Network for Studies on Pensions, Aging and Retirement

Netspar THESES

Daniel Andrés Pinzón Fonseca

The Relationship between Health and Employment

Empirical Study for USA

MSc Thesis 2011-059

The Relationship Between Health and Employment

Empirical Study for USA

Daniel Andrés Pinzón Fonseca
MSc. Health Economics Policy and Law
Erasmus University of Rotterdam
Master Thesis
Rotterdam, The Netherlands

August 2011

Abstract

This document examines the two-way relationship between health and employment and their dynamics using U.S. data from the PSID (Panel study of Income Dynamics). This study uses two dependent variables (Self-assessed health and Employment) which are estimated using a bivariate probit model to address the endogeneity problem present between them. The results show that there is a significant evidence of the existence of endogeneity and suggest that good health positively affects the probability of being employed (healthy people have 2.85% more chances to join the labour force than unhealthy people) and that there is a positive impact of being employed on the probability of reporting good health (employees have 0,07% more chances of being healthy than non-employees), however, the effect of employment status on health is found not significant.

1 Introduction

Nowadays, there is a global concern about an ageing population and its sustainability. This concern have made some governments to contemplate the possibility of incrementing the retirement age. This decision could amplify the labour market, however, health is needed to make this extra force efficient and hold or improve the productivity of the economy. This is one of the main points to study the relationship between health and employment, however, the endogeneity between these two markets makes this issue difficult.

Moreover, it is also important for governments and policy makers to understand the relationship between health and employment in order to create and implement more efficient socio-economic policies in terms of improving population's health via policies in the labour market and/or making the labour force more efficient via health policies (e.g. ensuring health care for everyone in the population).

This relationship has been studied for a long time and the researches in this field have mostly focused on the effect of employment on health (e.g. Dooley et al. [1996], Clark and Oswald [1994], Bambra and Eikemo [2009], Morris et al. [1994]) or on the effect of health on employment (e.g. Currie and Madrian [1999], Jakobsen and Larsen [2010], García-Gómez et al. [2010]). However, it has been demonstrated in other researches (e.g. Cobb et al. [1977], Leung and Wong [2002], Lindeboom and Kerkhofs [2009], Haan and Myck [2009]) that there is a two-way relationship between health and employment.

The literature have shown that the effect of health on employment (e.g. Dooley et al. [1996] is positive, Clark and Oswald [1994], Bambra and Eikemo [2009], Morris et al. [1994]) thus, healthy people are more likely to be employed than those who report to be in a poor health status (Pelkowski and Berger [2004]), moreover, García-Gómez et al. [2010] showed that health limitations increase the hazard of non-employment by 58% for men and by 39% for women. Furthermore, the decision to join or leave the labour market strongly depends on the individual's health status, because unhealthy people may decide to be or keep being non-employed due to their health status, or they can lose their job because of their low productivity.

Furthermore, it is also known that the effect of employment on health (e.g. Böckerman and Ilmakunnas [2007], Dooley et al. [1996], Clark and Oswald [1994], Bambra and Eikemo [2009], Morris et al. [1994]) is also positive. It has been shown that employed people usually report a better health status than those who are unemployed (in some studies authors use non-employed instead of unemployed), for instance, Rodriguez [2002] shows that full-time employed people with fixed-term contracts in Germany are about 42% more likely to report poor health than those who have permanent work contracts. Moreover, the lack of employment may impact individual's mental health and this can be reflected later in physical health problems (Jin et al. [1997]), Rohwedder and Willis [2010] have demonstrated that retirement is associated with a reduction of the memory score by about 4.7 units (on a scale ranging from 0 to 20) compared to those who continued working.

However, the relationship between health and employment is more complex than these one-way relationships. It has been demonstrated (Cai [2007], Brown et al. [2005]) that there is a double causality relationship between health and employment. However, the literature in this field is scarce, it is known that this two-way relationship generates an endogeneity problem which can be solved by means of simultaneous equations without imposing any exclusion restrictions on the explanatory variables (Leung and Wong [2002])). In the main studies it is found the article of Lindeboom and Kerkhofs [2009] studied this relationship for the Netherlands using a sample of older workers and Haan and Myck [2009] analyzed this relationship and their dynamics using a bivariate probit model and panel data for Germany. Because the scarce of this type of research overseas, this document attempts to extend the knowledge about this topic like Lindeboom and Kerkhofs [2009] and Haan and Myck [2009].

Thus, according to the points mentioned above, the aim of this document is to analyze the double causality found in health and employment and their dynamics providing evidence for The USA (United States) using the PSID (Panel Study of Income Dynamics) from 1985 to 2007 (18 waves). The results obtained in this study are congruent to the literature

showing the positive relationship between health and employment. Furthermore, the results show that a healthy person has a higher chance to be employed than an unhealthy person (an increase of 2,85% of the probability of being employed); they also show that an employed individual has an increase of 0,07% of the probability of reporting a good health status compared to a non-employed individual, however, the effect of employment on health is found to be not significant.

2 Literature Review

The relationship between health and employment has been studied in a large number of articles (e.g.Jin et al. [1997], Bambra and Eikemo [2009], Morris et al. [1994], García-Gómez et al. [2010], Currie and Madrian [1999], Leung and Wong [2002], Haan and Myck [2009]). These studies are divided in three groups, one is focused on the effect of health on employment, the other one is focused on the effect of employment on health and the other group takes into account the double causality between health and employment. In general terms, the majority of the studies have focused on the one- way causality and used cross-sectional data (e.g.Bambra and Eikemo [2009], Morris et al. [1994],Currie and Madrian [1999]) or longitudinal data (e.g. García-Gómez et al. [2010]). This document contributes to the group of studies focused on the two-way causality and provides evidence using panel data which allows to control for individual unobserved heterogeneity that could be correlated with the SAH (Self-Assessed Health), employment and their determinants, moreover, it allows to analyze the dynamics over time between health and employment.

2.1 Effects of Employment on Health

In this type of studies some authors (e.g. Jin et al. [1997], Furensgaard et al. [1983], Dooley et al. [1996], Clark and Oswald [1994]) have found a relationship between employment status and psychiatric problems such as depression and substance abuse. The article of Jin et al. [1997] compiles these effects in reviews and they suggest that unemployment and health are totally bound, as the studies have shown unemployment can cause several and major problems on the health status. People who are not employed are tending to generate cardiovascular, physical, medical and mental disorders. Moreover, Furensgaard et al. [1983] tested the psychosocial characteristics of a group of unemployed patients consecutively admitted to a psychiatric emergency department and found that also persons, who are under anxiety, can develop many other problems causing suicidal desires, alcohol consumption and physiological illness, that causes a huge problem in the whole society.

In the same line of studies, it is found that one of the health effects associated with unemployment is mental distress (Clark and Oswald [1994]) or mental illness, which usually results in admission to mental disorder clinics (Dooley et al. [1996]). Their results show that unemployment can cause various kinds of health complications for humans which can vary through etiological and pathological processes.

The effect of unemployment on health has also been studied using morbidity and mortality as a measure of health (Bambra and Eikemo [2009], Morris et al. [1994]). In this category of studies, Bambra and Eikemo [2009] used the European Social Survey from 2002 to

2004 within the population between 25 and 65 years-old for 23 countries (Scandinavian, Anglo-Saxon, Bismarckian, Southern and Eastern), to test the relationship between unemployment and self-reported health using risk morbidity and mortality as a measure for the health status, including the effect of social protection on the condition of unemployment. The survey demonstrated that all people who were unemployed had higher rates of mortality. Moreover, unemployed people reported higher rates of poor health than those who were employed. Furthermore, the results show that health problems predominately ocurred for women as for men and that women are more likely to receive less than the average wage replacement rates. Also Repetti et al. [1989] found this differential effect of gender on health, showing that employment among women is significantly related to better health (positive) and is significant. Furthermore, Morris et al. [1994] using a cohort study in Britain from 1978 to 1985 for middle-aged men, found that men who experienced unemployment were twice more likely to die than men who remained continuously employed, reporting a relative risk of 1,95.

In addition to these studies, Rohwedder and Willis [2010] analyzed the effect of retirement on cognition using cross-nationally comparable surveys of older people in The USA, England and 11 European countries for 2004. Acording to their findings, retirement is associated with a reduction of the memory score of about 4.7 units on a scale from 0 to 20 compared to those who continued working. The causal effect of retirement on health is identified by using a two-stage estimation method with public pension policies as instrumental variable. Furthermore, in contrast to Rohwedder and Willis [2010], Coe and Zamarro [2011] using two steps estiamtions and statutory retirement ages as instrumental variables, with data taken from the Survey of Health, Ageing and Retirement in Europe (SAHRE), they conclude that retirement induced by social security leads to a 0.35 point decrease in the probability of reporting to be in fair, bad or very bad health.

Moreover, other studies included probabilities and ordered health states (using logistic models in most cases) into the models (Böckerman and Ilmakunnas [2007], Rodriguez [2002]). Rodriguez [2002]) examined the impact of marginal employment based on panel data from Britain and Germany (1991-1993, including both temporary and part-time employment schemes where the measure of the perceived health status is used as the dependant variable. The results show that the health status of part-time workers with permanent contracts is not significantly different from those who are full-time employed. In contrast, fulltime employed people with fixed-term contracts in Germany are about 42% more likely to report poor health than those who have permanent work contracts. In Britain, only part-time work with no contract is associated with poor health, but the difference is not statistically significant.

2.2 Effects of Health on Employment

The studies focused on the effects of health on employment have demonstrated that decrements on health affect employment in a negative way (e.g. Bound et al. [1999], Blau and Gilleskie [2001], Lindeboom et al. [2006], Currie and Madrian [1999], Jakobsen and Larsen [2010], García-Gómez et al. [2010]). Zucchelli et al. [2010] used the HILDA (Houshold, Income and Labour Dynamics in Australia) from 2001 to 2006 to show that health shocks increase the propability of leaving the labour force by 50%, while in presence of limitations

the propability even increases to 122%. Furthermore, Bound et al. [1999], using the first 3 waves of the longitudinal Health and Retirement survey (HRS) (USA), have found that when a health shock occurs in early ages, it is less likely to lead to labour force exits. Moreover, they found evidence that only 30% of men remained in the labour force whose health was good in the second wave and then later declined.

