'Who Cares?!'

Studying the effect of Caregiving on labor market aspects using the Wisconsin Longitudinal Study

Master's Thesis

Wouter Burgmeijer

313973wb@student.eur.nl

Supervisor: dr. Margaretha Buurman

ERASMUS UNIVERSITY

Erasmus School of Economics

Department of Economics

September 2011

Abstract

Around the world, many people provide informal care next to a paid job. Sometimes only for months, sometimes even for years. This paper focuses on a special type of informal care; caregiving to family or friends, a rather obligatory task which is unpaid and which has to be carried out next to a paid job. In this paper, we analyze the effects of caregiving upon several labor market aspects. According to our hypotheses, caregiving yields negative effects upon hours worked and productivity and people who give care work more often part-time. However, further research shows that these negative effects of caregiving disappear when we control for either the number of household members (hours worked) or sex (productivity, parttime).

Keywords: caregiving, hours worked, participation, productivity

Table of contents

1. Introduction

1.1 Caregiving

Imagine that your Mother, Father, your spouse, a good friend or even your neighbor becomes very ill, suffers from a very bad mental or physical condition or has disabilities requiring long term care. In addition, it is more or less obligatory for you to give care since the person needing care is not able to buy enough personal care in the market. In the Netherlands, caregiving by friends or family is called 'Mantelzorg'. At least in the Netherlands, Mantelzorg is a serious phenomenon, since 2.6 million people provide 'Mantelzorg' in that Country, of which 1.8 million people combine Mantelzorg with a paid job.[1] Sometimes only for months, sometimes even for years. Mantelzorg are activities which are unpaid and which have to be carried out next to a job which puts serious weight on a caregiver's shoulders. *As a matter of clarification: for the rest of this paper the term 'caregiving' is used very often as a substitute for 'Mantelzorg'.* Sometimes caregiving is not given by only one person; it is well possible that giving care can be shared with family or friends. Plus, next to informal care (Mantelzorg), formal (paid) care may take place. In both cases, the caregiving task becomes less time consuming hence less heavy. However, Mantelzorg will always remain an activity which requires a lot of (unpaid) time from the caregiver which otherwise could be put into other activities.

This paper tries to capture the effect of caregiving on caregivers' labor market aspects like total hours worked and productivity. When the (expected negative) effects on one or more labor market aspects turn out to be large and significant, this could be a serious eye opener for governments and employers to find ways to make it easier for caregivers to combine a job with the duty of caregiving. In the Netherlands, very recently a new CAO (collective labor agreement) has been adopted for certain trade unions with the purpose of making the combination of work and giving care more easy.[2] Plus, a new law has just been proposed which makes it easier for caregivers to take more days off (with the purpose of giving care) while at the same time keeping their job in the Netherlands.[3] These developments in law

---

[1] Timmermans, de Boer, van Campen, de Klerk, de Wit and Woittiez. (2001)
[2] http://www.werkenmantelzorg.nl
[3] www.rijksoverheid.nl

already point to the importance of caregiving in the Netherlands. Our study however, focuses on caregiving in the United States.

The labor market aspects we analyse are productivity, total hours worked, the choice between a part or fulltime job and participation (the decision whether to work or not to work). To mention a few of these papers already; in 'Husband's health and wife's labor supply, Berger and Fleisher (1984) conclude that when the health of a wife's husband deteriorates, the hours worked depends on the available labor market transfers. If those are sufficiently high, the wife spends more time giving care to her husband which comes at the cost of a decrease in market work (time dedicated to her job). In addition, Ettner (1995) finds in 'Impact of "Parent Care" on Female Labor Supply Decisions' that "corisidence with a disabled parent" leads to a significant reduction in hours worked and this is primarily due to a complete withdrawal from the labor force. Also, giving care to a corisident has a larger (more negative) effect on total hours worked than giving care to a person living outside the household.

This paper adds value to the current literature in a number of ways. First, there is not a very big amount of literature available. In fact, most of the current literature is about total hours worked. About the other labor market aspects, literature is even more scarce or absent at all. We try to expand the current literature on hours worked and at the same time start with the expansion of literature on the other labor market aspects mentioned above. We try to accomplish these goals by making use of a great database which is pretty unique in its existence with respect to the number of respondents and variables: The Wisconsin Longitudinal Study (see Methodology).

Main research question:

What is the effect of caregiving on a caregiver's labor market outcomes?

Subquestions:

1. What is the influence of caregiving on the caregiver's total hours worked, decision on parttime or fulltime employment, productivity and participation?

2. What are the differences between married and unmarried caregivers, caregivers of a different age or sex, caregivers with a different number of household members and caregivers with a different family income?

1.2 Expectations

In this paragraph, we will formulate our first expectations very shortly. With respect to caregiving, we expect giving care to have mainly negative effects on labor market aspects. When people have to fulfill the duty to give care, they probably have less time to work reducing the total number of hours worked. As another consequence of less available time to work, caregivers could also be more intended to work parttime instead of fulltime. Concerning productivity, we expect that caregivers could become less productive, for example because they cannot fully concentrate on their work anymore. Regarding participation, we expect caregivers to abstain from working more often than non-caregivers because caregiving is a time consuming process which comes at the cost of other activities such as paid work.

With respect to the variables mentioned in the subquestions, we expect married women to reduce their working hours more than unmarried women do. Because of the traditional division between men (breadwinner) and women (household), we think that a married women will take up the caregiving task in most cases. Furthermore, we expect that for individuals that live together with other household members, caregiving has less negative effects since giving care could be shared with those others in that case. The same expectation goes up for the number of children a respondent has. If a person has one or more children, the caregiving task can be shared with those children which diminishes the expected negative effects of informal care. Regarding family income, we expect that for caregivers with a higher family income, the likelihood of a decrease in working hours is higher. That is, individuals with a larger household income will more often diminish working hours because they will still earn a relatively high income thereafter. To end with, we expect that females, whether married or unmarried, more often stop working due to caregiving. Because traditionally women earn and work on average less than men, women are probably more inclined to stop working because their participation constraint is more often violated than is the case for men.

