since due to the investment motive people volunteer to have experience and social contacts, parents might choose to volunteer for the future benefits of their children. According to Tiehen (2000)'s paper, the presence of school-aged children increases the opportunities of volunteering (like school), thus people involve in volunteer activity more. Besides, Freeman (1997) also found consistent results with the investment model implication.

Hypothesis₆: The effect of being with a partner is not clear.

For this model, if we assume that couples are more interested in making career and earning more for their shared lives, they must spend more time for volunteering; to gain more experience and to broaden their network. Besides, couples share the burden of a 'home', so can have more time to devote for volunteering. On the other hand, unmarried, divorced and widowed people can also volunteer to have a more social life; however they might have more responsibilities at home so time can be limited for volunteering activities. Due to Boin et al. (1993) and Freeman (1997)

empirical results, people with a partner participate more. However, we cannot conclude that these results validate the investment model, since there are different reasons couples or individuals adopt for volunteering.

Hypothesis₇: Investment model does not predict that an individual with higher income would volunteer more.

Due to the investment model, a person only volunteers if it is profitable to do, since volunteering is done to increase the potential future earnings, social contact and experience. Thus, income would not be an important determinant for volunteer labor supply. However, most results in the literature invalidates this assumption like Boin et al. (1993) and Freeman (1997), where they find a positive significant effect of income. (Consumption model)

1.2.2. Determinants of the Decision and the Hours of Volunteer Labor Supply

Volunteer activity is relevant with someone's "will"; it can come in many forms but for the simplest definition: it is an unpaid-work. Economic studies on volunteering generally provide valuable insights about the impacts of different demographic variables on volunteering decision and the hours volunteered.

Freeman (1997), focused on general demographic variables that might influence both the participation decision and the hourly volunteering activity, such as wage, income, education level, marital status, age, number of children present in the family with 1989 Current Population Survey data. The paper concludes that with higher opportunity cost of time (wage), hours volunteered decrease. On the other hand, according to the results, the probability of volunteering increases with wage. Moreover, Menchik and Weisbrod (1987) also conclude that all else equal, hours

volunteered decrease with wage. However, Carlin (2001) shows that although individuals are less likely to participate in volunteer activities when their wages increase, hourly volunteering is more likely to increase, in the case of married women. The two opposing results of Carlin (2001) and Freeman (1997) give rise to thought that volunteering should not be considered as a standard consumer behavior, there might be different effects dominating the volunteer activity in certain cases. As mentioned above, according to the literature; there are two effects of wage on volunteering: the first one is that higher wages increase the participation in volunteering (income or wealth effect), the second one is that they can also reduce the participation rate (substitution effect). We observe that, income effect dominates in Freeman (1997) paper, whereas substitution effect dominates in Carlin (2001) paper.

According to Freeman (1997), Menchik and Weisbrod (1987) and Boin et al. (1993) *income* varies directly with the amount of volunteer time and also with the decision of contributing to the volunteer labor supply. In general, income is a proxy for the purchasing power of an individual, thus an increase in income causes volunteer labor supply to increase if it is assumed to be a normal good. Besides, as mentioned in the theoretical models, according to the investment model a change in the income might not affect either the decision or the hours of the volunteering. This is why people might engage in volunteer labor supply only for their benefits about the future earnings and social contacts.

Tiehen (2000) conclude that increased *in working hours* of married women indicate a decline in volunteer participation. Taniguchi (2006) also focuses on the effect of employment characteristic of the individual on volunteering and concluded that part-time working women are more encouraged to volunteer than the full-time

working women, whereas for men full-time working strongly increases their contribution in participation to volunteer work. For Boin et al. (1993), full-time working women has the lowest participation ratio. On the other hand, full-time working men and men job-searchers show the highest probability of participation. Also for Freeman (1997), among men, employment is positively related with the participation in volunteering. According to the hypothesis₃ of the investment model, the possible explanation can be the wish for higher status and social contact. The different results between the genders can be due to the life responsibilities of the individuals. Since women have the burden of children and the housework, she cannot devote much of her spare time for volunteering.

Life -cycle age pattern is assumed to be an important determinant of the volunteer activity; differences in ages of people might reflect differences in volunteer activities due to needs and physical constraints. At young ages, people want to spend more of their time with leisure, at middle ages they try to shape their life so give more importance to different kinds of volunteering activities and then due to the physical constraints, at older ages people do not prefer to join volunteer activities. Although Gallagher (1994) finds that age and volunteering are negatively related, he did not control for the health, which might have caused an incomplete estimation. Moreover, Boin et al. (1993)'s regression results confirm that hours volunteered follows a life-cycle pattern. As expected, in Boin et al. (1993)'s Netherlands data, age gives a life-cycle pattern both for the participation probability and the hours volunteer. These results validate the hypothesis₃ of the consumption model and also hypothesis₂ of the investment model.

People with higher *education* levels are also more likely have more participation rate of volunteer activity and also hours volunteer is higher. Boin et al.

(1993) and Freeman (1997) papers conclude that education is a positive significant variable both for supply of hours and the decision. A liable explanation for this can be revealed with the investment model of Menchik and Weisbrod (1987); where volunteering is seen essential for gaining higher status and knowing more people. By this way, higher educated people volunteer more hours to gain more social contact.

Rooney et al. (2006) also examine the effects of *race and gender* both on volunteering behavior and giving using data from the state of Indiana. Results indicate important differences in philanthropic behavior by gender. The research indicates that, with a possible reason that altruistic behavior is more sophisticated in women than men, women volunteer more. On the other hand Boin et al. (1993) concludes that women participate less than men in terms of likelihood of participation, since they spend more time on care-taking activities. Also, differences among volunteer labor participation and hours volunteered differ due to *race*. Due to Freeman (1997) volunteers are mostly White and Rooney et al. (2006) also computes that Whites volunteer more than Blacks, African-Americans and Latinos.

The paper by Carlin (2001) estimates how the *number of children* affects volunteer labor supply decision and the hourly volunteering of married women. They conclude that an increase on the number of children is found out to be a significant effect that reduces volunteer hours of a married woman, however volunteer participation is more likely to increase. Moreover, it is expected that families having younger children who need extra care devote less time to volunteering because bringing up a child is a tough work and needs time. But for the families having older (school aged) children the case is just the opposite; they devote more of their time to volunteering. The reason could be that, due to the investment motive people volunteer to have experience and social contacts and parents might choose to

volunteer for the future benefits of their children. Moreover Freeman (1997) and Boin et al. (1993) also found consistent results with the investment model implication.

Family situation-marital status is also assumed to influence participation in volunteer labor. Boin et al. (1993) found empirical results showing that people with a partner, engage more in volunteer work. Moreover, Freeman (1997) also finds that there is a higher potential of partners to volunteer. This is because they share life and responsibilities (such as caring for children, household work) and this enables a higher possible time to volunteer. On the other hand, since single people have to handle all the adversity and responsibility of life, available time to engage for volunteering diminishes. However, due to Menchik and Weisbrod (1987)'s investment motive, single people volunteer more hours to gain contact and know more people for possibility of social life . Thus, the effect of being with a partner is not clear.

1.3. Data

Panel Study of Income Dynamics (PSID) data, starting from 1968, is assumed to be the largest panel data with nearly 8000 households. This is a high-quality survey data on giving and volunteering on American families. The data describe giving and volunteering toward purposes of religion, health, youth and education, basic necessities, social changes, senior organizations and organizations that are not motioned; by classifying the household members as head, spouse and children and classify them due to their education, religion, health, wage, income, working and disability status etc. Although, designing giving surveys is a hard task and non-response might reduce the credibility of the data, Wilhelm (2006) indicates that

Center on Philanthropy Panel Study (COPPS) has a very high response rate and the quality is superior to many other giving and volunteering data.

Rooney et al. (2006) also highlighted the importance of the methodology to measure giving and volunteering. For them, the disparities among volunteering might arise due to the understanding of the survey. Although, the data for 2001 wave is available for volunteering, the questions about giving to the 2001 to the 2003-2005 waves show some differences. The questionnaire change might have caused problems in the estimation results, thus we will only include 2003 and 2005 waves. Also, for the purposes of this paper, the estimation sample is restricted with the responses of head and spouse. Our data set is a panel data, thus we are able to observe households overtime and thus we can estimate how changes in household structure are associated with changes in volunteering labor. Along with the volunteering data, PSID also includes data for charitable activities described the giving done by the family as a whole with the information on the decision maker and also the amount and the incidence.

1.4. Methodology

In our paper, the main interest is to present the determinants of voluntary labor supply. Thus, using our cross-sectional data set of 2003 and 2005 wave of PSID, we first discuss the summary statistics of both waves to have a general idea. In order to explain volunteering in a regression framework, we first define our dependent and independent variables. Next, we execute the probit regression; to examine how significant the household and individual characteristics on the decision of volunteer labor. Then, to test the data for hourly volunteering for different types of

purposes such as: youth and educational; health; religious; basic necessities, social change activities and senior organizations, we construct tobit regression. The interpretations are also explained based on the two models as consumption and investment. To take sample selection bias problem into account, we use Heckman's Selection Model. Then, to examine how changes in the household structure contribute in the decision of volunteer labor and hourly volunteering and also to solve the omitted variable bias problem, we test variables using first-difference model.

At last to see the effects of demographic variables together on the participation decision of volunteer labor and charitable giving, we construct bivariate probit regression analysis. In the final part, we make summary of the outcomes and conclude.

In order to establish the consistency of the results, we corrected wage of head and spouse, family income for inflation for all the regression analysis. Respondents who were not asked the questions, but their volunteering variables still coded as zero, respondents who respond as "did not know" or "not stated" are also corrected due to the available knowledge. However, if the hours volunteered response is entirely missing, but the lower bound is zero hours, there might exist a problem of selection bias. This is why Heckman's Model is used to address the problem. Moreover, since cross sectional studies may not be able to satisfactorily control for individual specific effects and cause a biased coefficient, by the first difference regression analysis; we also control and remove these individual effects from the analysis to establish unbiased estimators.

1.5. Summary Statistics

The entire sample consists of 4256 household observations in year 2003 and 4410 in year 2005. Out of them, 1870 respondents are head and 2386 are wife or “wife”³ in 2003, where 1852 of them are head and 2250 are wife or “wife” in 2005. Moreover, head being male in 2003 is 99.41 percent, and 99.54 percent in 2005. Thus, when we refer to head in the data set we generally mean men, and spouse indicates both the wife and the “wife”.

Table 1.a, 1.b, 2.a and 2.b shows the volunteer participation summary statistics of years 2003 and 2005 respectively. Tables depict summary statistics of yearly volunteering-2003 and 2005, where head volunteers (Hyear=1) or not (Hyear=0) or spouse volunteers (Wyear=1) or not (Wyear=0). In 2003, 28.05 percent of head volunteers, whereas in 2005 this ratio is 28.84 percent. Moreover for spouse, 29.82 percent volunteers in 2003 and in 2005, with a slightly increase this ratio is 33.22 percent.

1.5.1. Summary Statistics for Head and Spouse-2003 and 2005 waves

According to the summary statistics results women (Mean=0.32, 0.35) are more likely to participate in volunteer labor than men. (Mean= 0.29, 0.3) The possible reason can be the caring, altruism and empathy feelings which are generally more dominant across women.

Sample mean and standard deviation of the *age* of men, and of spouse, appear similar across two types of volunteering status. The statistics also reveal that the volunteers generally come from *metropolitan and rural* areas. People who have *children* of ages between 0 and 5 are mostly in non-volunteer group, and the possible

³ PSID data distinguishes a legally married women (wife) and a woman cohabiting (“wife”) but in the data Wife refers to both of the types and we call it generally as the spouse.

explanation can be the need of care and thus more time of these children. Besides, families with children at ages between 6 and 17 (school- aged) and also families having more children are more likely to be volunteers. If head or spouse is *disabled* and if *health* condition is bad, they are more likely to be non-volunteers, due to the physical constraints. Tables also show that, head and spouse who has not completed any grade and who has completed only high-school *education* are generally non-volunteers. Whereas, people who have some collage education, who completed collage education and who has advanced degree are mostly in volunteer group. The *marital status* of head also influences participation in volunteer work; household heads who volunteer are slightly more likely to be married. We also expect *race and religious preferences* to affect supply of volunteer labor. In our data; we observe volunteers are mostly Protestants, whereas Catholics, African-Americans and Hispanics are generally in non-volunteer group. We assume that *position on the labor market* is also an important determinant, since people decide about the allocation of their time to devote for labor work and for volunteering. We see that, when men and spouse are working, they have a higher incidence of participation in the volunteer labor. *Wage and income* of the family show the same characteristic; both head and spouse with higher wage rate are more likely to be volunteers.