In contrast to Bound et al. [1999], Lindeboom et al. [2006] have found that people who experienced bad health conditions during early childhood show a higher tendency to develop health deterioration during adulthood and to become non-employed than those who have not experienced bad conditions during childhood. They used data from the National Child Development Study (Great Britain) to develop their research. Using health shocks as instrumental variable they found a causal effect of disability on employment. As a result, they show that when disability occurs at the age of 25, the employment rate at the age of 40 is reduced by 21%.

Furthermore, following the same line of studies, García-Gómez et al. [2010] analysed the role played by health on the labour market in the working-age population using the BHPS (British Household Panel Survey) modeling by discrete-time duration models. The main findings of the authors highlight the high relevance of health as a determinant of employment transitions. They found a positive relationship between health and employment, showing that presences of health limitations increase the propability of leaving the labour force by 58% for men and by 39% for women. Moreover, they show that mental health decay increases the risk of non-employment and also mental health improvement does not increase the level of employment.

In addition to the studies mentioned above, Kalwij and Vermeulen [2008] using the Survey of Health, Ageing and Retirement in Europe (SAHRE) found that a man who reports a good health status has higher chances to participate in the labour force, between 13,2% in Greece and 28,8% in Germany, than a man who reports bad health status. Using the HRS,Blau and Gilleskie [2001] showed that in the USA the rate to enter the labour force is 7% lower for a man who reports a bad health status than for a man in fair health. Moreover, Jakobsen and Larsen [2010] examined in their paper the existence of the causal effect of health on employment and also that the effect differs for natives and immigrants in Denmark using Danish administrative data. In their results they show that new diagnoses indicating poor health reduce the probability of employment in about 46% for immigrants and by about 39% for Danish natives.

Apart from these studies, some authors (e.g. Currie and Madrian [1999], Pelkowski and Berger [2004]) have studied the effects of health on employment using wages as a proxy of employment. Studying the effect of health on wages, Currie and Madrian [1999] show empirical evidence of effects of health on the labour market activity, thus, they showed that poor health is related to lower wages which is caused by various channels. In general, health impacts the labour market outcomes through its direct effect on productivity, and indirectly by altering trade-offs between income and leisure but there is no clear evidence for the magnitude of the estimated relationship.

As Currie and Madrian [1999] showed empirically the relationship between poor health

and lower wages, Pelkowski and Berger [2004] have estimated the effect of temporary and permanent illness on the labor market outcomes using data from the National Longitudinal Surveys (NLS) of Older Men in 1976 and Mature Women in 1977 (USA). Their results show that current permanent health conditions have significant negative effects on the average hourly wages of workers. In terms of figures, the wages of permanently unhealthy males are about 6,4% lower than the wages of healthy males (7,2% in the case of females) and the number of working-hours is 6,4% lower for an unhealthy male than for a healthy one (3,9% in the case of females). They show as well that temporary bad health conditions have little impact on hourly wages or hours worked.

2.3 Two-way causality between Health and Employment

Some Authors (e.g. Cobb et al. [1977], Cai [2007], Lindeboom and Kerkhofs [2009], Haan and Myck [2009]) very often include the effect of causality and reverse causality of health and employment in an individual approach, showing that unemployment has an effect on the health status and health has an effect on employment as well.

The great majority of the studies in this group tackle the endogeneity problem by means of simultaneous equations. Lindeboom and Kerkhofs [2009] studied this endogenous relation for the Netherlands, using the Leiden University Center for Research on Retirement and Ageing (CERRA) panel survey for 1993 and 1995. They showed that financial incentives are important factors for the decision to stop working (pension reforms). Furthermore, they concluded that pension and social security reforms made in order to increase labour participation of elderly may have adverse effects on their health because the increased working efforts for older ages result in a deterioration of health. Moreover, Leung and Wong [2002], using a large cross-sectional data set, obtained from a survey of the Hong Kong population conclude that there is strong evidence that the health status is a significant determinant of employment, but not vice versa.

Other authors used different proxy variables to explain the relationship between health and employment, for example, Cai [2007] used wages as a proxy of labour market and Brown et al. [2005] used diabetes as a measure of health. Cai [2007] studied the effect of health on wages of working-age Australian men, mainly using the third wave of HILDA. Attempted to control the endogeneity problem and sample selection bias, the author estimated a simultaneous equation model for the two-way causality of health and employment. The results show that health has a positive and significant effect on wages (one unit of increase in health can raise wages by 9% to 12%) but the effect of wages on health is found insignificant. This relationship still holds when diabetes is used as a measure of health. In this case, Brown et al. [2005] showed that diabetes has negative impact on employment and labour productivity. They showed that the probability of employment of diabetics is 7,4% to 7,5% lower than for non-diabetics. Both studies demonstrated that there is evidence on the endogeneity of health arising from unobserved factors that could also affect employment.

Although there is a scarce of this kind of studies using panel data, Haan and Myck [2009] proposed a joint model of health and labour market risks which identifies the mechanism through which poor health contributes to the probability of being jobless and vice versa.

They used non-employment as the expression of labour market risk and Self-assessed health status (SAH) as a measure of health risk. Thus, they estimated a dynamic bivariate logit model in which they explained the joint distribution of unobserved heterogeneity in a non-parametric way. The analysis has been realized on the sample of German men aged 30-59 using the German Socio-Economic Panel (SOEP) data for the years 1996-2007 and the results confirm a strong and significant relationship between health and labour market risks. Authors found evidence for positive correlation in unobservable characteristics determining the two risks which indicates that a separate treatment would lead to an overestimation of the relationship and finally they found ceteris paribus a positive effect of poor health on the labour market risk.

This study contributes to the literature analyzing the endogenous relationship using a panel data for USA taking the working-age population into account. Therefore, apart from the relationship, it allows as well to study the dynamics of health and employment; moreover, it allows controlling for individual unobserved heterogeneity (individual fixed effects) taking in to account the whole range of working-age.

3 Data and Variables

3.1 Data

This study uses data from the Panel Study of Income Dynamics (PSID). The PSID started in 1968 collecting annual information from 5000 households in the United States. After 1997 the information has been collected every two years and covers topics as employment, health, income, education and others.

In this study, the data between 1985 and 2007 of the working-age population is considered, i.e. the population between 16 and 65 years-old. However, because of the structure of the PSID, the sample is divided in two sub-samples: the first one uses biannual data from 1985 to 2007 (main sample) and the second one uses annual data from 1985 to 1997 (comparative sample).

3.2 Variables

3.2.1 Health: Self-assessed Health (SAH)

In order to analyze the individual's health status, there is a question in the PSID's questionnaire where the individual is asked to values its own health at the time of the interview by choosing one of the following five options: Excellent (1), Very Good (2), Good (3), Fair (4) and Poor (5).

Because of the econometric specification of the model, these five categories are recategorized into two categories. The first one collects the following categories: Excellent, Very Good and Good; and the second one collects the remainig two options.

3.2.2 Employment

The employment status is collected in interviews by asking the individual about its current situation, offering eight options: (1) Working now, (2) Only temporarily laid off, sick leave or maternity leave, (3)Looking for work, unemployed, (4) Retired, (5) Permanently disabled, temporarily disabled, (6) Keeping house, (7) Student and (8) Other.

These categories are reorganized into two categories. One of the new categories is Employed which collects the category (1) Working now; and the other is non-employed which collects the other seven categories.

3.2.3 Socio-Economic and Socio-Demographic variables

These kind of variables are used as control variables because they can influence the individual's health and employment status. The Socio-economic variables are *Own*, as explained in table 1, and the logarithm of the total household income in every single period of time. The latter variable is adjusted by the consumer price index.

The variables summerized as the Socio-Demographic variables are: Age, Sex, Marital Status (Single, Widowed, Divorced or Separated and the base category is Married), Race (White, Black and the base category is Other), Number of household members and Health Insurance. Variables' names and description are represented in table 1.

Table 1: Variables included in the study

Variable	**Description**
Age	Age of the Individual (in years).
Disability	1 If the individual has any physical or nervous condition that limits the type or amount of work, 0 Otherwise.
Education	Years of Schooling.
Employment	1 If the Individual is employed, 0 Otherwise.
Health	1 If the Self Auto-reported Health Status is good or very good, 0 Otherwise.
Health Insurance	1 If the Individual is covered by an insurance, 0 Otherwise.
log(Income)	Logarithm of total household Income.
# Members Fu	Number of Household members.
Own	1 If the individual lives in its own house, 0 Otherwise.
Sex	1 If the individual is Male, 0 if Female.
MARITAL STATUS	
Married	1 If the individual is Married, 0 Otherwise. (Reference Category)
Single	1 If the individual is Single, 0 Otherwise.
Widowed	1 If the individual is Widowed, 0 Otherwise.
Divorced	1 If the individual is Divorced, 0 Otherwise.
Separated	1 If the individual is Separated, 0 Otherwise.

continued on next page

continued from previous page

Variable	Description
RACE	.
White	1 if the race of the individual is White, 0 otherwise.
Black	1 if the race of the individual is Black, 0 otherwise.
Other	1 if the race of the individual is not White neither Black, 0 otherwise. (Reference Category)

3.3 Descriptive statistics

Table 2[1] represents the descriptive statistics of: the whole sample, the people who reported to be employed/non-employed, the people who reported a good/poor health status, the people who reported to be employed - healthy and the people who reported to be non-employed - unhealthy. The average age of the individuals in the sample is 39.41years and 45% of them are males. In this sample, 86% of the observations reported at least a good health status at the time of the interview and 75% reported to be employed.