1.3 Structure

This paper is organized as follows. Chapter 2 presents the Related Literature to the research. Chapter 3 presents the Methodology of the analysis. We will describe the Wisconsin Longitudinal Studies database in more detail and examine possible validity restrictions of the research. In the fourth and fifth chapter, research findings and their consequences are being interpreted and discussed. Also, research findings are compared to results of colleagues in the field. Then, a conclusion will recap the most important findings, state the potential value to society and answer the research question. At the end, in the discussion part we will comment about possible shortcomings of the research, suggestions for further research and some other after-words.

2. Related Literature

## 2.1 The labor-leisure tradeoff

We decided to start the literature analysis with a rather general labor market aspect; the labor-Leisure decision. The ideas follow from 'Labor Economics', a book written by George J. Borjas. In turn, some important insights from this book follow from 'A Theory of the Allocation of Time' by Gary S. Becker (1965). As the name says, the labor-leisure tradeoff is about a person or family choosing either how much to work and how much to take leisure. Say the only things a person could do with his money are to consume it or to take leisure. Intuitively, when the optimal amount of leisure is determined, so is the optimal amount of working hours (Hours worked = Total hours available – Leisure).

When this person has to make such decision, he or she wants to choose the combination of consumption and leisure which results in maximized utility. A budget constraint captures all the possible combinations of leisure and consumption out of which the person can make his choice. In addition, there are multiple indifference curves; every combination of leisure and consumption lying upon the same indifference curve gives the same utility. The optimal combination of consumption and leisure is at the point where the budget constraint is

tangent to the indifference curve (the highest indifference curve which just can be reached). See figure 1.

Now, imagine that the total income of the person above suddenly goes up. Important is that it is an increase in total income while holding the wage rate constant! According to Borjas, the effect is a parallel upward shift of the budget contstraint equal to the amount of the income change. The result of the upward shift of the budget curve is that the person has in fact a greater opportunity set due to the income change. The conclusion is that Ceteris paribus, if leisure is a normal good (which is intuitive and means that leasure increases with income), the amount of leisure in the optimal bundle increases with total income. This effect is called the income effect. The income effect is showed graphically in figure 1. The red lines show the budget constraints for the family of individual. The upward shift of the budget constraint shows the increase in total income. Recall that the optimal combination of leisure/hours worked and consumption is at the point where the budget constraint and the highest attainable indifference curve intersect. In the 'old situation', this was at p0, while in the situation with increased total income, p1 is the optimal bundle. Clearly, in the new situation, the hours leisure (hours worked) are higher (lower) than in the situation before the increase in total income.

Figure 1
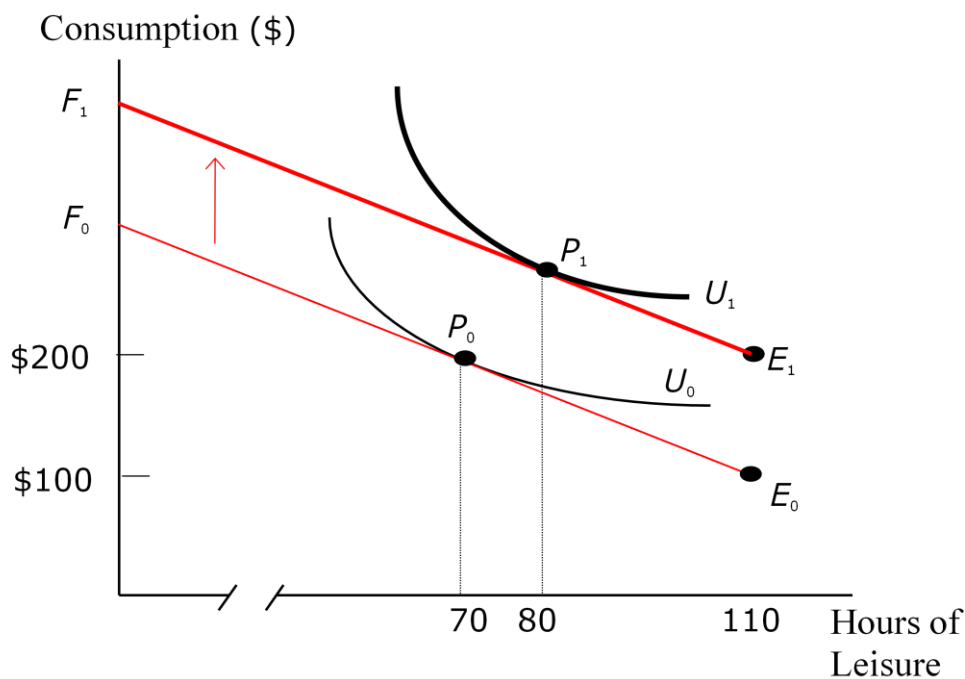
2.2 Caregiving and the tradeoff problem

When expanding our view with respect to caregiving, we could see caregiving as a third tradeoff variable. For example, a person could choose either to consume, to take leisure or to give care. In the framework sketched by Borjas (figure 1), we would see caregiving as an exogenous time consuming activity that comes at the cost of all other activities. We think that caregiving shifts the budget constraint down and hence decreases the optimum level of both consumption and leisure.

We want to give attention to 'Leisure, Home Production and work: The Theory of the Allocation of Time revisited' (1977) by Reuben Gronau, who modeled a similar decision problem. That is, he formalized the choice between working in the market, working at home and enjoying leisure. Home production is a perfect substitute for market work (same marginal utility) and is subject to diminishing marginal productivity in his model. Results are that an increase in hourly wage leads to a reduction in work at home and that it has an undetermined effect upon leisure. Besides, an increase in total income increases leisure, decreases market work and leaves working at home unchanged. The results are quite intuitive.

The assumption that work at home involves the same marginal utility as work in the market creates difficulties regarding the implementation of caregiving in the model. Gronau speaks of household production as being a perfect substitute for paid work and Gronau also says that home production yields "no utility per se".