1.5.2. Hourly Summary Statistics for Different types of Volunteering

The data describe giving and volunteering toward purposes of religion, health, youth and education, basic necessities, social changes, senior organizations, organizations that are not motioned; and there is also a variable that consists of total volunteering seven of these types. According to the summary statistics for hourly volunteering (Table 2.a.1 and 2.a.2) we observe that, in both waves both head and the

spouse hourly volunteering for religious activities (on average 16 percent) is the highest in mean, it is followed by organizations for youth and children (about 14 percent) and organizations for purposes activities that are not mentioned (about 4.25 percent). Then comes, organizations for people in need of basic necessities (about 3.67 percent), senior citizen organizations (about 2.85 percent), organizations for people in poor health (about 2.57 percent) and social change (about 2.09 percent), respectively.

Total hours of volunteering to all of these purposes are on average 27.33 and 27.60 hours in 2003 and 2005 respectively for head. Besides, these averages are 29.67 and 31 for the spouse. Thus, we can conclude that both the participation and the average hourly volunteering are higher in 2005 and both are higher for the spouse.

1.6. Regression Analysis

1.6.1. Dependent and Independent Variables

We define *volunteering* as an activity that people undertake with their freewill. The motivation may differ across volunteers (i.e. altruism, investment, consumption motives) and the organizational setting can be “formal” (organized) or “informal” (one-to-one) volunteering. In our study, we focus on formal type of organizations. In probit regression, the dependent variable is whether the person volunteers or not in that year. In a given year, the dependent variable equals to “1” if head/spouse volunteers, “0” if he or she does not report any volunteering. For the tobit regression, the dependent variable is head’s/spouse’s hours (yearly based) volunteered for formal organizations. While we are focusing on the first difference model, to examine how changes in household structure (such as wage, health,

income, number of children) influence volunteer labor decisions, we run OLS regression taking the dependent variable as the difference in the decision of volunteer participation and difference in the hours volunteered between the two years. For our bivariate probit regression, the dependent variables are the family charitable giving decision and the individual volunteer participation decision.

The independent variables (exogenous variables) are; marital status; health and disability situations, employment condition; education level, income and wage level, presence and number of children, age, religious affiliation and race. We will test if these independent variables are significant predictors of volunteering both in probit, tobit and bivariate probit models. For the first difference model, we are interested in learning if the changes in these demographic variables can explain the change in volunteer labor decision and the change in hours volunteered. Thus, the independent variables will be difference of the most of the variables for the two waves, whereas we will treat age, race, and religious affiliation as constant.

1.6.2. Probit Regression Analysis

The dependent variable equals to "1" if head/spouse engaged in any volunteer activity in 2003 or in 2005 wave, equals to "0" if volunteering is not reported for that person in that year and is missing if the individual chooses not to answer. Let H_{year} represents the head volunteering in year 2003 (2005) and W_{year} represents the spouse volunteering in year 2003(2005).

Then our model is:

$$Y_h = \theta_1 + X_h\beta_{h1} + X_s\beta_{s2} + Z_c + u_h \quad (1.1)$$

$$Y_s = \theta_2 + X_s\beta_{s1} + X_h\beta_{h2} + Z_c + u_s \quad (1.2)$$

Y_h and Y_s are head's and spouses volunteer groups, respectively. Let X_h be a vector that indicates socio-economic variables of head, X_s for spouse. B_{hi} ($i = \{1, 2\}$) symbolizes the effect of head's characteristics and β_{si} symbolizes the effect of spouse's characteristics. Let Z_c stands for the community variables, where c stands for the community. Then let u_h and u_s be the error terms, respectively. The error terms are assumed to be random variables which are serially uncorrelated and normally distributed with a mean of zero conditional on the explanatory variable. Our results are based on a system of probit equations as described above and shown in Table 3.1, 3.2, 3.3 and 3.4. A positive coefficient indicates a higher probability of participation in volunteer work and a negative one the opposite.

The coefficients from the probit model are difficult to interpret because they do not measure the change in the dependent variable associated with a one unit change in the relevant explanatory variable. Hence we also compute marginal effects to report these changes. Moreover, to compute the effect of one percentage change in the explanatory variables on the volunteer labor participation, we also get the elasticity.

Empirical results:

Wage

In volunteer labor economics, the household production function indicates that an individual's wage rate can have opposing effects on volunteering such as income and substitution effect. Income effect enables people to participate in volunteer labor as wage increases, whereas substitution effect implies a wage increase is more likely to reduce the volunteer activity according to the opportunity cost of time. In the literature we see both the cases where substitution or the income

effect dominates, mentioned in the literature survey section: Freeman (1997) concludes that, people will participate in volunteer activity more when wage is higher. On the other hand, Carlin's (2001) results contradict with the results of Freeman's paper: rises in the wage have negative effect on married women's volunteer participation.

However, following our results, different from these two opposing effects, we see that in both waves, wage of spouse and head has no significant effect on their own volunteering today. This result can be attributed to the fact of net effect of the effects mentioned above, since they work in opposite directions. Also, according to the investment motive, people only volunteer for their future earnings such as social contact, work experience and new social environment. Thus here, the effect of today's wage is offset and due to this argument of the investment model, we can say our empirical results are more prone to that motive.

Family Income

Income is an important explanatory variable for supply of volunteer labor and we refer to income as the total earnings of the family⁴. Due to the consumption model hypothesis₂, volunteering is treated as a normal good, thus an increase in the income is more likely to increase the participation.

However, surprisingly, our empirical evidence suggests that income is not a significant determinant as an indicator of the volunteer labor supply. This result can be explained by the hypothesis₇ of the investment model, where we assume that people only volunteer if it is profitable for them, and no significant effect of income can be observable. Hence, the empirical results of our data validates investment model hypothesis.

⁴ Income in PSID data includes trade, rent, farm, interest, retirement and unemployment income, annuity, alimony, dividend income, child support.

Age

We expect that due to life prospects, different valuations, different health and physical situations, young and old have different patterns in their volunteer work participation. Since age can have a non-linear effect we also include age squared in our regression. However, age or age-squared is not a significant determinant of the supply of volunteer labor in our regression results.

Education

Education is more likely to increase the participation rate of volunteer activity according to Menchik and Weisbrod (1987) paper. The possible reason is the investment motive; in which it assumes that to have a qualified job people need higher education and these jobs may require volunteering to specific organizations to gain more respect and social contact. According to our regression results, we observe a consistent outcome with the literature. Both the head and the spouse having some collage education (13-15 years of education), being collage graduate (16 years of education) and also having an advanced education degree (17 years or more) volunteers more than the high school graduates and the ones having no education at all. The education of the partner also significantly and positively affects the participation decision of the other partner. Moreover, according to the marginal effects, the effect of the education of the head and the spouse are nearly the same on the volunteering decision of the head, and surprisingly the effect of head's education has a slightly more influence on the spouse's volunteer participation decision. We can conclude that our results are consistent with the implication (hypothesis₄) of the investment motive.

To find by what percent the probability of being volunteered changes if the education level changes by one percent, we calculate the elasticity. The results

indicate that one percent increase in the head's college education causes the probability of being volunteered increase by 0.05 (0.05 in 2005) percent and one percent increase in his advanced education results in 0.06 (0.04 in 2005) percent increase in the probability of him being volunteered. The results are 0.07 (0.08 in 2005) and 0.05 (0.06 in 2005) for the spouse.

Marital Status

Volunteer work is a way of spending leisure time. One might argue that a single person has more time than a person with a partner, thus expect marital status to be a negative significant determinant. One might also argue that, since couples (both married and cohabiting) share the responsibilities of life, they can find more time to devote to other things than working, indicating a positive effect. Also, people do not need to be married to share the responsibilities, since in our data head can also be with a cohabiting woman and also share life and need social network. Therefore, exact expectation with regard to the marital status is not clear.

Our results show that married head has a positive influence on both the participation decision of him and also on the participation decision of the wife (it is only in 2003 wave). Thus, we conclude that married couples volunteer more than a divorced, widowed or a never married individual.⁵

Religious Affiliation and Race

We observe minor differences in volunteering with respect to religious affiliation and race based on the existing empirical literature. For PSID data of 2003-2005 waves, we are also able to observe different religious affiliation effects. In both waves, head being Protestant is significant and directly related with volunteer activity of the individual and also with the participation decision of the spouse.

⁵ In PSID data, although wife refers to both legally married and cohabiting women (we call both as spouse), due to the regression analysis here wife refers to only legally married women. Besides, if a head is never married, widowed or divorced, he can be with a cohabiting woman in the FU.

Surprisingly, religious affiliation of the spouse is not a significant determinant either for the head or for herself for most of the cases. Moreover, consistent with the previous literature, African-American heads (in 2003) and Hispanic wives (in 2005) seemed to volunteer less.

Position on the labor market

People decide their time to leisure, volunteer and labor market endogenously, thus the position on the labor market will help us model the time constraint and it will be an important determinant for the volunteer labor supply. Due to this time constraint, we believe that the participation in volunteering varies inversely with the working status. Besides, due to the investment motive, people who are seeking for a job might be more inclined to do volunteer labor, since like the single people; they might seek for a social environment that might help them find a job. Also, according to hypothesis₃ of the investment motive, employed people who want to gain social contacts and higher status also volunteer more. Surprisingly, in our data we cannot generally observe a significant effect of the employment status of the individual. More interestingly, we see that the employment of head is a positive significant variable for the participation decision of the spouse in both years. The possible explanation for this outcome is the possible income in the family enables more spare time for the spouse and promotes her for volunteering.

Health Status

Poor health or disability conditions among the household members may affect the participation rates in volunteer labor. Health constraints may prevent individuals from supplying volunteer labor even though they would like to. This is why, we also expect that people in poor health conditions participate less in volunteering. As probit regression tables show, good health of the volunteer is positively significant

for himself/herself. Moreover, the partner's health is also important for the individual's own decision; in 2003 spouse's participation is positively affected by the good health conditions of the head.

Presence of Children

According to Tiehen (2000), the presence of children can have different effects on the volunteer activity of parents. Since bringing up children needs more time, parents might not find enough time to devote for volunteer labor if they have preschool aged children (age between 0 and 5). On the other hand, due to the investment motive having school-aged children (age between 6 and 17) increases the participation rate of the individual. The possible reason is that, families volunteer in behalf of their children's future; to gain more experience and broaden their social contacts. Our regression results are valid according to these arguments; while having pre-school children decreases the participation of the individual, having school-aged children increases the rate. Besides, for Carlin (2001), having more children is more likely to increase the probability of volunteering, but reduces the number of hours volunteered. In our data, consistent with Carlin (2001), we observe a positive, significant effect of the number of children for both genders. Due to the elasticity analysis, one percent increase in the number of children causes the probability of being volunteered increased by 0.16 (0.21 in 2005) percent for the head and by 0.17 (0.16 in 2005) percent for the women.

Socio-Economic Environment

Labor market situation, urbanization, population, government provision situation can also influence the supply of volunteer labor. In rural areas, there is a belief that people are more helpful, thus participation rate is higher than metropolitan areas. However, metropolitan areas have higher volunteering area opportunities than

other parts of the city and also better transportation facilities to volunteer areas. In our data, we observe that individuals living in rural areas are significantly more likely to volunteer than those living in urban areas for 2003 wave. Thus, we can conclude that our sample results seem to support the first argument.

1.6.3. Tobit Regression Analysis

To examine the different tastes for volunteering, we present a tobit model where the head's/ spouse's hours volunteered to different types of formal organizations is the dependent variable. Like the probit model, the independent variables will be the demographic variables of the household and the individual. There are seven different categories of volunteering organizations: volunteered at or through church, synagogue or mosque (usually called as religious volunteering), volunteered through organizations for children and youth, for senior citizens, for people in poor health, for people in need of basic necessities, for social change and for purposes or activities not already mentioned. We also have a dependent variable that shows hours through organizations for all seven secular purposes. The question asked to the head and the spouse is as follows: "How often did you do volunteer activity at the specified type and how much time would you typically spend during one of this volunteering session?"

The related model is:

$$Y_{h*} = \theta_1 + X_h \beta_{h1*} + X_s \beta_{s2*} + Z_c + u_{h*} \quad (2.1)$$

$$Y_{s*} = \theta_2 + X_s \beta_{s1*} + X_h \beta_{h2*} + Z_c + u_{s*} \quad (2.2)$$

Y_{ph*} and Y_{ps*} are head's and spouse's hourly volunteering variable, respectively. Let X_h and X_s be a vector that indicates socio-economic variables of head and spouse respectively. B_{hi*} ($i = \{1, 2\}$) symbolizes the effect of head's characteristics and β_{si*}

symbolizes the effect of spouse's characteristics. Let Z_c be the community level variables, where c stands for the community. Then let u_{h*} and u_{s*} be the error terms, respectively. The error terms are assumed to be random variables which are serially uncorrelated and normally distributed with a mean of zero conditional on the explanatory variables.

Tables 4.1-4.4 show the related results. A positive coefficient indicates a higher hourly contribution in volunteer work and a negative one the opposite. Unless the type is mentioned, we generally focus on total hours volunteered to all seven types of the organizations.

According to the literature survey, religion is an important factor in most of the volunteering types. Tables 4.1-4.4 show the impact of religion affiliation and race differs across volunteering types. Generally being Protestant is positively and significantly associated with the hours volunteered to both genders. Like the probit results, head or spouse being African-American or Hispanic generally reduces the hours volunteered.