Table 2: Descriptive Statistics

	1985 - 2007(Odd Years)						
	All	E=1	E=0	H=0	H=1	E=1 & H=1	E=0 & H=0
	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Health	0.86	0.92	0.71	0.00	1.00	1.00	0.00
Employment	0.75	1.00	0.00	0.47	0.79	1.00	0.00
Sex	0.45	0.51	0.27	0.40	0.46	0.51	0.34
Age	39.41	38.71	41.50	45.42	38.46	38.31	47.53
# Members FU	3.13	3.10	3.20	3.09	3.13	3.10	3.03
Own	0.60	0.63	0.51	0.52	0.62	0.64	0.47
log(Income)	10.73	10.92	10.16	10.17	10.82	10.95	9.81
Health Insurance	0.40	0.40	0.40	0.40	0.40	0.40	0.42
Disability	0.14	0.08	0.31	0.53	0.08	0.06	0.72
Education	12.79	13.13	11.80	11.07	13.06	13.25	10.49
Married	0.68	0.69	0.62	0.57	0.69	0.70	0.54
Single	0.16	0.15	0.18	0.15	0.16	0.15	0.15
Widowed	0.02	0.01	0.04	0.06	0.02	0.01	0.09
Div/Sep	0.14	0.14	0.16	0.21	0.13	0.13	0.22
White	0.08	0.07	0.09	0.11	0.07	0.07	0.11
Black	0.63	0.65	0.56	0.48	0.65	0.67	0.46
Other Race	0.29	0.27	0.34	0.42	0.27	0.26	0.43

Source: PSID Data, waves 1985 - 2007 E=1: Employed; E=0: Non-employed
H=1: Healthy; H=0: Unhealthy

Moreover, from those individuals who reported to be employed, 92% reported to be healthy, while this percentage decreases to 71% for the group of non-employed individuals.

[1]The descriptive Statistics for the sample 1985-1997 can be found in the appendix (Table 7)

On the other hand, 79% of the healthy individuals reported to be employed while this figure decreases to 47% for the unhealthy individuals.

Table 2 also shows that the average age of the healthy-employed individuals is 38.31 years while it is 47.53 for the unhealthy-non-employed individuals. The education level is another difference between these groups because in the first group, the average duration of schooling is 13.25 years while in the second group it is 10.49 years. Finally, the main difference between healthy-employed and unhealthy-non-employed groups is given by disability, in this case, 6% of the healthy-employed individuals were disabled and this figure rises to 72% for the other group.

The relationship between Health and employment could be obtained from transition matrices of health and employment which are shown in **Table 3**. The first row of the table shows the probability to change between estates of health conditioned by the employment status of the previous time period; and the second row of the table shows the transition of employment conditioned to the individual's health status of the previous time period.

Table 3: Health and Employment Transition Matrices. Sample:1985-2007 (Odd years)

		Health $t+2$	
		$H_{t+2}=0$	$H_{t+2}=1$
Health t	$H_t=0$	53.25%	46.75%
	$H_t=1$	5.20%	94.80%

Cond.: E_{t-2}=employed

		Health $t+2$	
		$H_{t+2}=0$	$H_{t+2}=1$
$H_t=0$		75.61%	24.39%
$H_t=1$		11.38%	88.62%

C.: E_{t-2}=non-employed

		Employment $t+2$	
		$E_{t+2}=0$	$E_{t+2}=1$
Employ. t	$E_t=0$	62.73%	37.27%
	$E_t=1$	9.18%	90.82%

Cond.: H_{t-2}=Good

	Employment $t+2$	
	$E_{t+2}=0$	$E_{t+2}=1$
$E_t=0$	87.80%	12.20%
$E_t=1$	21.99%	78.01%

Cond.: H_{t-2}=Poor

From **Table 3** a positive relationship between Health status and Employment status of the individual can be seen. This table shows that an individual who was employed at time $(t-2)$ and reports a bad health status at time t is more likely to report a good health status at time $(t+2)$ than an individual who was non-employed. In the case of an employed individual, the probability to switch from a bad health status to a good health status in the following period is 46.75% while in the case of a non-employed individual, this probability decreases to 24.39%.

The transition of the Employment status of the individual conditioned to the individual's Health Status shows that people who have a good health status are more presumably to get a job in the following period than those who report a poor health status. In this case, given that the individual's health status is Good at time $(t-2)$, the probability of switching from non-employed at time t to employed at time $(t+2)$ is 37.27% and it decreases to 12.20% if the individual has a poor Health status at time $(t-2)$. As a result, it can be seen that Health Status and Employment status could be positively related.

4 Methodology

The main objective of this study is to understand the dynamics and the relationship between health and employment taking advantage of panel data. In this study, there are two dependant variables, **health (SAH)** and **employment**. These two variables suggest to be modeled using discrete choice models considering the double causality between them. The model applied in this study is a bivariate probit model to address endogeneity.

The first equation of the model specifies the relationship between Self-assessed Health (SAH) which is captured by the variable named **health (H)** and other explanatory variables including employment. The following expression shows the first equation of the model:

$$P(H_{it} = 1) = f(\alpha_1 + \beta_2 H_{t-2} + \beta_3 E_{t-2} + \Upsilon_1 \Xi_{it} + \Omega_1 Year + \Psi_{it}) \tag{1}$$

The second equation specifies the relationship between employment and other explanatory variables including health (SAH). The following expression shows the second equation of the model:

$$P(E_{it} = 1) = f(\alpha_2 + \gamma_2 H_{t-2} + \gamma_3 E_{t-2} + \Upsilon_2 \Xi_{it} + \Omega_2 Year + \Phi_{it}) \tag{2}$$

In the equations above, i represents individuals and t represents years, H denotes the Self-Assessed Health (SAH - health status) and E denotes Employment, H_{t-2} and E_{t-2} captures the SAH and the employment condition in the previous period respectively. One of the parameters that appear in the equations above is Ξ, which is a vector that contains the socio-economic and socio-demographic control variables (Age, Sex, Race, Income, Education, number of household members, Own House, Health insurance, Marital Status, Disability and Race). The econonomical cycle is captured using dummy variables which are contained in the vector $Year$ and the parameters Ψ and Φ are the error terms and α_1 and α_2 are constant terms. Notice that, β_2, β_3, Υ_1, Ω_1 γ_2, γ_3, Υ_2 and Ω_2 are the coefficients attached to the respective variables in each equation.

The model mentioned above presents two types of problems. The first problem arises for the unobservable heterogeneity (individual fixed effects) in the data, making the error term composed by the fixed effect of each individual and a random error around dthe expected value of the latent variables. Moreover, these individual effects can be correlated with the explanatory variables making the error term auto-correlated and furthermore dependent on the explanatory variables. In this case the error terms are ($\Psi_{it} = v_i + \epsilon_{it}$) and ($\Phi_{it} = u_i + \varphi_{it}$) where v_i and u_i captures the unobserved heterogeneity and ϵ_{it} and φ_i are the error terms independent of the explanatory variables.
The second problem arises for nonlinear panel data models with unobserved heterogeneity, resulting in the initial conditions problem (Heckman [1981]).This problem assumes that the initial observations ($t = 0$) are not random and correlated with the unobservable effects (Haan and Myck [2009]).

In order to solve the unobserved heterogeneity problem, the expressions below follow the method proposed by Mundlak [1978], assuming that the individual fixed effects are

correlated with the mean over time by individual of the explanatory variables. The initial conditions problem is solved following the method proposed by Wooldridge [2005]. These methods are also used by Casado et al. [2011] and Haan and Myck [2009].

$$v_i = \Lambda_1 \overline{\Xi}_i + \beta_1 H_0 + \vartheta_i; \qquad \vartheta_i \sim N(0, \sigma_\vartheta^2) \tag{3}$$

$$u_i = \Lambda_2 \overline{\Xi}_i + \gamma_2 E_0 + \delta_i; \qquad \delta_i \sim N(0, \sigma_\delta^2) \tag{4}$$

Substituting equation (3) into $\Psi = v_i + \epsilon_{it}$ and equation (4) into $\Phi = u_i + \varphi_{it}$ leads to

$$\Psi_{it} = \Lambda_1 \overline{\Xi}_i + \beta_1 H_0 + \vartheta_i + \epsilon_{it} \tag{5}$$

and

$$\Phi_{it} = \Lambda_2 \overline{\Xi}_i + \gamma_2 E_0 + \delta_i + \varphi_{it}, \tag{6}$$

where $\overline{\Xi}_i$ is a vector which contains the mean of the variables included in Ξ over time of individual i.

Thus, substituting equations (5) and (6) into (1) and (2) respectively leads to

$$P(H_{it} = 1) = f(\alpha_1 + \beta_2 H_{t-2} + \beta_3 E_{t-2} + \Upsilon_1 \Xi_{it} + \Omega_1 Year + \Lambda_1 \overline{\Xi}_i + \beta_1 H_0 + \vartheta_i + \epsilon_{it}) \tag{7}$$

and

$$P(E_{it} = 1) = f(\alpha_2 + \gamma_2 H_{t-2} + \gamma_3 E_{t-2} + \Upsilon_2 \Xi_{it} + \Omega_2 Year + \Lambda_2 \overline{\Xi}_i + \gamma_2 E_0 + \delta_i + \varphi_{it}) \tag{8}$$

with $\begin{pmatrix} \varphi_{it} \\ \epsilon_{it} \end{pmatrix} \sim N(0, \Sigma)$ where: $\Sigma = \begin{pmatrix} 1 & \sigma_{\varphi\epsilon} \\ \sigma_{\epsilon\varphi} & 1 \end{pmatrix}$.