 We would not see caregiving as a perfect substitute of market work. On the one hand, caregiving is a kind of activity that is performed at home and does not create utilities which are as large as in the case of paid work for most people. Besides, caregiving can indeed be expected to give direct utilities. For example, caring for an ill spouse can give you a good feeling and hence create direct positive utilities. Gronau himself also admits that comparison problems like this can arise: "Child care, cooking, gardening etc., clearly create direct utilities (positive *or negative*)." There are also others who support our way of thinking that caregiving is different from paid work, cannot be seen as a perfect substitute for paid work and can generate direct utilities. Jean Kimmel and Rachel Connelly state that caregiving cannot be the same as household production in Gronau's model because of the assumption

that production at home cannot create direct utilities per se. They would treat caregiving as a third variable besides market work and leisure (Kimmel and Connelly, 2007).

Although lack of comparision possibilities, we still got insights from Gronau's work and of the basic work-leisure model. We decided to include familyincome as a proxy for total income and predict that, according to the income effect, that people earning a higher total income give more informal care and decrease their working hours. However, to place this in a different light, we want to point again to the fact that caregiving is rather obligatory in our paper. Hence, caregiving is more or less fixed and can be expected not to fluctuate very much. By the same reasoning, the income effect is probably not at play very much.

Another variable we use in our analysis due to the story above about income and substitution effects is a variable describing that, when someone is giving care, to whom most care is given then (Husband, Father, Mother, Brother, Sister, Friend). If, say a wife, has to give care to her husband, this has serious consequences for total family income because the welfare of the household now solely depends on the wife's earnings. On the other hand, if the same women has to give care to her mother for example, then her husband probably still works and retains his income for the household. In the former case, the expected reduction of working hours due to caregiving can be expected to be less severe than in the case where the husband still works.

2.3 Male and Female labor supply

There is literature which pays special attention to gender differences with respect to labor market aspects, mostly about labor supply, where the majority of literature is about female labor supply. In the paragraphs below, we summarize some striking results. Starting with male labor supply, an observation is that men spend less lifetime on market work over time. This can be attributed to several facts. To mention a few; men spend more lifetime on education, workers retire earlier, workdays became shorter and an increase of holidays and holiday lengths can be observed (Ashenfelter and Layard, 1986). In a more global perspective, also trends with respect to male participation rates can be observed. What strikes is that participation rates for men, especially for older men, decline in all observed countries. This (post World War II) overall decline could be caused by "the expansion of government-organized social security systems" (Ashenfelter and Layard, 1986).

Turning to women, although for men a decline in the participation rate can be observed, for women the opposite is true. Furthermore, the participation rate of women has grown very heavily in the past decades in almost every developed economy and this can be observed for women of almost all ages. The strong increase in the participation rate of women is mainly attributable to the increased participation of married women while the participation rate for single females slightly decreased. Furthermore, women seem to work less hours per week compared to a number of years ago. The authors suggest that this could be partly the result of the fact that, within each cohort, although the participation rate increased, there are very much women who work only parttime among the women within a cohort and hence the average weekly hours worked decreased. It is clear that women work more nowadays than a couple of decades ago. Ashenfelter and Layard also make a distinction in the type of jobs which women have (blue collar versus white collar). It seems that, in particular in the United States, the increase of female labor supply goes hand in hand with an increase of females having a white collar job, also relative to men. In contrast, the percentage women who have a blue collar job decreased over the past years while for men the opposite is true. Hence, both in absolute and relative (to men) terms, the growth of female labor supply is accompanied by an increase of females in white collar jobs.

Looking at trends in female labor force participation across the globe, two trends are most important. The first observation is that female labor force participation is increasing in the majority of countries (Borjas, 2001). To name a few, some countries in which the increase in female labor supply is found to be substantial over the period 1980 – 2003 are Greece, Ireland and Japan. In other countries like Sweden, even in 1980 women made up a large part of the labor force already. Such countries are more exception than rule unfortunately.

Second, the growth of emancipation differs very much across countries. Borjas claims that this has probably to do with differences in countries' culture and economic well being. Also, in the United States (area of interest of our paper), we see increases in female labor force participation both among and across cohorts. On the one hand, female labor force participation seems to increase in a cohort study. This means that when the same women get older, they are more likely to participate in the labor market (James P. Smith and Michael P. Ward, 1985). On the other hand, labor force participation is more likely for women of

younger cohorts, pointing to the fact that apparently emancipation was not so usual a few decades ago.

Further, the (real) wage rate seems to be a key determinant of the female participation rate which can be seen in figure 2 (J. Mincer, 1985). Intuitively, when the real wage rate increases, more unemployed women are incentivized to start working. In the United states, the growth rate of female participation is very low hence the figure suggests that this is the case because the fact that the wage rate growth was small there. However, keep in mind that the figure is about growth rates and not about absolute numbers. For example, female Labor Force participation in the United States was with a female participation rate of 71.3% already one of the most emancipated countries in the world in 2003 (Table 2-4, Labor Economics, Borjas).

Figure 2
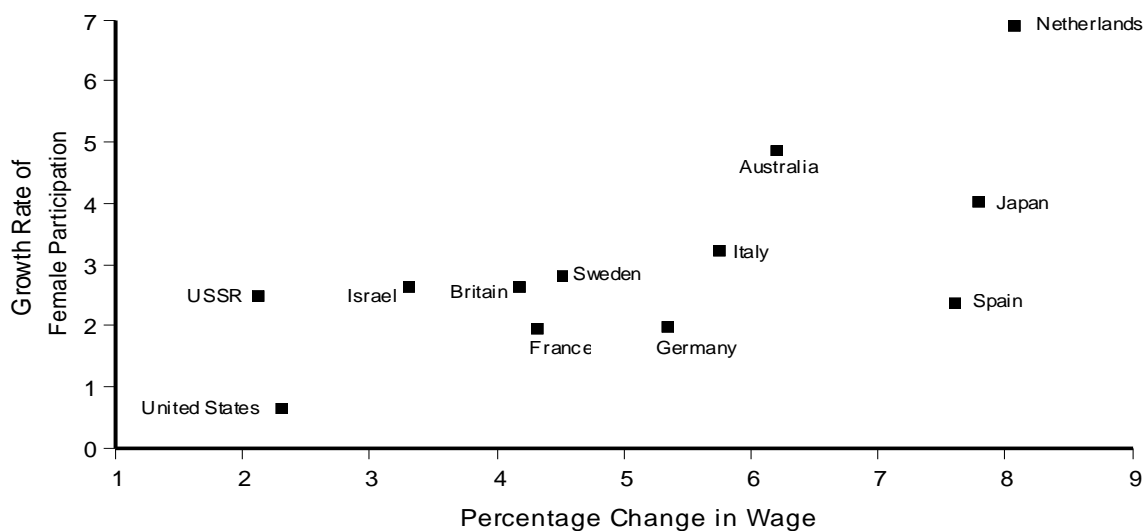
2.4 Household labor supply

A vast amount of literature exists with regard to 'Household Labor Supply', which focuses on labor supply of married men and women living together in one household. In 'The Household Production Function', Borjas (Borjas, 2001) describes the economic dilemma of the division of labor between wife and husband. He shows in a model that within a household, it is optimal for the person with the lowest wage or the greatest marginal household production, to specialize into household production. Borjas describes Household