The effects of marital status of head and health of the head and spouse are similar to the results of the probit regression; both the decision and the hourly volunteering of the individual are significantly and positively associated with these characteristics.

One of the challenging results of the tobit regression is again the wage; opportunity cost of time. Like probit results but unlike most of the literature, the estimation results also show that, there is not a significant relation between the hours of volunteering and today's wage of the individual. The outcome contradicts with, Freeman (1997), Menchik and Weisbrod (1987) and Boin (1993) et al. The possible reason can be the first hypothesis of the investment model, where substitution and

income effects offset each other, and people only volunteer to gain experience, status and social contact. Thus, today's hours volunteered is not affected by today's wage rate. However, surprisingly, the hourly volunteering of the spouse is positively related with the wage of head. This can imply that, a possible income in the family gives spouse more time to devote to volunteering since she needs to work less. Besides, following probit results, income has no significant effect on the hours volunteered. This effect of income, also show us that our data is more to the investment motive.

Like the probit regression results, head or spouse, who attended college, who is a college graduate or who has a post-education is more likely to volunteer hourly for all types of volunteering activities compared to some high school graduates and people who did not attend to school at all. Besides, one of the most interesting result is that educational attainment of the partner positively effects the hourly volunteering of the other partner. These could be because, more educated people have a higher opportunity to have a qualified job, and as mentioned before, due to the investment motive, they have to spend more time for special kinds of volunteering activities.

Following the literature (Boin 1993, Carlin 2001), the presence of pre-school aged children is more likely to decrease hours volunteered, since bringing up children needs more time. However, as number of children in the family increases, hours devoted to volunteering increases for both genders. Following hypothesis₅ of the investment motive, a possible explanation is to broaden the social environment for the benefit of the children.

For the women, one of the most surprising outcomes appears if the spouse is new in the family union. If she is new, there is a negative and significant effect on the hourly volunteering of the spouse. This may be since during the adaptation

period, spouse spends more time with the house, thus devote less of her time for volunteering.

As a conclusion, when we generally consider head and spouse volunteering to the whole seven purposes, we observe that the demographic and economic variables that explain the hourly volunteering generally follow the same pattern with the contribution decision to volunteer labor (probit model).

1.6.4. Heckman's Model - Sample selection bias as a specification error

Selection bias is a form of omitted variable bias. (Heckman, 1979) If the sample selection problem is not considered in the model and the dependent variable is directly regressed on the independent variables using only the observed data, then the OLS estimator will be biased; $E(b_1) \neq \beta_1$.

Heckman selection model controls for sample selection bias that could arise from the existence of unobservable variables that determine both the discrete (volunteer or not) or continuous choices (hours volunteered). This possible selection bias and differences in the outcome might arise due to the data; missing values in the data can be treated as zeros rather than a missing value or they can be censored. In PSID, if hours response is entirely missing, the lower bound for hours volunteered is a zero hour. Thus, zeroes are not true zeroes for the entire data, and there is a selection problem to address. However, with the help of accuracy codes presented, we corrected the data in the most available way. People who were not asked, people who choose not to answer or people who did not volunteer but the hours contained missing responses changed to lower bound as zero are coded with special numbers in the accuracy codes. Luckily, we were able to control for these kinds of data that

might cause selection bias. However, to be sure of the results we will present a model that takes care of such a problem.

Heckman's sample selection model offers a method to solve this problem of selection bias based on the following two latent variable models: (Heckman, 1979)

$$(3.1) \quad Y_1 = \beta_1'X_1 + u_1$$

$$(3.2) \quad Y_2 = \beta_2'X_2 + u_2$$

where X_1 is a k -vector and X_2 is an m -vector of regressors. Let the error terms u_1 and u_2 be jointly normally distributed, independent of X_1 and X_2 , with zero expectations: $u_1 \sim N(0, \sigma^2)$, $u_2 \sim N(0, 1)$ and $\text{corr}(u_1, u_2) = \rho$. Also, we allow correlation between the error terms of the two equations, thus assume possibility of the sample selection bias.

In our analysis, firstly the individual faces two decisions: volunteer or not. Then, if he/she chooses to volunteer, he/she must decide how many hours to devote for volunteering. Equation (3.1) is called as the outcome equation, where Y_1 is the total hours chosen to devote for volunteering and equation (3.2) is called as the selection equation, where Y_2 is the decision of participation in the volunteer labor supply. Then;

$$(3.3) \quad Y = Y_1 \text{ if } Y_2 = 1,$$

$$(3.4) \quad Y \text{ is a missing value if } Y_2 = 0.$$

We will construct two-stage analysis to address the self selectivity problem: In the first stage we will decide the group the individual decides to be in; whether he/she chooses to volunteer or not. Then, in the second stage we will examine the effects of the independent variables on the outcome (hours volunteered). At the end of the regressions, if we end up with a result such that the unobservable in the

selection model are correlated with the unobservable in the outcome model, this is simply saying that unobservable in the selection model (volunteer or not) are also affecting the outcome model (hours volunteered).

In order to separately identify the decision regarding participation (to volunteer or not) from the outcome decision (how much to volunteer) and in order to address and control for the selection bias problem, in the second stage we need to select at least one variable that uniquely determines the participation decision of the volunteer labor supply but not the hours volunteered. If such variables do not exist, Mills ratio is used which Heckman (1979) proposed to take account for the selection bias. (Madden, 2008) In our regression analysis, we cannot find such exclusion restrictions, thus both the selection and the outcome models include the same variables. So, we include inverse Mills ratio in the second-stage, where we run the regression for the outcome equation: hours volunteered. The ratio significantly (test by t-value) equal to (or so close to) zero provides evidence for the non-existence of the sample selection bias. Thus, we will end up with unbiased estimators and best fitted hours of volunteering.

We will first compute the Heckman Selection model using a two-stage process and then for the second procedure we will follow some different steps to get the outcome results: we will begin with the probit estimation of the volunteer decision, obtain inverse Mills ratio and include it in our tobit estimation and held the regression.

In the tables 4.5 and 4.6 we see the results of the Heckman selection model. The adjusted standard error for the hours volunteered for head equation regression is given by $\sigma=839.8$ (2003) $\sigma=867.04$ (2005). For the spouse: $\sigma=170.5451$ (2003) $\sigma=186.3068$ (2005). The correlation coefficient between

the unobservable that determine selection (whether to volunteer or not) and the unobservable that determine the hours volunteered is given by $\rho=1, 1, 0.67$ and 0.73 respectively for head 2003-2005 and spouse 2003-2005. Since ρ is positive (not equal to zero, OLS does not provide unbiased estimates) for both the head and the spouse in two waves, the unobservable of the selection and the outcome model are positively correlated with one another.

Although the tables of the second procedure are not presented, we observe the inverse Mills ratio is statistically insignificant at 5 percent level at all cases. The t-values of the Mills ratio are: $-0.22, -1.69, 1.68$ and 0.45 respectively for the head 2003-2005 and for the spouse 2003-2005. Therefore, there is no evidence (very small) of a sample selection problem and we can conclude that the estimates are unbiased. This proves that with the help of the accuracy codes, we were able to omit the selection bias from our data.

1.7. Unobserved Family Effects, Unobserved Heterogeneity and Omitted Variable Bias

In multiple variable regression analysis omitted variable bias is commonly treated as a specification error. Although, regression models are designed to describe the relationships between dependent variables and explanatory variables, the true relationships are hard to know; since, there can be some misspecification in formulating a regression model. Missing out an important variable or including an irrelevant variable can cause any estimated parameter to be biased. Moreover, the lack of ability to control for the unobservable individual-specific effects, which may be correlated with some explanatory variables, can also cause the misspecification of the model.

The following model depends on the Gibson (2001) paper:

Assume that the true model is:

$$(4.1) Y_t = \beta_0 + \beta_1 X_t + \mu_i + \varepsilon_t$$

Where Y_t is the dependent variable, X_t is the explanatory variable, ε_t is the error term and μ_i is an unobservable component that varies by individual. Assume that the omitted unobservable individual specific effect is a function of X_t in a regression such that:

$$(4.2) \mu_i = \gamma_0 + \gamma_1 X_t + u_t$$

So we have estimated;

$$(4.3) Y_t = \beta_0 + \beta_1 X_t + (\gamma_0 + \gamma_1 X_t + u_t) + \varepsilon_t$$

$$(4.4) Y_t = (\beta_0 + \gamma_0) + X_t (\beta_1 + \gamma_1) + (u_t + \varepsilon_t)$$

Now β_1 captures the structural effect and γ_1 captures the effect for unobservable. Assume that b_1 is the regression coefficient of variable X_t then $E(b_1) \neq \beta_1$. Thus unobserved heterogeneity (ignoring the unobserved effect) causes omitted variable biased.

The previous studies have ignored the role of individual unobservable and studied only cross-sectional data. This model might provide a biased estimate of the impact of an explanatory variable. In our paper, we will present one way to solve this problem: *first differencing*.

THE METHOD: One way to solve the problem of unobservable individual effects is to

$$(4.5) Y_t - Y_{t-1} = \beta_1 (X_t - X_{t-1}) + (\varepsilon_t - \varepsilon_{t-1})$$

Since family unobservable is common for each period, they drop out and $E(b_1) = \beta_1$, an unbiased estimator.

Now, let the first difference model in our panel data be:

$$(4.6) \quad Y_{p2005} - Y_{p2003} = (X_{h2005} - X_{h2003}) \beta_h^* + (X_{s2005} - X_{s2003}) \beta_s^* + Z_{c2005} - Z_{c2003} + u_p$$

$Y_{p2005} - Y_{p2003}$ is head/ spouse volunteer decision and hours volunteered differences. (For volunteer decision: $Y_{p2005} - Y_{p2003} = 1$ if volunteer in 2005 but not in 2003, $Y_{p2005} - Y_{p2003} = 0$ if in both waves volunteer or do not volunteer, $Y_{p2005} - Y_{p2003} = -1$ if volunteer in 2003 but do not volunteer in 2005. Let $(X_{i005} - X_{i2003})$ be a vector of household structure differences such as marital, health, disability, working statuses, wage, income differences where $(i = \{h, s\})$, and h indicates head and s indicates spouse. Let $Z_{c2005} - Z_{c2003}$ be the difference of community level variables and u_p be the error term. The error term is assumed to be random variables which are serially uncorrelated and normally distributed with a mean of zero conditional on the explanatory variables.

The negative correlation between the wage rate (opportunity cost of time) and volunteering and positive correlation between income and volunteering has been found in several previous studies. (Menchik and Weisbrod (1987), Freeman (1997). However, our probit and tobit regression analysis support either the opposite idea or indicates no effect for some cases. A reasonable explanation for this correlation is that individual and family unobservable determine both volunteering and wage and income. In other words there might be omitted variables that are correlated with wage rate and income: individual characteristics such as self-discipline, motivation etc. that also affect volunteer labor supply behavior. (Both the decision and hours volunteered) Thus, our cross-sectional studies may not be able to satisfactorily control for individual specific effects. When these individual specific effects are omitted from a cross sectional regression, as seen above, the coefficient on wage rate and income will be unbiased.

1.8. First Difference Regression Analysis

Tobit and probit regressions by themselves do not directly give the change in the probability in engaging in a volunteer activity or hours volunteered associated with a unit change in the independent variables. In order to deal with how the changes in the household and household members' characteristics can affect the behavior of the volunteer labor supply and hourly volunteering and address the omitted variable bias, we use first difference model. We are interested in learning if changes in marital, health, employment and disability statuses, and change in spouse or head in the family union, changes in wage, income and number of children in the family affect the volunteering labor decision and hours volunteered. Our dependent variable will be the difference of volunteer decision of two waves (If volunteer=1 if not=0) and difference between the hours volunteered in 2005 and in 2003, respectively. The independent variables will be difference of the independent variables used in the cross-sectional estimations. However, some variables might be still important but do not usually change or change in the same manner with respect to time, such as race, religious affiliation and age. Thus, they should drop out from the regression. We will run OLS to find the estimated coefficients.

The results of the changes in the volunteer labor decision are given at Table 5.1 and 5.2 and the results of the hourly volunteering change are at Table 5.3 and 5.4. Moreover, we tested the data for changes due to the total hours of volunteering of the family and according to the "family" volunteer decision (both head and the spouse) (Table 5.5 and 5.6).

The only significant outcomes of the first regression models for the volunteer labor decision are about spouse change in the family union and the health condition change of spouse. If a Wife/"Wife" or head splits off from the main family, e.g.,

through divorce, her background information is also analyzed in our PSID data. Besides, the most unexpected and surprising result is that, although only 0.3 percent spouse is new in 2005 wave, change in the spouse in the family union is a positive significant variable. This result can lead us to interpret that, if women are married or cohabiting in 2005, they are more likely to become volunteers than from non-changing and single women. Moreover, a significant, positive health condition change implies that, as expected a healthier woman is more likely to become volunteer.