Thus, holding the assumption of endogeneity (the error terms of eq.(7) φ_{it} are correlated with the error terms of eq.(8) ϵ_{it}) the bivariate probit model (simultaneous equations of two discrete dependent variables) to estimate the relationship between health and employment using the sample 1985-2007 (Odd Years) which is biannual data is given by equations (7) and (8). Notice that because of the scarce of instrumental variables, it is assumed that health and employment are affected by the last period's conditions, this assumption allows to used the lag of variables health and employment into the equations to estimate this simultaneous system.

5 Results

The results obtained from the estimation of the bivariate probit model presented in the previous section are shown in Table 4. It shows the coefficient, the standard error, the confidence intervals and the significance level of each variable included in the study. It should be noticed that the variable $RACE$ was not included in the employment's equation because none of its sub-variables (White and Black) were significant (even at a significance level of 20%), thus the model shows no evidence of discrimination in the labour market.

Moreover, **table 4** also shows a parameter called *rho* which represents the "correlation between the errors in the probit equation and the reduced-form equation for the endogenous regressor"[2]. In this case the *rho* is positive and highly significant which provides evidence for the endogeneity between health and employment supporting that the relationship between health and employment should be modeled simultaneously, otherwise, the coefficients would be inconsistent and biased due to the endogeneity.

Table 4: Coefficients and Standard Errors obtained from the bivariate probit estimation

	1985 - 2007(Odd Years)		
	Coef.	S.E.	95% Conf. Interval
HEALTH			
Health_0	0.3198 ***	(0.0195)	(0.2815 , 0.3580)
Health_{t-2}	1,1313 ***	(0.0173)	(1,0975 , 1,1652)
Employment_{t-2}	0.0051	(0.0161)	(-0.0265 , 0.0367)
log(Income)	0.0104	(0.0075)	(-0.0043 , 0.0251)
Sex	0.0415 ***	(0.0137)	(0.0145 , 0.0684)
Age	-0.0327 ***	(0.0051)	(-0.0427 , -0.0226)
Age^2	0.0002 ***	(0.0001)	(0.0001 , 0.0003)
Education	0.0248	(0.0180)	(-0.0104 , 0.0601)
Disability	-0.8164 ***	(0.0212)	(-0.8579 , -0.7749)
Single	0.0278	(0.0524)	(-0.0749 , 0.1304)
Widowed	0.1161 *	(0.0666)	(-0.0143 , 0.2466)
Div/Sep	0.0666 **	(0.0331)	(0.0017 , 0.1314)
White	0.1569 ***	(0.0333)	(0.0916 , 0.2223)
Black	-0.0957 ***	(0.0337)	(-0.1617 , -0.0298)
# Members FU	0.0190 **	(0.0084)	(0.0026 , 0.0354)
Own	0.0335	(0.0254)	(-0.0163 , 0.0832)
Health Insurance	-0.0626 ***	(0.0239)	(-0.1095 , -0.0157)
$\overline{Healthinsur}$	0.1634 ***	(0.0385)	(0.0880 , 0.2387)
$\overline{Disability}$	-0.4796 ***	(0.0338)	(-0.5458 , -0.4135)
$\overline{Single}$	-0.0602	(0.0585)	(-0.1747 , 0.0544)
$\overline{Widowed}$	-0.2011 **	(0.0850)	(-0.3677 , -0.0345)
$\overline{Divsep}$	-0.1516 ***	(0.0423)	(-0.2344 , -0.0687)
$\overline{\#MembersFU}$	-0.0578 ***	(0.0103)	(-0.0780 , -0.0375)
$\overline{Own}$	0.0672 **	(0.0330)	(0.0024 , 0.1319)
$\overline{log(income)}$	0.0985 ***	(0.0123)	(0.0745 , 0.1225)
$\overline{Education}$	0.0364 **	(0.0183)	(0.0005 , 0.0722)
$\overline{Age}$	0.0024	(0.0028)	(-0.0032 , 0.0080)
1989	0.0329	(0.0305)	(-0.0269 , 0.0928)
1991	0.0449	(0.0315)	(-0.0168 , 0.1066)
1993	-0.0043	(0.0309)	(-0.0650 , 0.0563)

continued on next page

[2] www.stata.com/statalist/archive/2006-11/msg00897.html

continued from previous page

	1985 - 2007(Odd Years)		
	Coef.	S.E.	95% Conf. Interval
1995	0.0714 **	(0.0342)	(0.0044 , 0.1384)
1997	0.0248	(0.0372)	(-0.0481 , 0.0976)
1999	0.0432	(0.0376)	(-0.0304 , 0.1169)
2001	0.0300	(0.0394)	(-0.0473 , 0.1073)
2003	-0.0193	(0.0410)	(-0.0997 , 0.0611)
2005	-0.0711 *	(0.0431)	(-0.1555 , 0.0134)
2007	-0.0299	(0.0454)	(-0.1190 , 0.0591)
α_1	-0.7653 ***	(0.1368)	(-1.0334 , -0.4973)
EMPLOYMENT			
Employment_0	0.2005 ***	(0.0136)	(0.1739 , 0.2271)
Health_{t-2}	0.1088 ***	(0.0175)	(0.0745 , 0.1431)
Employment_{t-2}	1.2921 ***	(0.0129)	(1.2668 , 1.3174)
log(Income)	0.1053 ***	(0.0064)	(0.0927 , 0.1179)
Sex	0.3918 ***	(0.0118)	(0.3686 , 0.4150)
Age	0.1092 ***	(0.0041)	(0.1011 , 0.1173)
Age^2	-0.0014 ***	(0.0000)	(-0.0015 , -0.0013)
Education	0.0760 ***	(0.0158)	(0.0451 , 0.1069)
Disability	-0.5464 ***	(0.0206)	(-0.5867 , -0.5061)
Single	0.1782 ***	(0.0414)	(0.0970 , 0.2594)
Widowed	0.1108 *	(0.0615)	(-0.0096 , 0.2313)
Div/Sep	0.0668 **	(0.0282)	(0.0115 , 0.1221)
# Members FU	-0.0491 ***	(0.0072)	(-0.0632 , -0.0350)
Own	0.0178	(0.0207)	(-0.0229 , 0.0585)
Health Insurance	-0.1739 ***	(0.0212)	(-0.2154 , -0.1324)
$\overline{Healthinsur}$	0.1027 ***	(0.0334)	(0.0372 , 0.1683)
$\overline{Disability}$	-0.2263 ***	(0.0316)	(-0.2883 , -0.1643)
$\overline{Single}$	-0.0057	(0.0469)	(-0.0976 , 0.0862)
$\overline{Widowed}$	0.1680 **	(0.0791)	(0.0130 , 0.3230)
$\overline{Divsep}$	0.1947 ***	(0.0365)	(0.1232 , 0.2662)
$\overline{\#MembersFU}$	-0.0001	(0.0089)	(-0.0174 , 0.0173)
$\overline{Own}$	0.1199 ***	(0.0277)	(0.0655 , 0.1742)
$\overline{log(income)}$	0.1237 ***	(0.0106)	(0.1029 , 0.1445)
$\overline{Education}$	-0.0653 ***	(0.0160)	(-0.0967 , -0.0340)
$\overline{Age}$	-0.0020	(0.0025)	(-0.0069 , 0.0028)
1989	-0.0262	(0.0252)	(-0.0756 , 0.0231)
1991	-0.0618 **	(0.0259)	(-0.1125 , -0.0110)
1993	-0.1015 ***	(0.0258)	(-0.1522 , -0.0509)
1995	0.0227	(0.0285)	(-0.0332 , 0.0786)
1997	-0.0324	(0.0312)	(-0.0935 , 0.0287)
1999	0.1243 ***	(0.0321)	(0.0615 , 0.1872)
2001	0.0538	(0.0338)	(-0.0124 , 0.1200)
2003	0.1043 ***	(0.0356)	(0.0345 , 0.1740)

continued on next page

continued from previous page

	1985 - 2007(Odd Years)		
	Coef.	S.E.	95% Conf. Interval
2005	0.1255 ***	(0.0375)	(0.0520 , 0.1989)
2007	0.1156 ***	(0.0395)	(0.0381 , 0.1930)
α_2	-4.8120 ***	(0.1100)	(-5.0276 , -4.5964)
/athrho	0.1100 ***	(0.0100)	(0.0903 , 0.1297)
rho	0.1095 ***	(0.0099)	(0.0901 , 0.1290)
Source: Self Calculations		*$p < .1$; ** $p < .05$; *** $p < .01$	

According to the literature, there is a positive relationship between health and employment; these two variables affect each other in a positive way, thus, employed people are more likely to report a good health status than those who are non-employed and the effect of health on employment points in the same direction. Accordingly, healthy people are more likely to get a job and to be employed than those who report a poor health condition. In this context, **Table 4** supports the interpretation obtained in the descriptive analysis and gives evidence for the relationship between health and employment.

Taking into account that the applied model is a bivariate probit model which is a non-linear model, any interpretation about the magnitude of the effect of the independent variables on the latent variables (Health and Employment) can be obtained from the coefficients showed in table 4 due to the nature of the model. Thus, in order to show results and interpretations, the marginal effects of the joint and univariate probabilities should be estimated. In this case, the joint probabilities are: $Pr(H = 1, E = 1)$ the probability of reporting a good health status and being employed; $Pr(H = 0, E = 1)$ the probability of reporting a bad health status and being employed; $Pr(H = 1, E = 0)$ the probability of reporting a good health status and being non-employed; $Pr(H = 0, E = 0)$ the probability of reporting a bad health status and being non-employed. **Table 5** shows the marginal effects of each joint probability and the univariate probabilities.

As it was expected, the relationship between health and employment is positive in both directions. As investigated using the PSID, the probability of being employed increases by 2,85% when the individual's health status changes from a poor health status to a good health status. On the other hand, an employed individual shows an increase of 0.07% in the probability of reporting a good health status compared to a non-employed. These effects show how the employment condition changes the individual's health status and vice-versa.