production as activities like "a neat and well-behaved child or a good meal". Although these activities are definitely valuable, they can (in most cases) not be sold in the marketplace. He also relates this finding to empirical evidence that women earn less than men on average and that therefore, traditionally (although this is changing), women spend more time in the household whereas men mostly fulfill the role of 'breadwinner'. However, the wage gap narrows nowadays, decreasing the incentives for specialization. As a result, there are more and more so called "Mr. Moms": men who are specialized in household production. The paragraphs below will illustrate the model.

Following Borjas, consider a married couple, Jack and Jill. Jack and Jill's opportunity set is much bigger than in the case they weren't married. Probably for the sake of simplicity, Borjas considers being married as a condition for the expansion of the opportunity set. Nowadays, couples, living together but not married, are also in a position to expand their opportunity set. Hence, we would not see the condition 'being married' as a very important condition for the model to hold. Back to the model, figure 3 illustrates the expansion of the opportunity set for the (married) couple. In the model, Jack produces $10 output per hour in the household while Jill produces $25 per hour in the household. Contrary, Jack's wage is $20 per hour in the labor market while Jill's wage is only $15 per hour. This clearly illustrates the general observation that women earn less than men on average but are more productive in the household. Individual budget constraints can be seen in the bottom of figure 3.

When Jack and Jill are able to combine their budget constraints because they live together as a couple, we get the combined budget constraint (see also figure 3). On a normal 10 hours working day, Jack could produce/earn $100 in the household while Jill could $250 in the household making a total of $350 together (point E). When both Jack and Jill only work in the labor market they also earn $350 together (point G). The household's budget constraint is characterized by GFE.

Which point on the budget constraint the couple chooses, depends on the positioning of the highest indifference curve. If the indifference is tangent to the budget constraint at location F, then both Jack and Jill specialize in the activity they are most productive at. However, the relevant indifference curve could as well be positioned to the left or right of point F. What can be said with certainty, is that the indifference curve will intersect at point F when Jack's

budget constraint becomes steep enough. That is, his wage in the labor market becomes high enough. Hence, if Jack's wage is high enough compared to that of Jill, then Jill completely specializes into household production and Jack works the whole working day at the office. On basis of this model, we expect women to specialize more in household production because we expect their hourlywage to be lower than that of men. Although the wage gap between men and women closes gradually and women get more emancipated, there is still wage difference between men and women unfortunately.
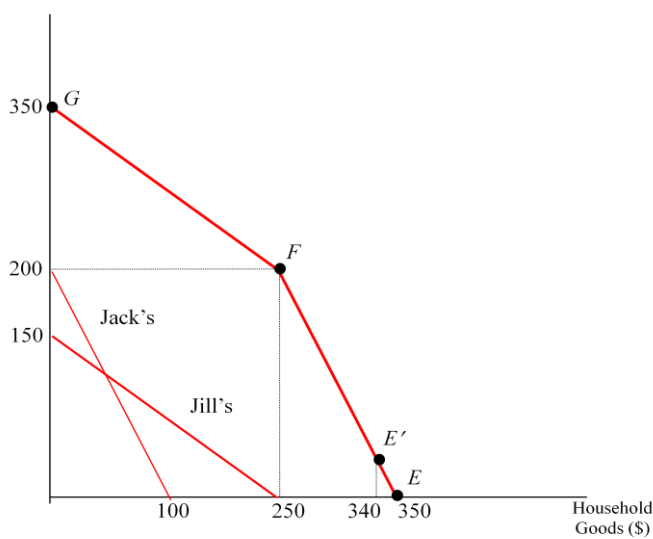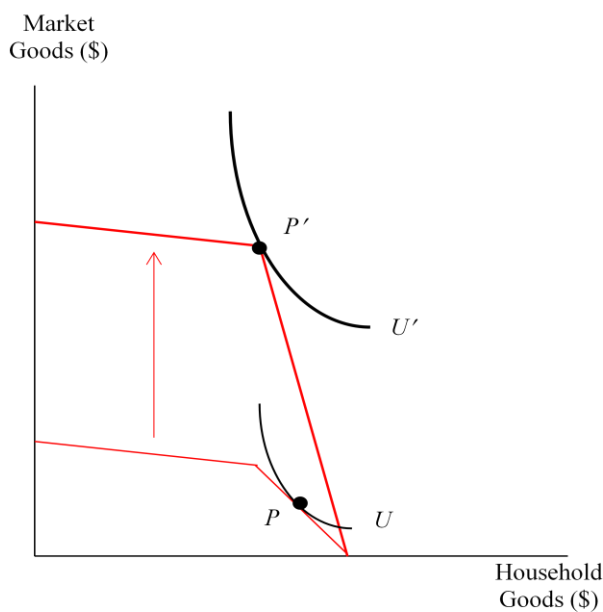
Figure 3

Figure 4

Here, it is assumed that the husband works. But, what if the husband does not work? If he is unemployed, it could well be possible that the wife has no choice other than to spend most hours in the labor market, simply because she is the only person earning money for the household. To put it into the framework of the model above; when the husband does not work, he has the lowest marginal productivity (zero in fact) in the market and he can be expected to specialize (at least for a while) completely in household production while it is highly probable that the wife fully specializes in the labor market.