The results of the hourly volunteering changes separately for head and the spouse are shown in Table 5.3 and 5.4. These outcomes are based on the total hours of volunteering for all seven purposes. For head, the significant ones are change in wage and change in family income. It is observed that if wage increased by one percent, hours volunteered decreases by 0.57 percent annually. Unlike our tobit results, wage change of the head in an increasing manner, is more likely to decrease the hours of volunteering of the head significantly. Thus, dropping out the individual unobservable allow us to observe the outcome where substitution effect dominates the income effect. Also, in consumption model, it is also assumed as people reach more professional careers, and earn more wage, they concentrate on working more, thus stop their participation in other activities. Besides, an increase in the hours volunteered due to an increase in the income can also be a sign of the consumption model, following hypothesis₂ and if the income is increased one unit then hours volunteered increase by 0.144 percent annually.

The effects on the total hours of volunteering of the family and on the family volunteer decision are given in Table 5.5 and Table 5.6. According to the results, wage of head and family income are the significant variables affecting the total hours

volunteered in the family. To find by what percent annual hours volunteering changes if the explanatory variable changes by 1 percent, we calculate the elasticity of the significant explanatory variables. We conclude that if the wage of the head increases by one percent, total hours volunteered decreases by 0.23 percent, whereas one percent increase in the income causes 0.02 percent increase in the total hours volunteered.

In the literature, the effects of wage and income on volunteering mostly consist of cross-sectional studies. For the first-difference regression, in case of men, wage has produced contradicting results with our tobit and probit results but consistent results indicating that substitution effect dominates the income effect; consumption model. Moreover, like most of the previous studies, we observe a direct relation between income and volunteering, validating the second hypothesis of the consumption motive. As indicated before, cross sectional studies may not be able to satisfactorily control for individual specific effects and thus coefficients on wage rate and income will be biased. Using panel data of two years and first differencing the data we are able to control and remove these individual effects from the regression, and now results are more prone to the consumption model.

1.9. Bivariate Probit Regression Analysis

In the case of bivariate probit analysis we have two binary response variables that vary jointly; family donation decision and individual volunteer decision. Moreover, the random distributions (errors) are assumed to be jointly distributed with the correlation coefficient. We will observe both the correlation coefficient and the significance of this estimation. A positive correlation coefficient implies a joint

positive correlation and a negative one implies the opposite. Also, we want to estimate the coefficients to account for this joint distribution.

Menchik and Weisbrod (1987) concluded that contribution of time and money are complements, in the sense that people decide both activities together. Moreover, Cappallari et al. (2007) and Freeman (1997) also find results indicating that voluntary work and money donations are strongly and positively related.

Our findings are shown in Table 6.1 and 6.2 for the two waves. According to the statistical significance test we observe that all results are significant and we notice that time and money donations are positively and strongly correlated. This implies that, two types of giving are complements and an increase in one type is more likely to increase the other giving type. Thus, our results are consistent with Menchik and Weisbrod (1987), Cappallari et al. (2007) and Freeman (1997).

The observations show that, the probability of giving activities for both genders increase if the individual has good health conditions is employed and has a sensible family income. Also head being married is positively associated with both giving types. On the other hand, head or spouse being new in the family union decrease both volunteering and money donations. Like probit estimation results, an educated person is more likely to contribute in both volunteering activities. All these findings are consistent with our probit estimates.

The key variable that shows different effect on the two types of giving is the presence of children in the family. As our probit results show, the presence of pre-school aged children is more likely to decrease the volunteer participation of the individual, whereas presence of school-aged children increases the participation. However, family participation in the money donations is not affected. We mention that the possible reason for the increase in time volunteering is the investment motive

of Menchik and Weisbrod (1987), however it is surprising that the money donations is not affected by the presence of children in the family, since high cost of raising a child (caring, schooling, feeding) reduces the available income and this might have caused an decrease in the money donations.

As a conclusion, the empirical results are mostly consistent with the literature and also mostly consistent with our probit results. We also conclude that an increase in the supply of volunteering is associated with an increase in money donations, since they are assumed to be complements.

CHAPTER 2

CONCLUSION

The purpose of this paper is to study the determinants of volunteer work using PSID panel data. Our empirical results show that positively significant determinants in general for both regression types (probit and tobit) are, head or spouse being Protestant, the individual having good health conditions, the schooling, the number of children in the family, the marital status of head, the employment of the individual (employment status of the individual usually effects the partner instead of him/herself) and living in the rural areas. The negative significant ones are the presence of pre-school age children in the family union and the individual being Hispanic or African-American.

The most striking results of these regressions are the wage and the income. In the literature, wage as being the opportunity cost of time is more likely to decrease the participation and the hours volunteered. (Menchik and Weisbrod, 1987, Freeman, 1997) On the other hand, due to the income effect, wage can also increase both the participation and hours devoted to volunteering. (Carlin, 2001) Moreover, in the literature and due to the consumption model, as being the purchasing power of an individual, an increase in the income is more likely to increase both the participation

and the hours volunteered. In our study however, we find no significant effect of the wage and income on one's volunteering activity. The possible reason can be the investment motive or the situation that individual and family unobservable determine both volunteering and wage and income together. In other words there might be omitted variables that are correlated with wage rate and income that offset the effects. Thus, our cross-sectional studies may not be able to satisfactorily control for individual specific effects.

In order to solve this unobserved heterogeneity, first-difference regression is applied. We observe a change in the sign of the wage rate of the head and family income in the first-difference of the hours volunteered. We conclude that, dropping out the unobservable individual effects, our results are more consistent with the literature where wage substitution effect dominates and income is a positive significant variable; consumption model.

At last, by observing donations together, we find strong evidence that money and time donations are gross complements. Although the determinants for the both volunteering types act together, the distinct result appears if there are pre-school age children in the family union.

The contribution of this paper is firstly the data it uses, where PSID is a high-quality survey data on giving and volunteering on American families. Another important highlight of this thesis is the Heckman Model. To the extent that the decision of contributing to the volunteer labor and the hours volunteered are related and also lack in the data can treat missing values as zeroes that can cause biased estimates in the regressions, we use Heckman's model for solving this possible problem of sample selectivity. Besides, the other important contribution is solving the unobserved heterogeneity problem by first differencing. Since cross-sectional

studies may not be able to satisfactorily control for individual specific effects, our panel data also enables us to observe the effects of the changes in the explanatory variables while dropping out the unobservable. At first our results seem to verify the implications of the investment motive more. Then, taking the family and individual unobservable into account and analyzing the first-difference model, we can conclude that dominant motive is the consumption motive. Thus, this study makes it possible to observe both models' implications during different stages of our analysis.

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APPENDICES

Appendix A: Tables

**Table 1.a Summary Stat.
2003-MEN**

**Table 1.b Summary Stat.
2005-MEN**

	Hyear=0 if head does not volunteer	Hyear=1 if Head volunteers	Hyear=0 if head does not volunteer	Hyear=1 if Head volunteers
Volunteering decision	0 (0)	1 (0)	0 (0)	1 (0)
Age of Head	44.81719 (14.52748)	45.90419 (13.15107)	44.77212 (14.93888)	46.4717 (13.11183)
Age of Spouse	42.65292 (13.91846)	43.74655 (12.53168)	42.51473 (14.32141)	44.44815 (12.65656)
Live in Metropolitan Area	.7144754 (.4517389)	.7359098 (.4410251)	.7192869 (.4494204)	.7403774 (.4385931)
Live in Rural Area	.0302125 (.1711999)	.0402576 (.1966421)	.0298217 (.1701228)	.0369811 (.1887867)
Live in Urban Area	.250332 (.4332761)	.2181965 (.4131879)	.2463533 (.4309566)	.2166038 (.4120858)
Families have children aged 0-5	.2415395 (0.4280876)	.1956522 (.3968617)	.2560778 (.4365361)	.1901887 (.3925981)
Families have children aged 6-17	.2909754 (.4542876)	.3679549 (.4824433)	.2612642 (.4393948)	.3864151 (.4871114)
Number of children in family	1.005309 (1.178398)	1.084541 (1.157995)	.9675851 (1.160968)	1.143396 (1.213206)
Head is disabled	.0395218 (.1948651)	.012087 (.1093186)	.0405581 (.1972961)	.0135952 (.1158468)
Spouse is disabled	.0209025 (.1430816)	.0088638 (.0937675)	.0256078 (.1579877)	.0143613 (.11902)
Family Income	69583.34 (95129.17)	91717.12 (97594.24)	75838.62 (89346.14)	101876.9 (127566.9)
Head completed no school	.0046346 (.0679319)	.0008584 (.0292979)	.0038141 (.0616516)	.0015873 (.0398251)
Spouse completed no school	.0142077 (.1183676)	.008658 (.0926849)	.0133944 (.1149769)	.002447 (.0494266)
Head completed high school	.5771836 (.4940949)	.3330472 (.4715057)	.5627601 (.4961316)	.3357143 (.4724271)
Spouse completed high school	.5544627 (.4971155)	.3264069 (.4691012)	.5333098 (.4989772)	.3107667 (.4629963)
Head has some collage education	.2146168 (.4106294)	.2437768 (.429544)	.221914 (.4156057)	.2603175 (.438982)
Spouse has some collage education	.1333333 (.3399952)	.2506438 (.4335699)	.1383495 (.3453263)	.252381 (.4345511)
Head has high-school degree	.2437158 (.4294014)	.2978355 (.4575049)	.2534367 (.4350555)	.3107667 (.4629963)
Spouse has high-school	.1253188	.2181818	.1318294	.233279

degree	(.3311403)	(.4131904)	(.3383648)	(.4230909)
Head has 17 and more years of education	.0622951 (.2417348)	.1489177 (.3561616)	.0680296 (.2518411)	.1427406 (.3499509)
Spouse has 17 and more years of education	.0702317 (.2555827)	.1716738 (.3772586)	.0731623 (.2604478)	.15 (.3572132)
Health Head Bad	.1454666 (.3526292)	.0547945 (.2276705)	.1503247 (.3574474)	.0770975 (.266847)
Health Head Good	.8545334 (.3526292)	.9452055 (.2276705)	.8496753 (.3574474)	.9229025 (.266847)
Health Spouse Bad	.1416107 (.348709)	.0822476 (.2748534)	.1589122 (.3656541)	.0919453 (.2890585)
Health Spouse Good	.8583893 (.348709)	.9177524 (.2748534)	.8410878 (.3656541)	.9080547 (.2890585)
Head is Married	.884207 (.3200296)	.958132 (.200368)	.8641375 (.3426981)	.9532075 (.2112738)
Head is never-married	.0723291 (.2590751)	.0233494 (.1510716)	.0856031 (.2798225)	.0286792 (.1669664)
Head is Divorced	.035501 (.1850731)	.0161031 (.1259227)	.0431258 (.2031732)	.0150943 (.1219743)
Head is Widowed	.0019907 (.0445803)	.0008052 (.0283752)	.0016213 (.0402389)	0 (0)
Head is new in FU	.123424 (.3289779)	.0772947 (.267166)	.1293355 (.3356253)	.0777358 (.2678566)
Spouse is new in FU	.1539482 (.360959)	.0958132 (.2944535)	.1685575 (.3744213)	.1064151 (.3084846)
Head is retired	.1056128 (.3073924)	.0918614 (.2889466)	.1028553 (.3038191)	.0936556 (.2914591)
Spouse is retired	.0646981 (.2460332)	.0620467 (.2413377)	.0700162 (.2552157)	.0642479 (.2452868)
Head is Catholic	.2418004 (.4282487)	.2034739 (.4027486)	.2343962 (.4236927)	.2180685 (.4130951)
Head is Protestant	.5844382 (.4929046)	.6641853 (.4724699)	.5820896 (.4932989)	.6542056 (.4758119)
Spouse is Catholic	.2440056 (.4295718)	.1940299 (.395616)	.2451349 (.4302406)	.1889764 (.3916441)
Spouse is Protestant	.6153032 (.4866093)	.6840796 (.4650742)	.6087402 (.4881157)	.6944882 (.4608053)
Head is African-American	.2451481 (.4302482)	.1492659 (.3564958)	.2509778 (.4336465)	.175359 (.3804177)
Spouse is African-American	.2292234 (.4204049)	.1425081 (.349713)	.2329213 (.4227613)	.1689394 (.3748404)
Head is Hispanic	.0989051 (.2985891)	.0367521 (.1882331)	.1065842 (.30864)	.0372168 (.1893693)
Spouse is Hispanic	.0961326 (.2948273)	.0360825 (.1865755)	.1033088 (.3044178)	.0324939 (.1773799)
Wage of spouse	11.51385 (12.70501)	15.23329 (22.22641)	12.83104 (28.53009)	15.14294 (18.05197)
Head is working	.7894387 (.407775)	.8597905 (.3473442)	.802401 (.3982525)	.8610272 (.3460489)
Spouse is working	.6519575 (.4764286)	.719581 (.449385)	.6547812 (.4755166)	.728647 (.4448259)