The results obtained from the other variables show that the education level, the household's income and living in a house owned by the family unit have a positive impact on the probability of being healthy as well as on the probability of being employed.

The positive relationship between schooling and the latent variables shows that when the education level increases in one year, the probability of reporting good health increases by 0.33% and the probability of being employed by 1.99%, thus the joint probability of being healthy and employed increases as well (2,09%) . This means that people who are

Table 5: Marginal effects. Sample: 1985 - 2007 (Odd) Years

	Sample: 1985 - 2007(Odd) Years											
	$Pr(H=1,E=1)$		$Pr(H=1,E=0)$		$Pr(H=0.E=1)$		$Pr(H=0.E=0)$		$Pr(H=1)$		$Pr(E=1)$	
	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.
Health_{t-2}	0.1440***	(0.0048)	0.0078*	(0.0043)	-0.1155***	(0.0022)	-0.0364***	(0.0010)	0.1518***	(0.0027)	0.0285***	(0.0046)
Employment_{t-2}	0.3111***	(0.0038)	-0.3104***	(0.0034)	0.0276***	(0.0018)	-0.0283***	(0.0008)	0.0007	(0.0022)	0.3387***	(0.0036)
log(Income)	0.0264***	(0.0018)	-0.0250***	(0.0016)	0.0012	(0.0008)	-0.0026***	(0.0003)	0.0014	(0.0010)	0.0276***	(0.0017)
Sex	0.0985***	(0.0032)	-0.0929***	(0.0028)	0.0042***	(0.0015)	-0.0098***	(0.0005)	0.0056***	(0.0018)	0.1027***	(0.0031)
Age	0.0229***	(0.0011)	-0.0272***	(0.0010)	0.0058***	(0.0005)	-0.0014***	(0.0002)	-0.0044***	(0.0007)	0.0286***	(0.0011)
Age^2	-0.0003***	(0.0000)	0.0004***	(0.0000)	-0.0001***	(0.0000)	0.0000***	(0.0000)	0.0000***	(0.0000)	-0.0004***	(0.0000)
Education	0.0209***	(0.0043)	-0.0175***	(0.0038)	-0.0009	(0.0019)	-0.0024***	(0.0007)	0.0033	(0.0024)	0.0199***	(0.0041)
Disability	-0.2164***	(0.0056)	0.1068***	(0.0050)	0.0731***	(0.0024)	0.0364***	(0.0011)	-0.1096***	(0.0029)	-0.1432***	(0.0054)
Single	0.0436***	(0.0107)	-0.0399***	(0.0090)	0.0008	(0.0056)	-0.0045***	(0.0016)	0.0037	(0.0070)	0.0444***	(0.0097)
Widowed	0.0378**	(0.0155)	-0.0231	(0.0140)	-0.0092	(0.0062)	-0.0054***	(0.0020)	0.0146*	(0.0077)	0.0285*	(0.0151)
Div/Sep	0.0229***	(0.0076)	-0.0142**	(0.0067)	-0.0053	(0.0033)	-0.0034***	(0.0011)	0.0087**	(0.0042)	0.0176**	(0.0073)
White	0.0163***	(0.0038)	0.0047***	(0.0011)	-0.0163***	(0.0038)	-0.0047***	(0.0011)	0.0210***	(0.0049)	(omitted)	
Black	-0.0119***	(0.0040)	-0.0034***	(0.0011)	0.0119***	(0.0040)	0.0034***	(0.0011)	-0.0153***	(0.0051)	(omitted)	
# Members FU	-0.0098***	(0.0020)	0.0124***	(0.0017)	-0.0030***	(0.0009)	0.0005*	(0.0003)	0.0025**	(0.0011)	-0.0129***	(0.0019)
Own	0.0078	(0.0057)	-0.0033	(0.0050)	-0.0031	(0.0027)	-0.0014	(0.0009)	0.0045	(0.0034)	0.0047	(0.0054)
Health Insurance	-0.0483***	(0.0058)	0.0399***	(0.0051)	0.0027	(0.0025)	0.0057***	(0.0009)	-0.0084***	(0.0032)	-0.0456***	(0.0056)

Source: Self Calculations

*$p < .1$; ** $p < .05$; *** $p < .01$

more educated are more likely to have a good health status and to get a job than those who are less educated.

As it was mentioned above, another important determinant in the employment decision and in the perception of health is the socio-economic status of the family. In this point, a marginal increase in the household's income is reflected by increases of 0.14% and 2,76% of the probabilities of being healthy and employed respectively. In terms of a joint probability, the probability of being healthy and employed improves by 2,64%.

Apart from the household's income, the other variable which holds the socio-economic status of the family is *Own* which reflects the effect of living in a house which belongs to the family unit. When the individual switches from living in a house which does not belong to the family unit to an accomodation owned by the family unit, the probability of this individual of being healthy increases by 0.45%, the probability of being employed increases by 0.47% and the effect of the variable *Own* can increase the combined probability of being healthy-employed by 0.78%.

In agreement with the literature the results show that there is a differential effect of gender on the auto-reported health status. This effect of gender can be seen from the coefficient of the variable Sex which is positive, this means that males are more likely to report a good health status than females. This variable also appears in the employment equation and its positive coefficient gives evidence for the existence of the same difference between genders in the labour market. This means that the probability of being employed is higher for males than for females. Moreover, the marginal effects show that males have a 0.56% and 10.27% higher chances to be healthy and employed respectively than females and the joint probability of being healthy-employed is 9.85% larger for males than for females.

The results mentioned above, take into account only those variables which have a positive impact on health and employment. Nevertheless, there is a variable which has a negative impact on the univariate probability of being employed, on the univariate probability of good health and on the joint probability of good health and being employed; this variable is Disability. The marginal effects show that being disabled has the worst impact on SAH and employment. It reduces the first mentioned probability by 10.96%, the second one by 14.32% and the last one by 21.64%.

The role played by age in the model has to be interpreted looking at the variable age and the variable age-squared. In the equation of health it can be found that the probability of reporting a good health status decreases while age increases until it reaches a minimum point at the age of 85 years and beyond this point the probability of good health starts to increase while age increases. On the other hand, the probability of being employed increases while age increases. This happens until it reaches a maximum point at the age of 38 years and after this point this probability starts to decrease. Notice that the inflection point in health is not included in the sample because the maximun age is 65 years, thus it is concluded that when age increases, the probability of being healthy dicreases for all individuals included in the sample.

The socio-demographic variables included in this study like Race and the number of household members have different impacts on both equations or were not significant in

one of them and were not included. For instance, the marginal effects in table 5 show that when the number of household's members increases by one, the probability of being employed decreases by 1.29%, the probability of good health increases by 0.25% and the joint probability of being healthy-employed decreases by 0.98%.

From the variables that are included in just one equation, it can be seen that the race of the individual plays an important role on individual's health. White people have a 2.10% higher chances to be healthy compared to those people categorized in Other Race, while the chance for Black people to be healthy reduces by 1.53% .

Finally, the model was estimated without taking into account the endogeneity (Specification 2)[3] and without solving the problem of unobservable heterogeneity (Specification 3)[4] to check the bias of the results with these specifications. The estimations of these two specifications are represented in table 10 and their marginal effects in table 11.

From the tables mentioned above, it can be seen that the results obtained from Specification 2 are underestimated, however, the difference between this results and those obtained from the model which controls for endogeneity is not large. On the other hand, when endogeneity and unobservable heterogeneity are not taken into account (specification 3), the results obtained are overestimated. For instance, the effect of health on employment is 3,92% using Specification 3 compared to 2,85% when it is controlled for unobservable heterogeneity and endogeneity. Moreover, specification 3 shows that the effect of employment on health is 0.89% and significant.

5.1 Robustness Checks

In order to use the most recent data, this study has used biannual data from 1985 to 2007. However, in this section, it is checked if the results vary from using biannual instead of annual data taking advantage of the PSID's structure. It is expected to obtain the same relationship between the independent and the latent variables, however, the magnitude of the effects is not expected to be the same for both samples.

In order to estimate the relationship between health and employment using annual data, the model proposed in section 3 (equations (7) and (8)) should be modified using the first lag of health and employment variables instead of the second lag. Holding the assumption of endogeneity, the following equations show the bivariate probit model using annual data.

$$P(H_{it}=1) = f(\alpha_1 + \beta_2 H_{t-1} + \beta_3 E_{t-1} + \Upsilon_1 \Xi_{it} + \Omega_1 Year + \Lambda_1 \overline{\Xi}_i + \beta_1 H_0 + \delta_i + \varphi_{it}) \quad (9)$$

$$P(E_{it}=1) = f(\alpha_2 + \gamma_2 H_{t-1} + \gamma_3 E_{t-1} + \Upsilon_2 \Xi_{it} + \Omega_2 Year + \Lambda_2 \overline{\Xi}_i + \gamma_2 E_0 + \vartheta_i + \epsilon_{it}) \quad (10)$$

The estimation of the model using annual data is presented in table 8 (Appendix) and the marginal effects are presented in table 9 (Appendix). Comparing table 5 and table 9, it can be seen that apart from the variable $MaritalStatus$, in the great majority of

[3]This specification is estimated using equations (7) and (8) separately

[4]This specification is estimated using equations (1) and (2) separately.

the cases, the sign of the marginal effects is the same, thus, the relationship between the independent and the latent variables is hold in both samples.

Moreover, it is found that the relationship between health and employment is positive in both directions but their magnitudes differ when modeling with annual data instead of biannual data. Using annual data, the probability of being employed increases by 1,4% when the individual's health status changes from a poor health status to a good health status. With respect to the effect of employment on health, an employed individual shows an increase of 0.103% (not significant) of the probability of reporting a good health status compared to a non-employed. Notice that these figures using biannual data are 2,85% and 0,07% respectively.

Comparing the figures obtained using annual data with those obtained using biannual data, it can be seen that the effect of employment on health is not significant in both cases and that the effect of health on employment seems to be higher over time.