In the context of our paper, as discussed before, caregiving can be seen as a third activity which is a rather obligatory task and which has to be fulfilled next to a paid job and next to household production. Imagine the situation where Jill is more productive in household production wheras Jack is more productive in paid work. According to the model above, when we assume that because Jill is more productive in household production, she will likely specialize into household production. We expect the same thing to happen with respect to caregiving. That is, if Jill is more productive in caregiving she will specialize in it and if Jack is more productive he will. When determining the eventual combination of hours spend on the three different activities, this depends on the fact who is more productive at giving care. If Jill is more productive at giving care, she will likely take up most of the caregiving responsibilities. Of course, this comes at the cost of the time Jill can devote the household production she was at first specialized in. For Jack, Since the marginal productivity of paid work is higher than marginal productivity of household production, he will likely not reduce his work in the labor market to compensate for the loss in household production. Similarly, when Jack is more productive at giving care, he will reduce labor market hours and Jill will not start to work more as to compensate the loss in earnings.

 In the Netherlands, almost all new jobs (98%) in the health sector are being picked up by women[4] and we think that this is also the case for the majority of other developed countries. According to the theory about household labor supply, the reason for the fact that so much women join the health care sector could be that indeed women are more productive in giving care compared to men. Therefore, we expect women to give more care in our research.

---

[4] www.volkskrant.nl

2.5 Caregiving and labor market aspects

Not much research has already been carried out in order to investigate the relationship between caregiving and several work-related variables. In fact, almost all available literature aims at doing research on the effect of caregiving upon total hours worked. There is not enough literature about productivity, participation and the parttime/fulltime work decision to be able to create a separate paragraph for those variables of interest. However, the scarce amount of literature concerning these variables can be found throughout the paragraph about the hours worked decision. Although there is not much literature available, Parsons (1977) stresses in 'Health, Family Structure, and Labor Supply' the importance of doing further research on wage rates and productivity (like we also do in the discussion at the end of the paper). In the paragraphs below, some scientific literature is summed up to give a nice overview about what has been researched before in this field of interest. The complete reference list of all described literature can be found in the chapter 'Bibliography' at the end of the paper.

2.5.1 General discussion

 Before continuing, please give attention to a few points which will be discussed in more detail in the Methodology part. First of all, there is the possibility of a two-sided relationship between caregiving and work aspects: while caregiving could be expected to influence job type, job status and productivity, the opposite may be true as well. Not all studies control for this possibility. The consequence is that in those studies which do not control for a possible two-sided relationship, some significant coefficients may be overstated. One possibility to look at the one-sided relationship of caregiving upon work aspects is to use an instrumental variable (IV) approach, a solution which this research also comprehends.

 Another issue involves the comparability of research findings. This paper is about caregiving to either family or close friends. This kind of caregiving, also called 'Mantelzorg' in the introduction, could be different from the kind of caregiving which some other authors adopt. That is, some authors consider caregiving as giving care to people who are not close friends or family. The difference lies in the fact that giving care to family or good friends is in a sense not voluntarily but obligatorily while giving care to people who do not stand close to you is

often only voluntarily (and paid). The possibility of endogeneity issues is probably smaller in the former case, because obligatorily caregiving is rather fixed and can be seen as more or less exogenous. Although the discrepancy about the precise meaning of caregiving could give rise to different endogeneity biases and results across studies, we predict that our research suffers relatively less from endogeneity issues by the reasoning above.

2.5.2 Total hours worked

The most literature about the effects of caregiving on labor market aspects covers the effect of caregiving on 'Total hours worked'. Broadly seen, the literature can be separated into three parts. The first part is about the labor market effects of the caregiving in general, the second part is about caregivers who give care to their husband or wife and the last part is about caregivers who give care to one or both of their parents.

We start this part with a few papers which are about caregiving, where it is not specifically mentioned to whom care is given. The first paper is 'The Economics of Informal Care: Labor Market Effects in the National Hospice Study' (1986) in which Muurinen does research on the effects of caregiving on labor market aspects. Note that the authors talk about 'Voluntary Caregiving' which is different from the 'Mantelzorg' which this paper is about. However, we will still give attention to the results of Muurinen's paper. He founds that much caregivers stop working at all due to their caregiving duty and that the likelihood of exit increases with the caregiver's age and the 'female gender'. In contrast, the likelihood of exit decreases with the respondent's family income. A clear point which the author makes is that caregiving leads to income losses, no matter whether a caregiver keeps working or decides to leave the labor market.

In 'The Impact of Caring on Informal Carers' Employment, Income and Earnings: a Longitudinal Approach', Bittman et al (2007) use the 'longitudinal Household, Income and Labour Dynamics in Australia Survey' to analyse the effects of caregiving on labor market outcomes. The authors come to the conclusion that caregivers really cope with a disadvantage compared to non-caregivers. For caregivers, the likelihood that hours of work are reduced, or that the person abstains from working at all, is higher. Plus, the income level of caregivers is lower on average.

Also, using panel data from the 'Household, Income and Labour Dynamics in Austraila survey', Andrew Leigh concludes in 'Informal care and labor market participation' (2009) that caregivers work less, work less often, earn lower wages and have less life satisfaction. However, when individual fixed effects are included ("to account for individual heterogeinety"), much coefficients become either smaller or insignificant.

Besides, Axel Heimueller uses a total of twelve waves of 'the British Household Panel Study' to study differences between caregivers and non-caregivers in terms of earnings and participation in the labor market. First, he finds that the likelihood a caregiver will join the labor market at the end of his caregiving duty is smaller than for a non-caregiver. Second, in terms of earnings, caregivers earn substantially less than their non-caregiver counterparts.

In 'The Effect of Informal Caregiving on Labor Market Outcomes in South Korea' (2008), Do uses the 'Korean Longitudinal Study of Aging'. He concludes that caregiving has negative effects upon labor force participation and hourlywage. However, these results are only at play for women, not for men.

To end with, 'The Economics of Informal Care' (Muurinen, 1986) is about the effects of informal care on labor market aspects. People who gave care were faced with a serious loss in earnings, compared to people who did not give care. This was mainly the case because more than one quarter of the caregivers stopped working at all (left the labor force). The likelihood that a caregiver quits the labor force seems to be increasing in age, female gender and seems to decrease with (annual) family income.