**Table 2.a Summary Stat.
2003-SPOUSE**

**Table 2.b Summary Stat.
2005-SPOUSE**

	Wyear=0 if spouse does not volunteer	Wyear=1 if Spouse volunteers	Wyear=0 if spouse does not volunteer	Wyear=1 if Spouse volunteers
Volunteering decision	0 (0)	1 (0)	0 (0)	1 (0)
Age of Head	44.77716 (14.66266)	45.86863 (12.99671)	44.73062 (15.05062)	46.2925 (13.1768)
Age of Spouse	42.61528 (14.0678)	43.70181 (12.35102)	42.54613 (14.44867)	44.09827 (12.68994)
Live in Metropolitan Area	.7137365 (.4520931)	.7351041 (.4414362)	.7207997 (.4486849)	.7344452 (.4417699)
Live in Rural Area	.0300594 (.1707807)	.0394831 (.1948113)	.0298141 (.170104)	.0359205 (.1861516)
Live in Urban Area	.2516603 (.4340429)	.2189519 (.4136844)	.2434234 (.4292238)	.2264272 (.418653)
Families have children aged 0-5	.2476423 (.4317183)	.1880833 (.390919)	.2627148 (.440186)	.187941 (.3907904)
Families have children aged 6-17	.2762836 (.4472369)	.3898062 (.4878813)	.2388636 (.426464)	.4085953 (.4917319)
Number of children in family	.9839329 (1.17766)	1.119885 (1.158111)	.9410733 (1.165303)	1.165491 (1.191892)
Head is disabled	.0402098 (.1964853)	.0136494 (.1160724)	.041067 (.1984801)	.0166988 (.1281814)
Spouse is disabled	.0220126 (.14675)	.0078966 (.0885432)	.0259649 (.1590585)	.0154044 (.1231942)
Family Income	68365.41 (90532.22)	91821.03 (105674.3)	75228.51 (93419.16)	99084.42 (117053.9)
Head completed no school	.0048872 (.0697507)	.0007634 (.0276289)	.0044826 (.0668147)	.0006817 (.0261087)
Spouse completed no school	.0157692 (.1246055)	.0061538 (.0782348)	.0148912 (.1211406)	.001385 (.0372032)
Head completed high school	.583082.49 (314177)	.3480916 (.4765472)	.5719089 (.4948945)	.3510566 (.4774634)
Spouse completed high school	.5634615 (.4960517)	.3338462 (.471767)	.5517373 (.497411)	.3109418 (.4630394)
Head has some collage education	.2109023 (.4080258)	.2480916 (.4320702)	.2196489 (.4140861)	.259032 (.4382526)
Spouse has some collage education	.1327068 (.3393213)	.2389313 (.4265935)	.1333582 (.340025)	.2453988 (.4304701)
Head has high-school degree	.2419231 (.4283303)	.2953846 (.456391)	.2508591 (.4335904)	.3067867 (.4613198)
Spouse has high-school degree	.1173077 (.3218485)	.2238462 (.4169806)	.117984 (.3226507)	.2430748 (.4290885)
Head has 17 and more years of education	.0615385 (.2403616)	.1407692 (.3479172)	.0645284 (.2457389)	.1378116 (.3448216)
Spouse has 17 and more years of education	.0684211 (.2525145)	.1641221 (.3705278)	.0706014 (.2562057)	.1438309 (.3510379)
Health Head Bad	.1437063 (.350853)	.0682471 (.2522601)	.1475755 (.3547411)	.0931278 (.2907048)
Health Head Good	.8562937 (.350853)	.9317529 (.2522601)	.8524245 (.3547411)	.9068722 (.2907048)
Health Spouse Bad	.1476629 (.3548283)	.0765896 (.2660353)	.1653039 (.3715207)	.0906752 (.2872391)
Health Spouse Good	.8523371	.9234104	.8346961	.9093248

	(.3548283)	(.2660353)	(.3715207)	(.2872391)
Head is Married	.8798463 (.325198)	.9590811 (.1981735)	.86 (.3470479)	.9474022 (.2233009)
Head is never-married	.0750961 (.2635923)	.022972 (.149868)	.0891228 (.2849709)	.030789 (.1728009)
Head is Divorced	.0359762 (.1862635)	.017229 (.1301704)	.042807 (.2024573)	.0198845 (.1396483)
Head is Widowed	.0020957 (.0457389)	.0007179 (.0267932)	.0017544 (.041856)	0 (0)
Head is new in FU	.1250437 (.3308262)	.0789663 (.2697829)	.1343388 (.3410758)	.076331 (0.2656122)
Spouse is new in FU	.1571778 (.3640319)	.0954774 (.2939787)	.1778323 (.3824386)	.0987813 (.2984639)
Head is retired	.1090909 (.3118078)	.0862069 (.2807702)	.1007371 (.3010331)	.0989082 (.2986346)
Spouse is retired	.0660377 (.2483914)	.0595836 (.2367988)	.0708772 (.2566646)	.063543 (.2440154)
Head is Catholic	.2414804 (.4280593)	.2080238 (.4060448)	.2336141 (.4232069)	.2218521 (.4156306)
Head is Protestant	.5870282 (.4924581)	.6508172 (.476889)	.5796412 (.4937069)	.6482345 (.4776804)
Spouse is Catholic	.2387672 (.4264093)	.209785 (.4073061)	.2418519 (.4282843)	.203469 (.4027127)
Spouse is Protestant	.6160416 (.4864383)	.675315 (.4684307)	.6048148 (.488981)	.688459 (.4632779)
Head is African-American	.2500896 (.433142)	.1494169 (.3566289)	.2516743 (.4340516)	.1853282 (.3886887)
Spouse is African-American	.2335007 (.423134)	.1431686 (.350372)	.2325827 (.4225527)	.1791237 (.3835795)
Head is Hispanic	.1017665 (.3023991)	.0375191 (.1901029)	.1093565 (.3121476)	.0426997 (.2022489)
Spouse is Hispanic	.0976654 (.2969194)	.039725 (.195387)	.1080865 (.3105518)	.0350998 (.1840954)
Wage of spouse	11.58491 (12.76006)	14.68406 (21.38523)	12.86852 (29.73005)	14.7274 (16.49974)
Head is working	.7828671 (.4123659)	.8656609 (.3411388)	.7988768 (.4009103)	.8587026 (.3484399)
Spouse is working	.6516422 (.4765333)	.71285 (.4525947)	.6508772 (.4767765)	.724647 (.4468354)

Table 2.a.1-Table 2.a.2		
Summary Statistic- Hours volunteered to types of Volunteering 2003 and 2005	Mean-2003 (sd)	Mean-2005 (sd)
Head-Total volunteering	27.33905 (133.1299)	27.60023 (120.8728)
Spouse-Total volunteering	29.67493 (120.3467)	31.00816 (118.8983)
Head Religion Org.	20.01433 (99.99475)	21.29093 (106.9932)
Spouse Religion Org.	24.50705 (102.3431)	23.50181 (89.78636)
Head –youth and children org.	14.69055 (88.11451)	15.19864 (82.20339)
Spouse –youth and children org.	16.91953 (85.93697)	17.70499 (81.88254)
Head-Senior Citizen org.	1.684445 (37.42425)	1.398413 (22.66667)
Spouse-Senior Citizen org.	2.546992 (39.47969)	2.77415 (29.66952)
Head-Health org.	1.263393 (16.40466)	1.487982 (27.37037)
Spouse-Health org.	2.428806 (34.42953)	1.786848 (21.671)
Head-Basic Necessities	2.828242 (44.4825)	1.973923 (29.67789)
Spouse-Basic Necessities	1.616776 (17.71636)	2.00771 (23.07404)
Head-Social Change org.	1.681391 (26.71216)	1.187755 (18.90727)
Spouse-Social Change org.	.9880169 (12.82338)	1.490249 (25.075)
Head-Not mentioned org.	5.191024 (67.57643)	6.353515 (71.02862)
Head-Not mentioned org.	5.174812 (53.93938)	5.244218 (61.28893)

PROBIT REGRESSION TABLES

DEPENDENT VARIABLE = HEAD/SPOUSE VOLUNTEERS OR NOT IN 2003 AND 2005

	Table 3.1 Probit regression-Head Volunteering2003		Table 3.3 Probit regression-Head Volunteering2005	
HYEAR2003(Head Volunteer)	Coef. (sd)	Marginal Effects	Coef. (sd)	Marginal Effect
Age of Head	.0316309 (.0226058)	.0090767	.0342085 (.0239457)	.0142533
Age of Spouse	-.0143007 (.0231193)	-.0026638	-.0045557 (.0234988)	-.0020225
Age head square	-.000282 (.0002245)	-.0000779	-.0004385 (.0002381)	-.000171
Age spouse square	.0001226 (.0002398)	.0000219	.000223 (.0002426)	.0000789
Presence of preschool children	-.2118922 (.1122162)	-.0636905	-.2870172** (.112257)	-.0914208
Presence of School-aged Children	-.0256057 (.0907896)	-.0006919	.1295736 (.0899292)	.0374792
Number of children	.1370123*** (.0377563)	.0464609	.1721857*** (.0373934)	.0620116
Head has some collage education	.1705358*** (.0663318)	.0668858	.1931442*** (.0655986)	.0738992
Head is collage graduate	.4100931*** (.0757316)	.1453559	.2853938*** (.0766154)	.1191481
Head has advanced education	.5078886*** (.0914918)	.1810783	.2737571*** (.0941309)	.1233479
Head is African-American	-.5014655** (.2099703)	-.1711985	-.3219837 (.1907071)	-.1002501
Head is Catholic	.1649243 (.1007037)	.0565262	.3250217*** (.1002871)	.1127942
Head is Hispanic	-.159573 (.1614542)	-.0683088	-.2802345 (.1563892)	-.0911037
Head is Protestant	.302548*** (.0875106)	.1057463	.3549848*** (.0876025)	.1170745
Spouse is African-American	.1280477 (.2104518)	.0842904	.0472777 (.1917498)	.0196739
Spouse is Catholic	-.1009283 (.1080588)	-.0419833	-.2376197** (.1063569)	-.0792253
Spouse is Hispanic	-.1972762 (.1642356)	-.043719	-.2273879 (.1578373)	-.0765234
Spouse is Protestant	.1255836 (.0954832)	.0308643	.0335071 (.0936776)	.0155993
Head is disabled	.0479916 (.2238864)	.0039572	-.232515 (.2303446)	-.0814359
Head is married	.3751768** (.1264609)	.4109775	.3865899*** (.1158627)	.1317065
Head is new in FU	.2306505 (.1817771)	.0657198	-.0743081 (.161541)	-.006895
Head is retired	.3095161 (.1741527)	.0932385	.105087 (.1776455)	.0451952
Head is working	.2367474 (.1291546)	.0781465	.1157162 (.1331236)	.0231996
Health head good	.4461664***	.1370583	.2959677***	.0735023

	(.0987361)		(.0938055)	
Health spouse good	-.0603746 (.0890115)	-.0195478	.0888261 (.0863167)	.0271133
Family Income	5.82e-08 (3.78e-07)	5.82e-08	1.96e-07 (3.83e-07)	9.08e-08
Wage of head	.0002907 (.0010291)	.0000891	.0005168 (.0009401)	.0000557
Wage of Spouse	.0020512 (.0015769)	.0008348	-.0017209 (.0012314)	-.0003403
Spouse has some collage education	.2679568*** (.0631486)	.093364	.2800442*** (.063617)	.0933788
Spouse is collage graduate	.3392342*** (.0794041)	.1289876	.4704016*** (.0790136)	.1560096
Spouse has advanced education	.4612673*** (.0969852)	.1818303	.5288706*** (.0952706)	.1678137
Spouse is disabled	.004784 (.2266061)	-.0118446	-.205404 (.1973714)	-.0529411
Spouse is new in FU	-.3638856** (.1711213)	-.0974036	.0372735 (.147161)	.0066849
Spouse is retired	-.0022622 (.131213)	.0240958	-.0071946 (.1262454)	-.017424
Spouse is working	.1584525** (.0668834)	.0459357	.0940509 (.0677259)	.0276467
Living in metropolitan	.0717073 (.0613859)	.0218459	.0991362 (.0616417)	.0231888
Living in rural	.3589285** (.1395262)	.137803	.2440596 (.1417615)	.0658173
_cons	-2.744331 (.3729621)	.137803	-2.998297 (.3602392)	

N=3219 Pseudo R²=0.1137

N=3228 Pseudo R²=0.1172

	Table 3.2 Probit regression-Spouse Volunteering2003		Table 3.4 Probit regression-Spouse Volunteering2005	
WYEAR2003(Spouse Volunteer)	Coef. (sd)	Marginal Effect	Coef. (sd)	Marginal Effect
Age of Head	.0336489 (.0220409)	.0091036	.0196093 (.0224853)	.010631
Age of Spouse	-.0149432 (.022543)	-.0021341	.00044 (.0223286)	-.0030786
Age head square	-.000249 (.0002169)	-.0000657	-.0002348 (.0002217)	-.000112
Age spouse square	.000091 (.0002317)	7.84e-06	.0000513 (.0002294)	.0000519
Presence of preschool children	-.3252326*** (.1112917)	-.1110619	-.2644876** (.1087588)	-.0938522
Presence of School-aged Children	.046789 (.0890045)	.0178043	.311127*** (.0874895)	.1237819
Number of children	.1496882*** (.0372431)	.0557565	.1480803*** (.0362676)	.0591686
Head has some collage education	.1789615*** (.0648481)	.0693637	.1962764*** (.0640462)	.0696006
Head is collage graduate	.2905817*** (.075171)	.1100265	.2987739*** (.075901)	.116092
Head has advanced education	.3687228*** (.0910421)	.1384475	.3439725*** (.0936029)	.1125355