6 Discussion and Conclusions

The relationship between health and employment has been studied in a large number of articles and few of them have studied this relationship as a two-way causality taking into account the endogeneity present between health and employment. This article lines to those which explain the double causality between health and employment (e.g. Cai [2007], Leung and Wong [2002], Brown et al. [2005]). Moreover, it uses panel data to explain how changes from health or employment have an impact on the dynamics of one another, following Haan and Myck [2009]. The results obtained on this document are based on estimations of a discrete choice model with simultaneous equations. These types of estimations are done when endogeneity between the variables is present. In this document, the *rho* [5] obtained (0,1095) and its high significance level provides evidence for the existence of endogeneity between health and employment. This result justifies the assumption of endogeneity and allows to model the relationship between health and employment with simultaneous equations using a bivariate probit model.

This study has shown that the probability of being employed increases by 2,85% when the individual's health status changes from a poor health status to a good health status. Moreover, an employed individual shows an increase of 0.07% in the probability of reporting a good health status compared to a non-employed. In agreement with other studies (e.g. Haan and Myck [2009], Kalwij and Vermeulen [2008]), these results show that there is a positive relationship between health and employment.

The findings of this study could be useful for policy-makers in order to create and implement socio-economic policies that take the two-way causality between health and employment into account. The endogenity suggests that health and employment policies have an indirect impact on one another. Moreover, the positive relationship found provides evidence that this impact goes in the same direction.

[5] Correlation between the errors in the probit equation and the reduced-form equation for the endogenous regressors (Stata.com)

Thus, unemployment could be tackled by policies focused on improving populations health (e.g. ensuring health care for everyone). These kinds of policies have a direct impact on health and an indirect impact on employment because healthier people show a higher productivity which makes them more likely to be hired or to keep being employed. On the other hand, policies to tackle unemployment directly, would lead to improve the populations health indirectly, because as some authors have shown (e.g. Rohwedder and Willis [2010]), non-employment causes several and major problems in health like cognition problems. Moreover, mixed policies would lead to stronger effects in both markets or policies targeted on reducing unemployment could be reinforced by policies in the health sector or vice-versa.

Apart from the importance of health on employment and vice-versa, this document shows as well the important role played by education, the socio-economic status and gender. The results show that there is a positive impact of education and income (e.g. Böckerman and Ilmakunnas [2007]) on both markets and they show as well that there is a differential effect of gender on health and employment showing that women are less likely to report a good health status (Repetti et al. [1989]) and to be hired than men.

Morevoer, another point that this document highlights as García-Gómez et al. [2010], is the huge negative impact of disability on employment. The results show that when an individual becomes disabled, his/her probability of being employed decreases. Lindeboom et al. [2006] showed that this esffect is causal, thus, the negative impact of disability on employment, suggests policy makers to counteract this decrease on the labour force by creating policies to encourage hiring disabled people for instance.

In conclusion, understanding how and how much would be the impact of employment on health status and the impact of health on the labour market, policy makers can take advantage of health policies and labour policies in order to have a better impact on the target.

References

C Bambra and T Eikemo. Welfare state regimes, unemployment and health: a comparative study of the relationship between unemployment and self-reported health in 23 european countries. *Journal of Epidemiology & Community Health*, 63(2):92–98, 2009.

David M. Blau and Donna B. Gilleskie. The effect of health on employment transitions of older men. In Solomon Polachek, editor, *Worker Wellbeing in a Changing Labor Market (Research in Labor Economics, Volume 20)*. Emerald Group Publishing Limited, 2001.

Petri Böckerman and Pekka Ilmakunnas. Unemployment and self-assessed health: Evidence from panel data. Technical report, University Library of Munich, Germany, 2007.

John Bound, Michael Schoenbaum, Todd R. Stinebrickner, and Timothy Waidmann. The dynamic effects of health on the labor force transitions of older workers. *Labour Economics*, 6(2):179–202, June 1999.

H. Shelton Brown, José A. Pagán, and Elena Bastida. The impact of diabetes on employment: genetic iv's in a bivariate probit. *Health Economics*, 14(5):537–544, 2005.

Lixin Cai. Effects of health on wages of australian men. Melbourne Institute Working Paper Series wp2007n02, Melbourne Institute of Applied Economic and Social Research, The University of Melbourne, February 2007.

David Casado, Pilar García Gómez, and Ángel López. Informal care and labour force participation among middle-aged women in spain. Technical Report 1, March 2011.

Andrew E. Clark and Andrew J. Oswald. Unhappiness and unemployment. *Economic Journal*, 104(424):648–659, 1994.

S. Cobb, S.V. Kasl, and United States. Dept. of Labor. Manpower Administration. *Termination: the consequences of job loss*. DHEW (NIOSH) publication. U.S. Dept. of Health, Education, & Welfare, Public Health Service, Center for Disease Control, National Institute for Occupational Safety and Health, Division of Biomedical and Behavioral Science, 1977.

Norma B. Coe and Gema Zamarro. Retirement effects on health in europe. *Journal of Health Economics*, 30(1):77–86, January 2011.

Janet Currie and Brigitte C. Madrian. Health, health insurance and the labor market. In O. Ashenfelter and D. Card, editors, *Handbook of Labor Economics*, volume 3 of *Handbook of Labor Economics*, chapter 50, pages 3309–3416. Elsevier, October 1999.

D. Dooley, J. Fielding, and L. Levi. Health and unemployment. *Annual Review of Public Health*, 17:449–465, 1996. doi: 10.1146/annurev.pu.17.050196.002313.

K Furensgaard, S Benjaminsen, S Joense, and K Helstrup. Psychosocial characteristics of a group of unemployed patients consecutively admitted to a psychiatric emergency department. *Social Psychiatry*, 18(3):137–144, 1983.

Pilar García-Gómez, Andrew M. Jones, and Nigel Rice. Health effects on labour market exits and entries. *Labour Economics*, 17(1):62–76, January 2010.

Peter Haan and Michal Myck. Dynamics of health and labor market risks. *Journal of Health Economics*, 28(6):1116–1125, 2009.

James Heckman. The incidental parameters problem and the problem of initial conditions in estimating a discrete time - discrete data stochastic process. In McFadden D Manski CF, editor, *Structural analysis of discrete data with econometric applications*. MIT Press, Cambirdge, 1981.

Vibeke Jakobsen and Mona Larsen. Does the causal effect of health on employment differ for inmigrants and natives? Working paper (available at http://www.sfi.dk), The Danish National Centre for Social Research (SFI), January 2010.

Robert L. Jin, Chandrakant P. Shah, and Tomislav J. Svoboda. The impact of unemployment on health: A review of the evidence. *Public Health Policy*, 18(3):275–301, 1997.

Adriaan Kalwij and Frederic Vermeulen. Health and labour force participation of older people in europe: What do objective health indicators add to the analysis? *Health Economics*, 17(5):619–638, 2008.

S. Leung and C Wong. Health status and labor supply: Interrelationship and determinants. Technical report, Hong Kong University of Science and Technology, 2002.

Maarten Lindeboom and Marcel Kerkhofs. Health and work of the elderly: subjective health measures, reporting errors and endogeneity in the relationship between health and work. *Journal of Applied Econometrics*, 24(6):1024–1046, 2009.

Maarten Lindeboom, Ana Llena-Nozal, and Bas van der Klaauw. Disability and work: The role of health shocks and childhood circumstances. IZA Discussion Papers 2096, Institute for the Study of Labor (IZA), April 2006.

Joan Morris, K. Derek G. Cook, and A. Gerald Shaper. Loss of employment and mortality. *Brithis Medical Journal*, 308(6937):1135 – 1139, 1994.

Yair Mundlak. On the pooling of time series and cross section data. *Econometrica*, 46 (1):69–85, January 1978.

Jodi Messer Pelkowski and Mark C. Berger. The impact of health on employment, wages, and hours worked over the life cycle. *The Quarterly Review of Economics and Finance*, 44(1):102–121, February 2004.

Rena L. Repetti, K Matthews, and I Waldron. Employment and Women's Health: Effects of Paid Employment on Women's Mental and Physical Health. *American Psychologist*, 44(11):1394–1401, 1989.

Eunice Rodriguez. Marginal employment and health in britain and germany: Does unstable employment predict health? *Social Science & Medicine*, 55(6):963–979, 2002.

Susann Rohwedder and Robert J. Willis. Mental retirement. *Economic Perspectives*, 24 (1):119–138, 2010.

Jeffrey M. Wooldridge. Simple solutions to the initial conditions problem in dynamic, nonlinear panel data models with unobserved heterogeneity. *Journal of Applied Econometrics*, 20(1):39–54, 2005.

Eugenio Zucchelli, Andrew M Jones, Nigel Rice, and Anthony Harris. Effects of health shocks on labour market exits: Evidence from the hilda survey. *Australian Journal of Labour Economics*, 13(2):191–218, 2010.