As mentioned earlier, there are also some papers which focus on the effects of giving care to either husband of wife. The first paper worth mentioning is 'Health, Family Structure and Labor Supply' (Parsons, 1977). Parsons concludes that when a respondent's spouse becomes ill, men work less and increase home production, while women actually start to work more. Results could be quite intuitive when the spouse needs care: when the husband's wife becomes ill, the husband reduces labor market time as to care for her wife and to take over household activities. When a wife's husband becomes ill, the wife could have to work more because of the husband's loss in earnings while at the same time spending time at both household activities and caregiving. She can combine all these tasks because according to

Parons, these increases in home production (men) and labor market time (women) do mainly come from leisure time.

Secondly, Berger and Fleisher investigate in 'Husband's health and wife's labor supply' (1984) the effect on a wife's labor supply due to a deterioration of her husband's health. The Authors make use of a longitudinal approach to estimate the effect of the deterioration on the wife's labor supply. The results seem to depend on the height of labor market transfers the household receives when the husband suddenly needs care. When those transfer increase, the wife reduces market work (spends less time on a paid job) while giving more care to her husband. Berger and Fleisher state that 'if the loss in family income is small enough to be outweighted by the increase in the husband's need for care at home', the wife reduces her labor market activities.

The literature part of our research ends with some papers that are about caregiving to parents. We investigated two papers of Ettner, both written in 1995. The first paper of this author is 'The Opportunity Costs of Elder Care' in which Ettner does research on the impact of caregiving to disabled parents on the labor supply of the caregivers. Results seem to depend on whether the caregiver lives with the disabled parent in one house (corisidence) or that the respondent gives care to a parent living outside the household. Giving care to parents living either inside or outside the household both yields negative effects on labor supply with the effects of corisidence and the effects on women being larger.

The second paper of Ettner is called 'The Impact of "Parent Care" on Female Labor Supply Decisions' and is also about the effects of caregiving to elderly parents on female labor supply. Again, the researcher concludes that giving care to an elderly disabled parent leads to a reduction in labor supply but this reduction is primarily caused due to a 'withdrawal from the labor force' (making total hours worked equal to zero). As in the first paper of Ettner mentioned above, giving care to a corisident parent yields a larger (read: more negative) impact on labor market participation. The author's explanation for this finding is that when giving care to (a) corisident parent(s), a women might find it impossible to reduce her hours worked and at the same time retaining her job.

Next to Ettner's research, we consider 'Married Women's Allocation of Time to Employment and Care of Elderly Parents' (1994) by Wolf and Sodo. As the title already indicates the paper

is about the labor supply reaction due to the need to give care to an elderly parent. Results are that among married females, caregiving to elderly parents does not lead to any reduction in total hours worked. According to the authors, the reason for this observations is that it is "due to the division of domestic labor among men and women". Traditionally, women spend more time on working in the household compared to men who spend more time on a paid job. As already explained in the introduction; when suddenly an elderly parent needs care, the women will carry out the task of giving care since she is already more (than her husband) devoted to work at home. The traditional division between men and women is now changing into a direction where women start to spend more hours on a paid job and to make more career as well. The authors claim that it is not only the traditional division between men and women which could explain the differences of caregiving between men and women, but that "women tend to be far less specialized in their uses of time than are men", which means that women more often face "complex coordination problems involving a balancing of the simultaneous demands of job, household and parental care".

The final paper we consider is 'The Competing Demands of Employment and Informal Caregiving to Disabled Elders', published in 1990 and written by Stone and Short. They conclude that for caregivers, the likelihood of reducing working hours, the chance of leaving the labor market, as well as the probability of changed work schedules due to caregiving is greater. Also, "being female, white and in fair-to poor health increased the likelihood of work accommodation". Last but not least, even the prospect of carrying the heavy weight of the caregiving duty scares people and makes some respondents abstain from work at all.

2.5.3 Conclusion

From the literature summed up above, there are some findings which return in many if not all of the papers read. First, almost all papers conclude with the observation that caregiving yields negative effects. More specifically, caregiving affects mainly hours worked in a negative and significant way in the majority of the investigated literature. Furthermore, although literature is scarce, caregiving yiels negative effects upon participation and wages.

A few papers add a condition which has to be fulfilled in order for a negative effect to arise. For example, in Berger and Fleisher, 1982, the condition for the negative relationship upon

hours worked was that the loss in family income is low enough. Also, in (Ettner, 1995b), the negative effect when caring for parents could only be observed when the parents were coresidents. Another important thing which came forward in almost all literature was that caregiving has mainly negative effects for women whereas there is no significant effect for men on the contrary. The last and final observation which came to speak in around four or five papers was the fact that caregivers earn less on average.

2.6 Evidence from the Netherlands

Some people with a paid job have to cope with a caregiving duty with a higher probability. For example, women often have a greater social network than men, they can be expected to know more people who are in need of care, hence they are more often put into the role of caregiver compared to their male counterparts (de Boer et al., 2010). On average, female caregivers form a majority both among caregivers with a paid job as well as people not active on the labor market (de Boer et al., 2007). Also, for relative old employees the chance of a having to perform a caregiving duty is higher than younger employees since their parents and parents in law have reached an age where caregiving is most commonly observed. However, differences between people with a paid job, including the examples above, are not significant. Hence, for every person with a paid job, the probability of having to perform a caregiving duty is more or less the same (de Boer et al., 2010).

Then, if a person is confronted with the inevitable caregiving duty, it seems that women provide care more often and also more often go down under the pressure of caregiving. A possible explanation for both findings could be the gender differences with respect to labor and caregiving. While women mostly see paid work as a right and caregiving as a duty, for men the opposite seems true. Plus, an explanation for the observation that women feel more pressure than men is probably the need to care for children at home while the husband is at work (de Boer et al., 2010).

Whether someone works, how much hours someone works and under which circumstances does not influence the decision to give care. This points again to the fact that 'Mantelzorg' is rather obligatory; in many cases refusing to give care is no option. Remember that what we try to establish the effect of caregiving upon work related variables, exactly the other way

around. Hence, the finding that work aspects don't influence caregiving does only support our research.