Head is African-American	-.4589015** (.2038238)	-.1301542	-.0604053 (.1760239)	-.0324628
Head is Catholic	.0188777 (.0982548)	.0086441	.2176524** (.0974822)	.0785835
Head is Hispanic	-.4046185** (.1633276)	-.1349333	-.0963822 (.1507162)	-.0504008
Head is Protestant	.2224914** (.0851198)	.0818487	.2562303*** (.0849612)	.0894872
Spouse is African-American	.0587736 (.2043634)	.0107277	-.1111732 (.1776472)	-.0325374
Spouse is Catholic	.0636972 (.106328)	.0054837	.1023041 (.1045223)	.0177123
Spouse is Hispanic	-.0280707 (.1621121)	-.0132573	-.4717533*** (.154665)	-.1616623
Spouse is Protestant	.1836106 (.0945981)	.0495567	.2500243** (.093251)	.079228
Head is disabled	-.0167287 (.2164945)	.0512486	.2146165 (.2146683)	.115741
Head is married	.423344*** (.1251324)	.1107527	.1151664 (.1039157)	.1753467
Head is new in FU	.3771704** (.1860645)	.0044827	.0383124 (.1607363)	.005741
Head is retired	.2195239 (.1705474)	.0806764	.5904205*** (.1780279)	.1900999
Head is working	.2677254** (.125945)	.0971471	.4613585*** (.1373782)	.1270299
Health head good	.2565595*** (.0915677)	.093916	.0368369 (.0861788)	.007912
Health spouse good	.0944851 (.0876643)	.0339336	.2195356** (.0832053)	.0756457
Family Income	-5.69e-07 (4.68e-07)	-1.89e-07	-2.47e-07 (4.10e-07)	-9.22e-08
Wage of head	.0023918* (.0014016)	.0008372	.001967* (.001089)	.0005971
Wage of Spouse	.0006876 (.0014954)	.0003726	-.0029291 (.0015565)	-.0005625
Spouse has some collage education	.2535057*** (.0622066)	.0905474	.2977086*** (.0619851)	.1179364
Spouse is collage graduate	.48816*** (.078466)	.1831425	.5993034*** (.0781003)	.2254564
Spouse has advanced education	.5652614*** (.0964301)	.2165395	.5918423*** (.0955131)	.2349093
Spouse is disabled	-.122841 (.2267304)	-.0673074	.0445333 (.1787164)	.0161678
Spouse is new in FU	-.5193941** (.1757264)	-.1531808	-.3027897** (.1466939)	-.1170326
Spouse is retired	-.0096861 (.1274294)	.002024	-.0101586 (.1232277)	-.0199794
Spouse is working	.0713977 (.0651066)	.0116396	.1110601 (.0670026)	.0265228
Living in metropolitan	.0472834 (.0600689)	.0096815	-.0058071 (.0597716)	-.0006747
Living in rural	.2704706* (.1377379)	.1066727	.1790755 (.1402903)	.0560493
_cons	-2.615995 (.3629698)		-2.582655 (.3455667)	

N=3219 Pseudo R²=0.1172

N=3228 Pseudo R²=0.12945

TOBIT REGRESSION TABLES

DEPENDENT VARIABLE= HEAD/SPOUSE HOURS VOLUNTEERED ANUALLY (2003 AND 2005)

Table 4.1 Head Hourly Volunteer- All purposes2003		Table 4.3 Head Hourly Volunteer-All purposes2005
HOURS total-head	Coef. (sd)	Coef. (sd)
Age of Head	15.97448* (9.055344)	6.18802 (8.162038)
Age of Spouse	-13.91013 (9.224662)	.71355595 (8.002246)
Age head square	-.1543946* (.0897687)	-.0917414 (.0806756)
Age spouse square	.1707034* (.0952745)	.0502373 (.0818401)
Presence of preschool children	-72.966774* (43.792)	-66.90112** (37.63303)
Presence of School-aged Children	-16.07034 (35.25558)	19.4476 (29.60586)
Number of children	56.67432*** (14.43396)	47.89381*** (12.0329)
Head has some collage education	77.16144*** (25.91138)	68.2003*** (21.90372)
Head is collage graduate	126.8134*** (29.2592)	94.40443*** (25.30958)
Head has advanced education	177.4846*** (34.72422)	92.93385*** (30.47557)
Head is African-American	-191.1632*** (84.01097)	-128.8786** (64.53853)
Head is Catholic	86.35405*** (40.31419)	96.91719*** (34.29493)
Head is Hispanic	-101.5176 (65.82218)	-109.2266** (53.51927)
Head is Protestant	131.3613*** (35.20557)	119.4314*** (30.11286)
Spouse is African-American	108.2217 (83.74457)	96.91719* (64.68505)
Spouse is Catholic	-57.10494 (42.19631)	-80.13949*** (36.00952)
Spouse is Hispanic	.9744185 (65.49871)	-29.86395 (53.75434)
Spouse is Protestant	22.4302 (36.93256)	-5.370269 (31.48533)
Head is disabled	55.86202 (90.60603)	-94.02513 (78.1391)
Head is married	121.6247** (51.39416)	106.1681*** (40.81441)
Head is new in FU	96.40562 (72.25718)	-50.19164 (55.99183)
Head is retired	88.90681 (68.14304)	19.83459 (58.00602)
Head is working	58.77508 (51.53053)	28.90399 (43.61542)

Health head good	215.3942*** (40.65704)	67.68335** (30.73441)
Health spouse good	-33.16897 (34.78334)	36.87046 (28.92421)
Family Income	-.0000265 (.0001415)	.0000972 (.0001202)
Wage of head	.1160594 (.3515666)	-.0500942 (.3097507)
Wage of Spouse	.3837166 (.5288509)	-.5695947 (.3735031)
Spouse has some collage education	76.01662*** (24.788)	72.43401*** (21.33775)
Spouse is collage graduate	110.8966*** (30.2961)	95.62254*** (26.03103)
Spouse has advanced education	94.86567*** (36.61032)	106.8419*** (31.01433)
Spouse is disabled	-51.26449 (95.29434)	-49.63124 (65.73019)
Spouse is new in FU	-119.5292* (67.88131)	19.46907 (50.9968)
Spouse is retired	-32.16917 (50.1111)	-17.46671 (41.47545)
Spouse is working	53.99279** (25.55367)	5.598819 (22.31922)
Living in metropolitan	33.73458 (23.82423)	35.30952** (20.37048)
Living in rural	42.31533 (52.91611)	59.38718 (47.39636)
Cons	-1044.719 (149.94)	-862.972 (122.8277)

N=3219 Pseudo R²=0.0214

N=3228 Pseudo R²=0.0204

Table 4.2 Spouse Hourly Volunteer-All purposes2003		Table 4.4 Spouse Hourly Volunteer-All purposes2005
HOURS total-spouse2003	Coef. (sd)	Coef. (sd)
Age of Head	7.570455 (7.009639)	4.873301 (6.396525)
Age of Spouse	-2.22212 (7.20518)	-.9610924 (6.32364)
Age head square	-.0612975 (.0686364)	-.0638036 (.0630418)
Age spouse square	.0151652 (.0737386)	.029566 (.0646779)
Presence of preschool children	-90.78173** (34.61298)	-92.17341*** (30.37584)
Presence of School-aged Children	.1438388 (27.60019)	53.88813** (23.72377)
Number of children	41.11209*** (11.39692)	42.12304*** (9.64824)
Head has some collage education	73.6607*** (20.10585)	48.19872*** (17.65064)
Head is collage graduate	81.53183*** (23.05979)	53.9856*** (20.49676)
Head has advanced education	107.5229*** (27.40504)	71.75982*** (24.87633)

Head is African-American	-121.0088** (64.20014)	72.07146 (49.49771)
Head is Catholic	5.284977 (30.71276)	51.6921** (27.19004)
Head is Hispanic	-139.3005*** (52.19337)	-40.75374 (42.37233)
Head is Protestant	63.65945*** (26.55094)	64.4478*** (23.77604)
Spouse is African-American	41.20758 (64.17889)	-63.10433 (49.94231)
Spouse is Catholic	2.065945 (32.96385)	-4.9295 (29.10272)
Spouse is Hispanic	51.46048 (50.90626)	-67.74527* (43.65985)
Spouse is Protestant	47.05759* (29.17039)	46.88976* (25.79842)
Head is disabled	68.90316 (59.39937)	96.64547 (72.35824)
Head is married	138.896*** (36.9897)	29.16491 (36.36654)
Head is new in FU	124.0315** (60.01981)	-.3167854 (47.25453)
Head is retired	31.72084 (53.54589)	206.4723*** (49.5555)
Head is working	50.86467 (40.13075)	166.4123*** (39.13675)
Health head good	72.81434** (29.0361)	-18.09107 (23.57661)
Health spouse good	41.79976* (27.60488)	66.78407*** (23.29404)
Family Income	-.0002057 (.0001247)	-.0000514 (.0000996)
Wage of head	.6151006** (.3023232)	.6588726** (.2361556)
Wage of Spouse	.0679557 (.4295106)	-.9255838 (.3870284)
Spouse has some collage education	69.40897*** (19.42012)	72.72813*** (17.23282)
Spouse is collage graduate	115.9*** (23.83095)	145.6416*** (21.08635)
Spouse has advanced education	155.9084*** (28.69477)	183.5425*** (25.0879)
Spouse is disabled	-26.30553 (73.46899)	33.473 (49.74555)
Spouse is new in FU	-163.6906*** (56.57444)	-81.34479** (43.31923)
Spouse is retired	47.19409 (38.64774)	8.804933 (33.33563)
Spouse is working	-2.571638 (19.69107)	-12.13381 (18.03481)
Living in metropolitan	5.684087 (18.44027)	-.4156132 (16.28786)
Living in rural	50.33258 (40.83288)	29.66774 (38.43332)
cons	-761.3991 (116.8589)	-666.3602 (97.68418)

N=3219 Pseudo R²=0.022

N=3228 Pseudo R²=0.0245

HECKMAN SAMPLE SELECTION REGRESSION TABLES

Table 4.5 HECKMAN TABLE FOR HEAD YEARS 2003-2005

HEAD HOURS VOLUNTEERED 2003- 2005	Coef. (sd)	Coef. (sd)
Age of Head	31.45839 (27.18408)	11.87801 (27.71337)
Age of Spouse	-32.30514 (22.85766)	6.074114 (22.02546)
Age head square	-.3035204 (.2603151)	-.1839039 (.3035169)
Age spouse square	.3898536 (.2341239)	.0704721 (.2475613)
Presence of preschool children	-115.4466 (151.1538)	-135.4699 (166.6257)
Presence of School-aged Children	13.57997 (79.90962)	76.72653 (98.08166)
Number of children	96.34255 (78.76007)	108.0065 (84.60312)
Head has some collage education	133.3207 (115.3153)	150.9739 (111.6407)
Head is collage graduate	248.6793 (232.4899)	213.2838 (149.8287)
Head has advanced education	329.9785 (281.5061)	200.3994 (155.0794)
Head is African-American	-332.164 (336.8145)	-307.0057 (232.7182)
Head is Catholic	111.623 (123.0473)	222.4516 (179.7197)
Head is Hispanic	-155.1781 (167.3345)	-244.9645 (202.2864)
Head is Protestant	197.77 (177.006)	268.1176 (187.6444)
Spouse is African- American	166.5552 (210.8909)	223.7086 (176.9334)
Spouse is Catholic	-73.00085 (108.2652)	-152.4194 (148.401)
Spouse is Hispanic	-34.87574 (180.6886)	-116.722 (181.2415)
Spouse is Protestant	65.24509 (107.7842)	14.83182 (84.8802)
Head is disabled	215.2294 (212.0869)	-192.2539 (250.0346)
Head is married	196.8196 (262.3721)	220.982 (237.0179)
Head is new in FU	189.1639 (210.7005)	-117.3345 (152.1957)
Head is retired	168.3678 (230.6766)	62.69322 (171.2201)
Head is working	106.7564 (176.3586)	59.05461 (134.9776)
Health head good	399.6284 (271.7107)	163.6372 (172.4471)
Health spouse good	-36.35614 (85.2051)	116.6765 (93.68676)
Family Income	-.0000772 (.000315)	.0000907 (.0003001)