A Appendix

Table 6: Health and Employment Transition Matrices. Sample:1985-1997

		Health $t+1$	
		$H_{t+1=0}$	$H_{t+1=1}$
Health t	$H_t = 0$	55.63%	44.37%
	$H_t = 1$	4.44%	95.56%

Cond.: E_{t-1}=employed

		Health $t+1$	
		$H_{t+1=0}$	$H_{t+1=1}$
$H_t = 0$		77.81%	22.19%
$H_t = 1$		11.04%	88.96

C.: E_{t-1}=non-employed

		Employment $t+1$	
		$E_{t+1=0}$	$E_{t+1=1}$
Employ. t	$E_t = 0$	70.53%	29.47%
	$E_t = 1$	8.11%	91.89%

Cond.: H_{t-1}=Good

	Employment $t+1$	
	$E_{t+1=0}$	$E_{t+1=1}$
$E_t = 0$	91.18%	8.82%
$E_t = 1$	17.16%	82.84%

Cond.: H_{t-1}=Poor

Table 7: Descriptive Statistics

	1985 - 1997						
	All	E=1	E=0	H=0	H=1	E=1 & H=1	E=0 & H=0
	Mean	Mean	Mean	Mean	Mean	Mean	Mean
Health	0.86	0.91	0.70	0.00	1.00	1.00	0.00
Employment	0.73	1.00	0.00	0.43	0.78	1.00	0.00
Sex	0.45	0.52	0.26	0.40	0.46	0.52	0.33
Age	38.72	37.81	41.15	45.58	37.56	37.34	47.71
# Members FU	3.18	3.15	3.26	3.15	3.18	3.14	3.09
Own	0.58	0.61	0.49	0.50	0.59	0.62	0.46
log(Income)	10.65	10.86	10.08	10.07	10.74	10.89	9.75
Health Insurance	0.07	0.02	0.20	0.19	0.05	0.02	0.31
Disability	0.14	0.08	0.31	0.55	0.08	0.06	0.72
Education	12.47	12.88	11.38	10.46	12.81	13.03	9.91
Married	0.69	0.71	0.63	0.58	0.71	0.72	0.55
Single	0.14	0.14	0.16	0.14	0.14	0.14	0.14
Widowed	0.03	0.02	0.05	0.08	0.02	0.01	0.10
Div/Sep	0.14	0.14	0.15	0.21	0.13	0.13	0.22
White	0.08	0.07	0.10	0.11	0.07	0.07	0.11
Black	0.64	0.66	0.57	0.49	0.66	0.68	0.47
Other Race	0.29	0.27	0.34	0.41	0.27	0.26	0.41

Source: PSID Data, waves 1985 - 2007 E=1: Employed; E=0: Non-employed
H=1: Healthy; H=0: Unhealthy

Table 8: Coefficients and Standard Errors obtained from the bivariate probit estimation

	1985 - 1997		
	Coef.	S.E.	95% Conf. Interval
HEALTH			
Health_0	0.4251***	(0.0166)	(0.3926. 0.4577)
Health_{t-2}	1.1770***	(0.0152)	(1.1472. 1.2068)
Employment_{t-2}	0.0076	(0.0148)	(-0.0215. 0.0367)
log(Income)	0.0151**	(0.0069)	(0.0015. 0.0286)
Sex	0.0297**	(0.0126)	(0.0051. 0.0543)
Age	-0.0395***	(0.0056)	(-0.0505. -0.0285)
Age^2	0.0002***	(0.0000)	(0.0001. 0.0003)
Education	0.0278	(0.0262)	(-0.0236. 0.0791)
Disability	-0.7946***	(0.0196)	(-0.8330. -0.7562)
Single	-0.0289	(0.0545)	(-0.1357. 0.0779)
Widowed	0.0386	(0.0690)	(-0.0966. 0.1738)
Div/Sep	0.0204	(0.0348)	(-0.0478. 0.0885)
White	0.1619***	(0.0267)	(0.1094. 0.2143)
Black	-0.0776***	(0.0272)	(-0.1310. -0.0242)
# Members FU	0.0134	(0.0088)	(-0.0037. 0.0306)
Own	0.0364	(0.0265)	(-0.0155. 0.0884)
Health Insurance	-0.0676**	(0.0310)	(-0.1285. -0.0068)
$\overline{Healthinsrur}$	-0.0078	(0.0458)	(-0.0976. 0.0819)
$\overline{Disability}$	-0.5113***	(0.0305)	(-0.5711. -0.4515)
$\overline{Single}$	-0.0305	(0.0598)	(-0.1477. 0.0867)
$\overline{Widowed}$	-0.0789	(0.0806)	(-0.2369. 0.0791)
$\overline{Divsep}$	-0.1327***	(0.0417)	(-0.2144. -0.0509)
$\overline{\#MembersFU}$	-0.0562***	(0.0102)	(-0.0761. -0.0362)
$\overline{Own}$	0.0247	(0.0320)	(-0.0381. 0.0874)
$\overline{log(income)}$	0.0858***	(0.0109)	(0.0645. 0.1071)
$\overline{Education}$	0.0356	(0.0264)	(-0.0161. 0.0874)
$\overline{Age}$	0.0103**	(0.0041)	(0.0022. 0.0184)
1987	0.0569*	(0.0300)	(-0.0019. 0.1157)
1988	0.2132***	(0.0316)	(0.1513. 0.2750)
1989	0.0689**	(0.0315)	(0.0072. 0.1306)
1990	0.0904***	(0.0327)	(0.0264. 0.1544)
1991	0.0719**	(0.0316)	(0.0100. 0.1338)
1992	0.0620*	(0.0333)	(-0.0032. 0.1272)
1993	0.0823**	(0.0353)	(0.0132. 0.1515)
1994	0.1183***	(0.0390)	(0.0418. 0.1947)
1995	0.1865***	(0.0396)	(0.1088. 0.2641)
1996	0.1247***	(0.0418)	(0.0427. 0.2067)
1996	0.1850***	(0.0462)	(0.0945. 0.2756)
α_1	-0.8477***	(0.1179)	(-1.0788. -0.6167)

continued on next page

continued from previous page

	1985 - 1997		
	Coef.	S.E.	95% Conf. Interval
EMPLOYMENT			
Employment_0	0.3371***	(0.0124)	(0.3129. 0.3614)
Health_{t-2}	0.0508***	(0.0164)	(0.0187. 0.0829)
Employment_{t-2}	1.4996***	(0.0118)	(1.4764. 1.5227)
log(Income)	0.0314***	(0.0061)	(0.0195. 0.0434)
Sex	0.3617***	(0.0110)	(0.3402. 0.3831)
Age	0.0672***	(0.0046)	(0.0583. 0.0762)
Age^2	-0.0012***	(0.0000)	(-0.0013. -0.0011)
Education	0.0310	(0.0220)	(-0.0121. 0.0740)
Disability	-0.3984***	(0.0199)	(-0.4373. -0.3595)
Single	0.0491	(0.0434)	(-0.0360. 0.1342)
Widowed	-0.0255	(0.0655)	(-0.1538. 0.1028)
Div/Sep	0.0573*	(0.0301)	(-0.0017. 0.1163)
# Members FU	-0.0345***	(0.0078)	(-0.0498. -0.0193)
Own	0.0054	(0.0214)	(-0.0365. 0.0473)
Health Insurance	-0.4904***	(0.0291)	(-0.5473. -0.4334)
$\overline{Healthinsrur}$	-0.2675***	(0.0437)	(-0.3532. -0.1818)
$\overline{Disability}$	-0.2642***	(0.0299)	(-0.3227. -0.2056)
$\overline{Single}$	0.1580***	(0.0482)	(0.0634. 0.2525)
$\overline{Widowed}$	0.3240***	(0.0772)	(0.1726. 0.4754)
$\overline{Divsep}$	0.2505***	(0.0366)	(0.1787. 0.3223)
$\overline{\#MembersFU}$	0.0034	(0.0090)	(-0.0143. 0.0210)
$\overline{Own}$	0.0583**	(0.0265)	(0.0064. 0.1102)
$\overline{log(income)}$	0.1639***	(0.0096)	(0.1450. 0.1827)
$\overline{Education}$	-0.0211	(0.0221)	(-0.0645. 0.0223)
$\overline{Age}$	0.0193***	(0.0036)	(0.0123. 0.0262)
1987	0.1149***	(0.0257)	(0.0646. 0.1653)
1988	0.0845***	(0.0261)	(0.0334. 0.1356)
1989	0.1120***	(0.0268)	(0.0595. 0.1645)
1990	0.1257***	(0.0278)	(0.0713. 0.1802)
1991	0.0757***	(0.0271)	(0.0225. 0.1288)
1992	0.0695**	(0.0285)	(0.0137. 0.1254)
1993	0.1133***	(0.0302)	(0.0540. 0.1725)
1994	0.2055***	(0.0334)	(0.1401. 0.2709)
1995	0.2519***	(0.0338)	(0.1857. 0.3181)
1996	0.2134***	(0.0357)	(0.1434. 0.2834)
1997	0.2565***	(0.0391)	(0.1799. 0.3331)
α_2	-4.3527***	(0.0977)	(-4.5441. -4.1614)
/athrho	0.0835***	(0.0095)	(0.0648. 0.1022)