In total, three out of four caregivers combine the caregiving with a paid job while one out of four caregivers also combine those two duties with unpaid work. Caregivers who combine caregiving with a paid job are on average younger, have a young children, are highly educated and healthy. (de Boer et al., 2007) Although 75% combines caregiving with paid work, out of all working caregivers (with a paid job), 6% works less and 9% even stopped working completely as a result of caregiving. Also, 8% refused an offer to work more. This is probably the case since caregiving is a very time-consuming activity. Among the non-working caregivers, 13% pointed to the fact that they feel restricted regarding entering the labor market again due to the weight caregiving puts upon their shoulders.

To give care and still perform well in the market is often very difficult to combine. One way to be able to earn money while at the same time giving care to a family or friend, is to make sure to work flexible, which means that you can decide merely yourself when and how long to work. Another possibility is to take additional day offs in order to create more free time (de Boer et al., 2010). A third possibility is to spend less time in the household: one third of all caregivers embraces this solution. A fourth and last solution which is frequently used is to send your children to a child care facility (de Boer et al., 2007). To end with, what is done very often is to share the duty to give care with both other household members and formal caregivers. This reduces workload substantially. After all, keep in mind that caregiving still comes at the cost of a caregiver's time for other activities, no matter how good the proposed solutions might be.

2.6.1 Conclusion

In the first paragraph, the question was addressed which people were most likely to give care. We call this 'caregiving participation'. Among people, mainly women and relatively old employees participated into caregiving in the Netherlands. Thereafter, we have seen that among people who actually participated, women gave most care.

Most papers pay attention to differences between paid and unpaid caregivers. Among people with a paid job, there are no significant participation differences between different

groups of people (like between men and women). Plus, when people actually gave care, comparing paid and unpaid caregivers showed us that paid caregivers are on average younger, healthier, have younger children and are higher educated. But, paid caregivers work less or stop working at all.

Also, unemployed caregivers feel restricted to enter the labor market again. Caregiving puts serious weight upon one's shoulders. It is certainly no choice, it is an obligatory task which often has to be done next to a heavy job. Some solutions to make combining market work and caregiving more easy were also proposed. Among them were: taking additional days off, flexible working and sharing duty with other household members.

The research carried out in the Netherlands gave us new insights into caregiving and the motivations and characteristics of caregivers. De Boer et al. could gather much detailed information about caregivers by making use of very detailed questionnaires. What could be put in line with the other literature is mainly the difference between men and women. For women, the probability of giving care is higher while at the same time women give more care than men.

3. Methodology

3.1 Wisconsin Longitudinal Study Database

For the analysis, the Wisconsin Longitudinal Study (WLS) database has been used. "The Wisconsin Longitudinal Study (WLS) is a long-term longitudinal study using a random sample of 10,317 men and women who graduated from Wisconsin high schools (USA) in 1957. Most of them are part of the well known 'babyboom generation'. "The WLS sample is mainly of German, English, Irish, Scandinavian, Polish, or Czech ancestry" who have at least a high school education.

The large database consists of over 200 variables providing researchers with a great diversity of data. It provides rich data in different scientific fields like economics, sociology and demography and it is frequently used for academic purposes. The data for research were

collected from original respondents or their parents in 1957, 1964, 1975, 1992 and 2003 and data was also collected from siblings of the original respondents. Not all variables are available for multiple years. A decent number of variables are either called archived data and are supposed not to change over time (such as sex and IQ), or data is available for only one year (reason unknown). For this study, either variables out of the 1992 wave or archived variables are being used, mainly because the availability of data in this wave.

3.2 Methods used

Before starting with the main analysis, it is important to have a closer look at the variables used. That is, we use descriptive statistics and frequencies statistics to look at mean, median and possible outliers. When there are no remarkable things to notice, we can proceed to the main analysis.

For the main analysis, in order to estimate the regression parameters, Ordinary Least Squares (OLS) is used in the first place. OLS is a convenient way to do a cross-sectional study analysis and it is widely used by many researchers in multiple fields of research. The research is carried out as follows. The main analysis consists of a total of twelve regressions, three for each dependent variable. For each dependent variable, the first regression only contains the 'caregiving' variable, the second regression contains both the caregiving variable and some specific control variables which may influence the results (see research question, subquestion 1). The third regression also adds the other control variables and captures essentially all selected variables. All regression parameters are judged upon sign, size and significance level.

Furthermore, we will use an instrumental variable (IV) approach in order to cope with possible endogeneity in the research findings. To give an example: instead of caregiving having a negative effect on working hours it could be that total working hours leads to less caregiving instead. To control for the possibility of a two-sided relationship we search for an instrument for caregiving, which is a variable that is of strong influence upon either caregiving or the dependent variables but not upon both. To carry out the IV approach in SPSS, Two Stage Least Squares is used (following Ettner, 1995).

Recall that, although we opt to use the instrumental variable approach for matter of robustness, the possibility of causality problems is probably not so large in case of 'Mantelzorg' compared to voluntary caregiving. This has to do with the fact that 'Mantelzorg is obligatory care whereas voluntary caregiving is voluntarily (as the name says). With respect to the obligatory care, one could argue that the possibility of reverse causality is smaller; a variable like 'Hours worked' can be expected to have a much larger impact upon voluntary care than upon obligatory care, since the latter type of care has to be given anyhow, no matter the time spend on other activities.

3.3 Variables used

Let's start with one of the most important variables throughout the research; caregiving. People either give care or they don't. When respondents said they do, they gave personal care to a family member or friend due to physical/mental condition, illness or disability at least once in the past 12 months and for a period of one month or more (see table 1).

As dependent variables, four labor market variables are used. The first variable is 'total hours worked' which captures the total number of hours a respondent worked throughout the past 12 months. The second variable is a dummy variable which specifies whether a respondent worked full or part-time during his current or last job. The third variable is a respondent's most recent hourlywage, which has been used as a proxy for productivity. The reason for using hourlywage as a proxy is that productivity is very difficult to measure and hourlywage is commonly used as proxy. 'Participation' represents the fact whether a respondent works or does not work. A respondent is called to be participating when he/she either currently works or has worked in the past 12 months (i.e. has a paid job). Formally, someone participates if hours worked during the past 12 months exceed zero.