Wage of head	.1986331 (.7329372)	.3029124 (.716083)
Wage of Spouse	.8611787 (1.521706)	-1.394888 (1.478508)
Spouse has some collage education	154.232 (158.7319)	170.4678 (148.4647)
Spouse is collage graduate	203.3841 (194.3245)	236.8071 (230.6431)
Spouse has advanced education	208.4754 (256.2724)	279.8433 (256.6621)
Spouse is disabled	-97.44009 (211.1414)	-58.12585 (205.9113)
Spouse is new in FU	-252.7644 (254.3292)	44.63119 (135.4031)
Spouse is retired	-82.62989 (114.7452)	-26.93908 (111.7438)
Spouse is working	87.00167 (104.3647)	33.69793 (77.81875)
Living in metropolitan	59.48582 (66.61716)	88.38074 (72.44781)
Living in rural	133.6622 (222.4306)	156.5912 (166.768)
_cons	-2137.727 (2170.913)	-2478.843 (2025.5)
HEAD VOLUNTEER DECISION 2003-2005		
Age of Head	.0316309 (.0226058)	.0342085 (.0239457)
Age of Spouse	-.0143007 (.0231193)	-.0045557 (.0234988)
Age head square	-.000282 (.0002245)	-.0004385 (.0002381)
Age spouse square	.0001226 (.0002398)	.000223 (.0002426)
Presence of preschool children	-.2118922 (.1122162)	-.2870172** (.112257)
Presence of School-aged Children	-.0256057 (.0907896)	.1295736 (.0899292)
Number of children	.1370123*** (.0377563)	.1721857*** (.0373934)
Head has some collage education	.1705358*** (.0663318)	.1931442*** (.0655986)
Head is collage graduate	.4100931*** (.0757316)	.2853938*** (.0766154)
Head has advanced education	.5078886*** (.0914918)	.2737571*** (.0941309)
Head is African-American	-.5014655** (.2099703)	-.3219837 (.1907071)
Head is Catholic	.1649243 (.1007037)	.3250217*** (.1002871)
Head is Hispanic	-.159573 (.1614542)	-.2802345 (.1563892)
Head is Protestant	.302548*** (.0875106)	.3549848*** (.0876025)
Spouse is African-American	.1280477 (.2104518)	.0472777 (.1917498)
Spouse is Catholic	-.1009283 (.1080588)	-.2376197** (.1063569)
Spouse is Hispanic	-.1972762	-.2273879

	(.1642356)	(.1578373)
Spouse is Protestant	.1255836 (.0954832)	.0335071 (.0936776)
Head is disabled	.0479916 (.2238864)	-.232515 (.2303446)
Head is married	.3751768** (.1264609)	.3865899*** (.1158627)
Head is new in FU	.2306505 (.1817771)	-.0743081 (.161541)
Head is retired	.3095161 (.1741527)	.105087 (.1776455)
Head is working	.2367474 (.1291546)	.1157162 (.1331236)
Health head good	.4461664*** (.0987361)	.2959677*** (.0938055)
Health spouse good	-.0603746 (.0890115)	.0888261 (.0863167)
Family Income	5.82e-08 (3.78e-07)	1.96e-07 (3.83e-07)
Wage of head	.0002907 (.0010291)	.0005168 (.0009401)
Wage of Spouse	.0020512 (.0015769)	-.0017209 (.0012314)
Spouse has some collage education	.2679568*** (.0631486)	.2800442*** (.063617)
Spouse is collage graduate	.3392342*** (.0794041)	.4704016*** (.0790136)
Spouse has advanced education	.4612673*** (.0969852)	.5288706*** (.0952706)
Spouse is disabled	.004784 (.2266061)	-.205404 (.1973714)
Spouse is new in FU	-.3638856** (.1711213)	.0372735 (.147161)
Spouse is retired	-.0022622 (.131213)	-.0071946 (.1262454)
Spouse is working	.1584525** (.0668834)	.0940509 (.0677259)
Living in metropolitan	.0717073 (.0613859)	.0991362 (.0616417)
Living in rural	.3589285** (.1395262)	.2440596 (.1417615)
_cons	-2.744331 (.3729621)	-2.998297 (.3602392)
mills		
lambda	839.79 (761.8482)	867.0403 (667.3072)
rho	1.00000	1.00000
sigma	839.79001	867.04028
lambda	839.79001 (761.8482)	867.04028 (667.3072)

Table 4.6 HECKMAN TABLE FOR SPOUSE YEARS 2003-2005

SPOUSE HOURS VOLUNTEERED 2003-2005	Coef. (sd)	Coef. (sd)
Age of Head	.9913661 (9.627225)	5.770116 (7.867225)
Age of Spouse	.3663543 (8.027912)	-3.757302 (7.238957)
Age head square	-.0122153 (.0850754)	-.0722145 (.0792556)
Age spouse square	.0037318 (.0790524)	.0641015 (.0745252)
Presence of preschool children	-69.17903 (68.30267)	-102.8342 (46.53288)
Presence of School- aged Children	-8.713606 (28.42474)	19.2754 (45.97863)
Number of children	30.64612 (28.80517)	44.11294 (20.73635)
Head has some collage education	76.63151 (41.06146)	38.05417 (32.42073)
Head is collage graduate	65.42998 (59.15591)	26.30474 (43.29049)
Head has advanced education	81.04695 (73.23871)	38.28257 (51.70547)
Head is African- American	-41.27853 (108.4978)	154.3543 (56.22248)
Head is Catholic	17.11017 (29.91425)	35.4005 (40.6595)
Head is Hispanic	-101.2382 (94.745)	-44.81398 (46.90095)
Head is Protestant	50.76809 (47.66288)	44.18766 (41.9508)
Spouse is African- American	30.24214 (68.24857)	-95.35775 (56.68496)
Spouse is Catholic	-14.0859 (33.77007)	-30.07583 (33.34818)
Spouse is Hispanic	84.5075 (49.80227)	2.934398 (81.17284)
Spouse is Protestant	32.88959 (43.43495)	25.20543 (42.04632)
Head is disabled	232.4566 (78.50825)	89.44538 (76.51637)
Head is married	124.9538 (100.9816)	.3088705 (39.35144)
Head is new in FU	130.3372 (96.70069)	5.679425 (53.55627)
Head is retired	-28.14074 (68.83237)	174.0751 (98.78424)
Head is working	-7.401242 (66.82344)	149.4123 (78.20127)
Health head good	49.36511 (60.40742)	-42.95474 (27.7796)
Health spouse good	55.44745 (34.92451)	53.12236 (41.63961)
Family Income	-.0001771 (.0001393)	-.000037 (.0001063)
Wage of head	.4347349	.5881905

	(.3872241)	(.3003902)
Wage of Spouse	-.1163761 (.3718008)	-.9309595 (.6346733)
Spouse has some collage education	32.49141 (52.03044)	42.7038 (45.01692)
Spouse is collage graduate	59.40282 (90.97846)	113.906 (79.86942)
Spouse has advanced education	99.65009 (104.5425)	161.4538 (79.71004)
Spouse is disabled	7.436755 (84.69815)	65.31653 (56.72418)
Spouse is new in FU	-167.9369 (115.6295)	-80.58679 (64.17002)
Spouse is retired	103.0778 (40.58848)	32.48438 (36.84133)
Spouse is working	-26.33028 (23.10031)	-48.36086 (24.35267)
Living in metropolitan	-6.140674 (20.08426)	4.503814 (17.24626)
Living in rural	4.339384 (62.99378)	13.22643 (44.60005)
_cons	-392.842 (729.5234)	-397.3147 (517.7065)
SPOUSE VOLUNTEER DECISION 2003-2005		
Age of Head	.0336489 (.0220409)	.0196093 (.0224853)
Age of Spouse	-.0149432 (.022543)	.00044 (.0223286)
Age head square	-.000249 (.0002169)	-.0002348 (.0002217)
Age spouse square	.000091 (.0002317)	.0000513 (.0002294)
Presence of preschool children	-.3252326*** (.1112917)	-.2644876** (.1087588)
Presence of School-aged Children	.046789 (.0890045)	.311127*** (.0874895)
Number of children	.1496882*** (.0372431)	.1480803*** (.0362676)
Head has some collage education	.1789615*** (.0648481)	.1962764*** (.0640462)
Head is collage graduate	.2905817*** (.075171)	.2987739*** (.075901)
Head has advanced education	.3687228*** (.0910421)	.3439725*** (.0936029)
Head is African-American	-.4589015** (.2038238)	-.0604053 (.1760239)
Head is Catholic	.0188777 (.0982548)	.2176524** (.0974822)
Head is Hispanic	-.4046185** (.1633276)	-.0963822 (.1507162)
Head is Protestant	.2224914** (.0851198)	.2562303*** (.0849612)
Spouse is African-American	.0587736 (.2043634)	-.1111732 (.1776472)
Spouse is Catholic	.0636972 (.106328)	.1023041 (.1045223)

Spouse is Hispanic	-.0280707 (.1621121)	-.4717533*** (.154665)
Spouse is Protestant	.1836106 (.0945981)	.2500243** (.093251)
Head is disabled	-.0167287 (.2164945)	.2146165 (.2146683)
Head is married	.423344*** (.1251324)	.1151664 (.1039157)
Head is new in FU	.3771704** (.1860645)	.0383124 (.1607363)
Head is retired	.2195239 (.1705474)	.5904205*** (.1780279)
Head is working	.2677254** (.125945)	.4613585*** (.1373782)
Health head good	.2565595*** (.0915677)	.0368369 (.0861788)
Health spouse good	.0944851 (.0876643)	.2195356** (.0832053)
Family Income	-5.69e-07 (4.68e-07)	-2.47e-07 (4.10e-07)
Wage of head	.0023918* (.0014016)	.001967* (.001089)
Wage of Spouse	.0006876 (.0014954)	-.0029291 (.0015565)
Spouse has some collage education	.2535057*** (.0622066)	.2977086*** (.0619851)
Spouse is collage graduate	.48816*** (.078466)	.5993034*** (.0781003)
Spouse has advanced education	.5652614*** (.0964301)	.5918423*** (.0955131)
Spouse is disabled	-.122841 (.2267304)	.0445333 (.1787164)
Spouse is new in FU	-.5193941** (.1757264)	-.3027897** (.1466939)
Spouse is retired	-.0096861 (.1274294)	-.0101586 (.1232277)
Spouse is working	.0713977 (.0651066)	.1110601 (.0670026)
Living in metropolitan	.0472834 (.0600689)	-.0058071 (.0597716)
Living in rural	.2704706* (.1377379)	.1790755 (.1402903)
_cons	-2.615995 (.3629698)	-2.582655 (.3455667)
mills		
Lambda	170.5451 (271.158)	186.3068 (193.809)
rho	0.66913	0.72782
sigma	254.87728	255.97849
lambda	170.54508 (271.158)	186.30677 (193.809)

FIRST DIFFERENCE REGRESSION TABLES

**DEPENDENT VARIABLE 1= HEAD/SPOUSE VOLUNTEER DECISION2005-
HEAD/SPOUSE VOLUNTEER DECISION2003**

**DEPENDENT VARIABLE 2= HEAD/SPOUSE HOURS VOLUNTEERED2005-
HEAD/SPOUSE HOURS VOLUNTEERED2003**

Table 5.1		Table 5.2	
Head Yearly Volunteering Decision- First Difference	Coef. (sd)	Spouse Yearly Volunteering Decision- First Difference	Coef. (sd)
Head gets married	-.0484383 (.0632933)	Health condition change	.043044* (.0248357)
Health condition change	.0177296 (.0250244)	Disability condition change	.0403125 (.0594593)
Disability condition change	.006324 (.0574153)	Working condition change	.0225098 (.0202387)
Working condition change	.0324173 (.0299061)	Spouse in the FU	.0517052* (.0240303)
Wage of head change	-.0000671 (.0002732)	Family income change	4.44e-09 (1.22e-07)
Head in the FU	.0379526 (.0265068)	Spouse gets retired	-.0379162 (.0399588)
Family income change	1.84e-08 (1.31e-07)	Wage of spouse change	-.0000583 (.0002877)
Head gets divorced	.025269 (.0979293)	Number of children change	.0035542 (.0144367)
Head gets retired	-.0579076 (.0510849)	_cons	.0490828 (.0085985)
Number of children change	.0056037 (.0137635)		
_cons	.0223095 (.0081948)		

N= 3674 R²= 0.0025

N= 3662 R²= 0.003

Table 5.3		Table 5.4	
Head Yearly Volunteering- First Difference _HOURS	Coef. (sd)	Spouse Yearly Volunteering- First Difference _HOURS	Coef. (sd)
Head gets married	-36.3888 (23.03968)	Spouse Health condition change	.6499488 (9.919861)
Head Health condition change	-.3410048 (10.8877)	Spouse Disability condition change	44.14178 (23.50563)
Head Disability condition change	4.324593 (24.66094)	Spouse Working condition change	-.5651848 (8.026921)
Head Working condition change	9.287872 (12.88527)	Spouse in the FU	-4.72877 (17.65427)
Wage of head change	-.447166*** (.1172654)	Spouse is retired	28.70866 (15.9079)
Head is new in FU	9.744497	Wage of Spouse change	.0471684