Source: Self Calculations $^*p < .1$; $^{**}\ p < .05$; $^{***}\ p < .01$

Table 9: Marginal effects. Sample: 1985 - 1997

	Sample: 1985 - 1997											
	$Pr(H=1,E=1)$		$Pr(H=1,E=0)$		$Pr(H=0.E=1)$		$Pr(H=0.E=0)$		$Pr(H=1)$		$Pr(E=1)$	
	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.
Health_{t-2}	0.1354***	(0.0047)	0.0238***	(0.0042)	-0.1213***	(0.0020)	-0.0378***	(0.0010)	0.1591***	(0.0024)	0.0140***	(0.0045)
Employment_{t-2}	0.3820***	(0.0037)	-0.3810***	(0.0034)	0.0324***	(0.0017)	-0.0334***	(0.0008)	0.0010	(0.0020)	0.4144***	(0.0035)
log(Income)	0.0096***	(0.0017)	-0.0075***	(0.0016)	-0.0009	(0.0007)	-0.0012***	(0.0003)	0.0020**	(0.0009)	0.0087***	(0.0017)
Sex	0.0950***	(0.0031)	-0.0910***	(0.0028)	0.0049***	(0.0013)	-0.0089***	(0.0005)	0.0040**	(0.0017)	0.0999***	(0.0030)
Age	0.0130***	(0.0013)	-0.0183***	(0.0012)	0.0056***	(0.0006)	-0.0003	(0.0002)	-0.0053***	(0.0008)	0.0186***	(0.0013)
Age^2	-0.0003***	(0.0000)	0.0003***	(0.0000)	0.0000***	(0.0000)	0.0000***	(0.0000)	0.0000***	(0.0000)	-0.0003***	(0.0000)
Education	0.0108*	(0.0063)	-0.0070	(0.0056)	-0.0022	(0.0028)	-0.0015	(0.0010)	0.0038	(0.0035)	0.0086	(0.0061)
Disability	-0.1839***	(0.0056)	0.0765***	(0.0051)	0.0738***	(0.0022)	0.0336***	(0.0010)	-0.1074***	(0.0027)	-0.1101***	(0.0055)
Single	0.0092	(0.0124)	-0.0132	(0.0108)	0.0042	(0.0060)	-0.0002	(0.0020)	-0.0040	(0.0076)	0.0134	(0.0117)
Widowed	-0.0028	(0.0187)	0.0079	(0.0174)	-0.0044	(0.0068)	-0.0007	(0.0026)	0.0051	(0.0088)	-0.0072	(0.0187)
Div/Sep	0.0165**	(0.0084)	-0.0138*	(0.0075)	-0.0009	(0.0036)	-0.0018	(0.0012)	0.0027	(0.0046)	0.0156*	(0.0081)
White	0.0169***	(0.0031)	0.0051***	(0.0009)	-0.0169***	(0.0031)	-0.0051***	(0.0009)	0.0220***	(0.0040)	(omitted)	
Black	-0.0096***	(0.0032)	-0.0028***	(0.0010)	0.0096***	(0.0032)	0.0028***	(0.0010)	-0.0124***	(0.0042)	(omitted)	
# Members FU	-0.0074***	(0.0022)	0.0092***	(0.0020)	-0.0022**	(0.0009)	0.0003	(0.0003)	0.0018	(0.0012)	-0.0095***	(0.0021)
Own	0.0052	(0.0062)	-0.0002	(0.0055)	-0.0037	(0.0028)	-0.0013	(0.0010)	0.0049	(0.0036)	0.0015	(0.0059)
Health Insurance	-0.1317***	(0.0082)	0.1226***	(0.0075)	-0.0038	(0.0033)	0.0130***	(0.0012)	-0.0091**	(0.0042)	-0.1355***	(0.0081)

Source: Self Calculations

*$p < .1$; ** $p < .05$; *** $p < .01$

Table 10: Coefficients and Standard Errors obtained from the univariate probit estimations of Specifications 2 and 3

	Sample: 1985 - 2007(Odd Years)							
	Specification 2				**Specification 3**			
	Health		**Employment**		**Health**		**Employment**	
	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.	Coef.	S.E.
Health_0	0.3200***	(0.0195)						
Employment_0			0.2004***	(0.0136)				
Health_{t-2}	1.1301***	(0.0173)	0.1067***	(0.0175)	1.3122***	(0.0156)	0.1489***	(0.0169)
Employment_{t-2}	0.0037	(0.0161)	1.2922***	(0.0129)	0.0654***	(0.0156)	1.3954***	(0.0118)
log(Income)	0.0105	(0.0075)	0.1053***	(0.0064)	0.0555***	(0.0057)	0.1600***	(0.0050)
Sex	0.0366***	(0.0137)	0.3917***	(0.0118)	0.0364***	(0.0135)	0.4111***	(0.0115)
Age	-0.0333***	(0.0051)	0.1092***	(0.0041)	-0.0345***	(0.0045)	0.1044***	(0.0036)
Age^2	0.0002***	(0.0001)	-0.0014***	(0.0000)	0.0002***	(0.0001)	-0.0014***	(0.0000)
Education	0.0256	(0.0180)	0.0759***	(0.0158)	0.0749***	(0.0029)	0.0263***	(0.0025)
Disability	-0.8201***	(0.0212)	-0.5489***	(0.0206)	-1.0502***	(0.0151)	-0.6591***	(0.0149)
Single	0.0256	(0.0524)	0.1759***	(0.0415)	-0.0471**	(0.0226)	0.0860***	(0.0186)
Widowed	0.1171*	(0.0666)	0.1103*	(0.0615)	-0.0751**	(0.0376)	0.1700***	(0.0356)
Div/Sep	0.0642*	(0.0331)	0.0668**	(0.0282)	-0.0620***	(0.0195)	0.1460***	(0.0172)
White	0.1566***	(0.0334)			0.1701***	(0.0329)		
Black	-0.0970***	(0.0337)			-0.1150***	(0.0332)		
# Members FU	0.0196**	(0.0084)	-0.0492***	(0.0072)	-0.0155***	(0.0049)	-0.0541***	(0.0042)
Own	0.0325	(0.0254)	0.0171	(0.0207)	0.1116***	(0.0157)	0.1213***	(0.0132)
Health Insurance	-0.0639***	(0.0240)	-0.1738***	(0.0212)	-0.0186	(0.0190)	-0.1458***	(0.0172)
$\overline{Insurance}$	0.1636***	(0.0385)	0.1022***	(0.0334)				
$\overline{Disability}$	-0.4774***	(0.0338)	-0.2253***	(0.0316)				
$\overline{Single}$	-0.0582	(0.0585)	-0.0031	(0.0469)				
$\overline{Widowed}$	-0.2028**	(0.0850)	0.1686**	(0.0791)				
$\overline{divsep}$	-0.1506***	(0.0423)	0.1948***	(0.0365)				
$\overline{\#MembersFU}$	-0.0581***	(0.0103)	-0.0002	(0.0089)				
$\overline{Own}$	0.0683**	(0.0330)	0.1202***	(0.0277)				
$\overline{log(Income)}$	0.1004***	(0.0122)	0.1239***	(0.0106)				
$\overline{Education}$	0.0360**	(0.0183)	-0.0653***	(0.0160)				
$\overline{Age}$	0.0025	(0.0028)	-0.0019	(0.0025)				
1989	0.0332	(0.0306)	-0.0256	(0.0252)	0.0493*	(0.0297)	-0.0179	(0.0246)
1991	0.0460	(0.0315)	-0.0608**	(0.0259)	0.0719**	(0.0298)	-0.0465*	(0.0245)
1993	-0.0051	(0.0310)	-0.1007***	(0.0258)	0.0125	(0.0279)	-0.0816***	(0.0233)
1995	0.0702**	(0.0342)	0.0230	(0.0285)	0.1096***	(0.0300)	0.0475*	(0.0249)
1997	0.0234	(0.0372)	-0.0316	(0.0312)	0.0823**	(0.0319)	0.0051	(0.0262)
1999	0.0441	(0.0376)	0.1252***	(0.0321)	0.0784**	(0.0341)	0.1426***	(0.0291)
2001	0.0302	(0.0395)	0.0554	(0.0338)	0.0707**	(0.0338)	0.0755***	(0.0287)
2003	-0.0187	(0.0411)	0.1052***	(0.0356)	0.0251	(0.0330)	0.1297***	(0.0284)
2005	-0.0709	(0.0431)	0.1268***	(0.0375)	-0.0219	(0.0324)	0.1549***	(0.0282)
2007	-0.0301	(0.0455)	0.1172***	(0.0395)	0.0296	(0.0321)	0.1464***	(0.0278)
α	-0.7756***	(0.1369)	-4.8153***	(0.1101)	-0.2738**	(0.1133)	-4.1568***	(0.0882)

Source: Self Calculations

*$p < .1$; ** $p < .05$; *** $p < .01$

Table 11: Marginal effects. Sample: 1985 - 2007 (Odd Years) Specifications 2 and 3

	Sample: 1985 - 2007(Odd Years)							
	Specification 2				**Specification 3**			
	$Pr(H=1)$		$Pr(E=1)$		$Pr(H=1)$		$Pr(E=1)$	
	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.	$\frac{\partial Y}{\partial X}$	S.E.
Health_{t-2}	0.1512***	(0.0027)	0.0280***	(0.0046)	0.1788***	(0.0026)	0.0392***	(0.0044)
Employment_{t-2}	0.0005	(0.0022)	0.3387***	(0.0036)	0.0089***	(0.0021)	0.3672***	(0.0034)
log(Income)	0.0014	(0.0010)	0.0276***	(0.0017)	0.0076***	(0.0008)	0.0421***	(0.0013)
Sex	0.0049***	(0.0018)	0.1027***	(0.0031)	0.0050***	(0.0018)	0.1082***	(0.0030)
Age	-0.0045***	(0.0007)	0.0286***	(0.0011)	-0.0047***	(0.0006)	0.0275***	(0.0009)
Age^2	0.0000***	(0.0000)	-0.0004***	(0.0000)	0.0000***	(0.0000)	-0.0004***	(0.0000)
Education	0.0034	(0.0024)	0.0199***	(0.0041)	0.0102***	(0.0004)	0.0069***	(0.0006)
Disability	-0.1098***	(0.0029)	-0.1439***	(0.0054)	-0.1431***	(0.0023)	-0.1734***	(0.0040)
Single	0.0034	(0.0069)	0.0439***	(0.0097)	-0.0065**	(0.0032)	0.0225***	(0.0047)
Widowed	0.0147*	(0.0077)	0.0284*	(0.0151)	-0.0105*	(0.0055)	0.0428***	(0.0083)
Div/Sep	0.0084**	(0.0042)	0.0175**	(0.0073)	-0.0086***	(0.0028)	0.0371***	(0.0042)
White	0.0209***	(0.0049)			0.0230***	(0.0049)		
Black	-0.0155***	(0.0051)			-0.0189***	(0.0052)		
# Members FU	0.0026**	(0.0011)	-0.0129***	(0.0019)	-0.0021***	(0.0007)	-0.0142***	(0.0011)
Own	0.0043	(0.0034)	0.0045	(0.0054)	0.0152***	(0.0021)	0.0319***	(0.0035)
Health Insurance	-0.0085***	(0.0032)	-0.0456***	(0.0056)	-0.0025	(0.0026)	-0.0384***	(0.0045)

Source: Self Calculations

*$p < .1$; ** $p < .05$; *** $p < .01$