	(21.02859)		(.1139749)
Family income change	.0000246* (.0000564)	Head gets married	-4.697179 (21.95296)
Head gets retired	-35.92699 (22.01898)	Head Health condition change	-12.3853 (10.37416)
Spouse Health condition change	-.5945621 (10.41091)	Head Disability condition change	-2.280799 (23.49775)
Spouse Disability condition change	7.433791 (24.6692)	Head Working condition change	3.935158 (12.27751)
Spouse Working condition change	2.82295 (8.424269)	Wage of head change	.1574486 (.1117343)
Spouse is new in FU	-22.69338 (18.52819)	Head is new in FU	12.57296 (20.03673)
Spouse gets retired	10.6912 (16.69537)	Family income change	-.0000194 (.0000537)
Wage of Spouse change	.0596803 (.1196169)	Head gets retired	-16.41349 (20.98041)
Number of children change	12.11187 (5.986198)	Number of children change	3.13439 (5.703846)
_cons	.4366334 (3.588099)	_cons	1.123456 (3.418859)

N= 3655 R²= 0.0098

N= 3655 R²= 0.0012

VARIABLE	Table 5.5 Total hours- First Difference	Table 5.6 Family Total Volunteer Decision-First Difference
	Coef. (sd)	Coef. (sd)
Head gets married	165.9977 (720.121)	-11.1718 (25.54297)
Head Health condition change	-1.579856 (282.024)	12.02362 (10.0035)
Head Disability condition change	203.4778 (638.7289)	20.97221 (22.65596)
Head Working condition change	432.7709 (333.6992)	12.21387 (11.83644)
Wage of head change	-0.2894022*** (0.1914918)	-.0082563 (.1077197)
Head in the FU	273.7214 (544.6096)	1.255696 (19.31751)
Family income change	.0044019*** (.0014601)	-.0000808 (.0000518)
Head gets divorced	111.8625 (1105.167)	13.35415 (39.20069)
Head Retirement condition change	28.97559 (570.2345)	19.2083 (20.22644)
Spouse Health condition change	-53.06133 (269.735)	-12.7434 (9.567605)
Spouse Disability condition change	239.9089 (638.8639)	33.09785 (22.66075)
Spouse Working condition change	.5925034 (218.1917)	-.3308826 (7.739344)
Spouse in the FU	-220.0966 (480.1608)	-2.908548 (17.03149)
Spouse Retirement condition change	592.9598 (432.3645)	7.81253 (15.33613)
Wage of spouse change	1.929645	.0838803

	(3.097761)	(.1098788)
Number of children change	-60.31265 (155.1169)	5.814923 (5.502057)
_cons	-214.2663 (92.93315)	-3.611875 (3.296374)

N= 3655 R²= 0.0034

N= 3655 R²= 0.0309

BIPROBIT REGRESSION TABLES

DEPENDENT VARIABLE= FAMILY DONATION DECISION AND HEAD/SPOUSE VOLUNTEER DECISION

Table 6.1 2003 BIPROBIT REGRESSION

HEAD		
	Coef. (sd)	Marginal Effect
Family Donation Decision		
Age of Head	-.0075805 (.0075171)	0.000171
Age of Head square	.000127 (.0000756)	2.68e-06
Head is Protestant	.0473642 (.0357129)	0.048
Head is married	.2628214*** (.055049)	0.08
Living in Metropolitan	.0805307*** (.0382921)	-0.0201
Health head good	.1393911*** (.0547117)	0.071
Head is new in FU	-.2283564*** (.0491009)	-0.072
Head has some collage education	.2687952*** (.0429224)	0.101
Head is collage graduate	.4689144*** (.0547049)	0.198
Head has advanced education	.4598153*** (.0693932)	0.261
Presence of preschool children	-.0714824 (.0676874)	-0.017
Presence of School-aged children	-.0667613 (.0589662)	0.019
Head is working	.2883244*** (.0417974)	0.042
Head is disabled	-.3086877*** (.095802)	-0.039
Wage of head	-.0029804*** (.0010511)	-00001
Family Income	3.86e-06*** (6.23e-07)	5.30e-07
Number of children	-.0382969 (.0229263)	0.0041
_cons	-.5401654 (.1912989)	
Head Volunteer Decision		
Age of Head	.0037595 (.0082187)	

Age of Head square	-.0000373 (.0000819)
Head is Protestant	.2107872*** (.0382704)
Head is married	.3524085*** (.0682337)
Living in Metropolitan	-.1258036*** (.041544)
Health head good	.3145854*** (.0650976)
Head is new in FU	-.2773076*** (.0563548)
Head has some collage education	.3302204*** (.0458068)
Head is collage graduate	.5980155*** (.0532402)
Head has advanced education	.7920823*** (.0656288)
Presence of preschool children	-.0523232 (.0729366)
Presence of School-aged children	.1174749 (.0612711)
Head is working	.0867965 (.046309)
Head is disabled	-.0626579 (.1120371)
Wage of head	.0006102 (.0008147)
Family Income	9.44e-07 (4.84e-07)
Number of children	.0343918 (.0241915)
_cons	-1.79098 (.2169753)

RHO: 0.2103 Chi-square(1) =77.32

SPOUSE

	Coef. (sd)
Family Donation Decision	
Age of Spouse	-.0104912 (.007902)
Age of spouse square	.0001831** (.0000833)
Spouse is protestant	.0410247 (.0373872)
Living in Metropolitan	.0837709** (.0388871)
Health spouse good	.1181445** (.0547708)
Spouse is new in FU	-.2374506*** (.047422)
Spouse has some collage education	.2545679*** (.0435584)
Spouse is collage graduate	.4703876*** (.0565089)
Spouse has advanced education	.4687204*** (.06898)
Presence of preschool children	.0127823

	(.0693902)
Presence of School-aged children	-.0040912 (.0598046)
Spouse is working	.4475371*** (.0357661)
Spouse is disabled	-.1124067 (.1604021)
Wage of spouse	-.0008941 (.0013577)
Family Income	3.10e-06*** (6.4e-07)
Number of children	-.059336*** (.0228972)
_cons	-.2279117 (.1887728)
Spouse Volunteer Decision	
Age of Spouse	.0095389 (.0083694)
Age of spouse square	-.000105 (.0000882)
Spouse is protestant	.1344237*** (.0387713)
Living in Metropolitan	-.1032203*** (.0405735)
Health spouse good	.2323076*** (.0613189)
Spouse is new in FU	-.3355279*** (.0521883)
Spouse has some collage education	.3335206*** (.0449932)
Spouse is collage graduate	.5268045*** (.0531366)
Spouse has advanced education	.7450607*** (.0651839)
Presence of preschool children	-.12409 (.0717562)
Presence of School-aged children	.1607246** (.0600731)
Spouse is working	.1130654*** (.0361469)
Spouse is disabled	-.1514181 (.1830746)
Wage of spouse	.0006777 (.0013022)
Family Income	1.54e-06*** (4.68e-07)
Number of children	.0544462*** (.023027)
_cons	-1.354132 (.2045421)

RHO: 0.1959 Chi-square(1) =70.32

Table 6.2 HEAD-SPOUSE 2005 BIPROBIT REGRESSION

HEAD	
	Coef. (sd)
Family Donation Decision	
Age of Head	-.0047714 (.0073881)
Age of Head square	.0001102 (.000074)
Head is Protestant	.0956925*** (.0346881)
Head is married	.2255105*** (.0508675)
Living in Metropolitan	.0734553 (.0387721)
Health head good	.1458832*** (.0532041)
Head is new in FU	-.1291376*** (.0495856)
Head has some collage education	.253261*** (.0418953)
Head is collage graduate	.4056777*** (.0534706)
Head has advanced education	.4379145*** (.0699382)
Presence of preschool children	-.0119482 (.064954)
Presence of School-aged children	-.0108398 (.0571789)
Head is working	.2586357*** (.0424659)
Head is disabled	-.3938993*** (.089168)
Wage of head	.0023092 (.0014715)
Family Income	1.62e-06** (6.35e-07)
Number of children	-.0270988 (.0214968)
_cons	-.6056844 (.1885275)
Head Volunteer Decision	
Age of Head	.0285349*** (.0077377)
Age of Head square	-.0002322*** (.0000771)
Head is Protestant	.2271058*** (.0375301)
Head is married	.2228905*** (.0601076)
Living in Metropolitan	.0248417 (.0410008)
Health head good	.2171375*** (.0584753)
Head is new in FU	-.1158458**

	(.0546962)
Head has some collage education	.3517398*** (.0442951)
Head is collage graduate	.6379829*** (.0515231)
Head has advanced education	.7187167*** (.065704)
Presence of preschool children	-.1471342** (.0705511)
Presence of School-aged children	.2333887*** (.0608604)
Head is working	.1184455*** (.0460875)
Head is disabled	.1321132 (.0943336)
Wage of head	.0004445 (.0007282)
Family Income	4.75e-07 (3.15e-07)
Number of children	.100371*** (.0231384)
_cons	-2.447973 (.2058321)

RHO: 0.1945 Chi-square(1) =70.36

SPOUSE

	Coef. (sd)	Marginal effect
Family Donation Decision		
Age of Spouse	-.0151849 (.007946)	0.0015
Age of spouse square	.0002476*** (.0000837)	4.37e-06
Spouse is protestant	.0241838 (.0360605)	0.07
Living in Metropolitan	.0879012** (.0393225)	-0.017
Health spouse good	.178769*** (.0496459)	0.082
Spouse is new in FU	-.1935983*** (.046854)	-0.095
Spouse has some collage education	.2450808*** (.0424484)	0.13
Spouse is collage graduate	.4342376*** (.0552227)	0.25
Spouse has advanced education	.4538038*** (.0726858)	0.25
Presence of preschool children	.0202548 (.0664084)	-0.008
School children	.0185357 (.0578093)	0.14
Spouse is working	.5121248*** (.0347345)	0.07
Spouse is disabled	.0780128 (.1411904)	-0.00007
Wage of spouse	.0007382 (.000888)	-0.0001

Family Income	1.92e-06*** (6.09e-07)	3.69e-07
Number of children	-.0280337 (.0216914)	0.0098
_cons	-.2351499 (.1859006)	
Spouse Volunteer Decision		
Age of Spouse	.0135324 (.0078417)	
Age of spouse square	-.0000987 (.0000817)	
Spouse is protestant	.2921265*** (.0378705)	
Living in Metropolitan	-.1151313*** (.039852)	
Health spouse good	.2913305*** (.0554484)	
Spouse is new in FU	-.3404572*** (.0493157)	
Spouse has some collage education	.4298939*** (.0431667)	
Spouse is collage graduate	.7294281*** (.0510134)	
Spouse has advanced education	.7043297*** (.0648284)	
Presence of preschool children	-.0463074 (.0694567)	
School children	.5709657*** (.0593509)	
Spouse is working	.0862569** (.0355012)	
Spouse is disabled	-.0351334 (.1555982)	
Wage of spouse	-.0011731** (.0005405)	
Family Income	6.40e-07*** (2.33e-07)	
Number of children	.0547693*** (.0225844)	
_cons	-1.684302 (.1952977)	

RHO: 0.1982 Chi-square(1) =74.88

Significance: *P<0.1 **P<0.05 ***P<0.01

Appendix B: Definitions of the variables

Age: The age of the individual.

Age square: Is $\text{age} \times \text{age}$, used to avoid non-linear effects.

Presence of pre-school children: Takes value 1 if a child or children ages between 0 and 5 is present in the family, 0 otherwise.

Presence of school-aged children: Takes value 1 if a child or children ages between 6 and 17 is present in the family, 0 otherwise.

Number of children: The total numbers of children in the family union.

Individual has some collage education: Is equal to 1 if the individual has 13-15 years of education and is equal to 0 otherwise.

Head is collage graduate: Is equal to 1 if the individual has 16 years of education and is equal to 0 otherwise.

Head has advanced education: Is equal to 1 if the individual has 17 and more years of education and is equal to 0 otherwise.

Individual is African-American/ Catholic/ Hispanic/ Protestant: Indicates the race and religious affiliation of the head and the spouse.

Individual is disabled: Is equal to 1 if the individual is disabled and is equal to 0 otherwise.

Head is married: Is equal to 1 if the individual is married and is equal to 0 if widowed, divorced or never-married.

Individual is new in FU: Is equal to 1 if the individual is new in the family union and is equal to 0 otherwise.

Individual is retired: Is equal to 1 if the individual is retired and is equal to 0 otherwise.

Individual is working: Is equal to 1 if the individual is working and is equal to 0 otherwise.

Health of the individual good: Is equal to 1 if the individual's health is good and is equal to 0 otherwise.

Living in metropolitan: Is equal to 1 if the individual is living in metropolitan areas (such that the population of the city is 1 million+), and is equal to 0 otherwise.

Living in rural: Is equal to 1 if the individual is living in rural areas, and is equal to 0 otherwise.

Wage of the individual: Wage in PSID data consists of, labor income and salaries, bonuses, overtime, tips, commissions and additional job income.

Family Income: Indicates the total family income of the previous year-Income in PSID data includes trade, rent, farm, interest, retirement and unemployment income, annuity, alimony, dividend income, child support.