Furthermore, as in every decent regression analysis, several control variables have been selected. Control variables can be separated into two groups. The first group consists of variables which we expect to influence the relationship between caregiving and labor market aspects, and can therefore be expected to change the results. To recap, the variables which are prone to influence the results are the variables 'Married', 'Members' (a count of the number of household members), 'Family Income' which is an accumulation of the household members' total incomes, 'children' (number of children), a variable describing to whom most

care was given by the caregiver (Whom_care) and a variable describing whether the spouse of the respondent works or not (spouse_work). We decide to include these variables because they are either the result of a brainstorm process in our heads, or they were included after investigation of existing literature about caregiving.

The second group of controls consists of rather 'general' control variables such as sex, age, IQ and education. Although all variables have been included with a reason, 'sex' deserves the most attention. Much literature, if not all, pays attention to gender differences. In fact, in most scientific papers, women tend to suffer more from caregiving than their male counterparts. Most of the time, this translates into women working less as a consequence of informal care while for men there's no significant effect. More information about these control variables, as well as all the other variables described above, can be found in table 1.

4. Pre-analysis

Before we run the total of twelve regressions and estimate the coefficients, we first do a 'pre-analysis'. Each variable is judged upon number the of observations, mean, standard deviation and missing values. The results can be found in table 2.

At first sight, the number of observations is decent for almost all variables included. The variables that have the smallest number of observations are 'Hourlywage', 'Whom_care' and 'Spouse_work'. Unfortunately, the variable 'Hourlywage' consists of only 3442 observations which is really small. Especially for this variable, the lack of observations could be a problem since it is one of the variables of interest and it makes decent analysis more difficult. Besides, the variables 'Spouse_work' and 'Whom_care' consists of only 3249 observations and 229 observations respectively. Since the number of observations for these variables is also very small (especially whom_care), we decided to exclude them from the main analysis. Although the variable 'whom_care' lacked observations, we still tried to do a regression analysis with this variable. But, as expected, running a decent OLS analysis was not possible due to the lack of observations. For the other mentioned variables, missing values are less detrimental; this is due to the fact that the Wisconsin Longitudinal Study Database is so large (recall that

it contains over 10.000 respondents), resulting in the fact that missing values do not impose a big problem in most cases.

Moving to the mean and standard deviation, one of the remarkable observations is the low mean and standard deviation of the variable participation. With a mean of around 1 and a rounded standard deviation of 0, almost all respondents worked at the time the interview took place and the variation within this variable is really small. Besides, the variable education deserves attention. Rounded up, an average respondent scores 2 on education which means that the average respondent went to college for only two years, possesses an associate degree, a two year diploma/certificate, or a two-year teaching certificate. Hence, scoring on average a 2 on the education score does mean that the average respondent is not very highly educated. The same is true for the educational level of both the parents of the respondent. Rounded up they also score on average 2 on a scale of 0 to 5, meaning that on average they only finished high school and didn't choose to continue studying thereafter.

To conclude, overall the variables look fairly good in terms of frequencies and descriptives. Although the variables participation (little variation) and hourlywage (missing values) deserve attention, missing values do not have a detrimental effect upon most of the included variables which is due to the huge size of the database. We assume that the data are of good enough quality to use for further analysis.

4.1 Specific hypotheses

Based on the investigation of the literature and the data, we can formulate a number of hypotheses. We will sum up the expectations pointswise below with a little explanation.

1. We expect caregiving to influence hours worked in a negative and significant way. The fact that almost all literature is about the effect of caregiving upon hours worked and that at the same time the effect is proven to be negative and significant generates these expectations.

2. We expect that caregiving leads to more parttime work. This follows from the expectations with respect to hours worked. When people have to give care, we expect them to work less hours and also turn more often to a part-time work contract.

3. We expect that caregiving yields negative effects for productivity. We only found a limited amount of literature about the effects of caregiving on productivity. Shortly, those papers (see literature paragraph about hours worked) conclude that caregiving is of negative influence upon wages, which we used as a proxy for productivity. These observations are also consistent with our early hypotheses from the introduction.

4. We expect that caregiving leads to less participation in paid work. Evidence for this hypotheses came from a few scientific papers in which a negative relationship between caregiving and participation could be observed. Our expectation follows as well from the scientific evidence that caregivers spend less hours in the labor market than their non-caregiving counterparts.

5. We expect with respect to all four dependent variables, that caregiving yields mainly negative effects for women and that for men the effects are less severe or even not present. We base our expectations with respect to women on literature and general feeling which both predict that women are traditionally more active in the household and that men are traditionally seen as 'the breadwinner' of a family.

6. We expect that the number of children and household members reduce the negative effects of caregiving since there is a possibility of sharing the caregiving task. Plus, we expect married women to reduce their working hours more than unmarried women do because in most households the husband is a households' main income provider and the women takes the caregiving duty upon her shoulders. In addition, we expect that for respondents with a higher family income, the expected negative effects of caregiving are stronger; In case of hours worked, we expect the income effect to be responsible for a decline of hours worked in the optimum.

5. Main results

Let's start the analysis by doing a total of twelve regressions which form the basis for further analysis. For each dependent variable, model I contains only the variable caregiving as independent variables, model II adds the possible 'caregiving-influencing controls' while

model III captures in essence the full model, with all the other controls being added as well. Results can be found in tables 3 and 4. At first sight, it can be noticed that out of the full regression models (i.e. model III for each variable of interest), caregiving only turns out to be significant upon hours worked. Therefore, a separate paragraph on the effects upon hours worked is created below while a second paragraph captures comments on the other (less striking) results.

5.1 Hours worked

First, have a look at the regressions of caregiving upon hours worked (table 3). In model I and II, caregiving is significant and the coefficient shows the expected negative sign. That is, giving care results in less hours worked which confirms the hypotheses. However, in model III which is the full model, the coefficient of caregiving turns out to be non-significant. This means that when someone gives care, this does not seem to change this person's total hours worked. We want to figure out what is the cause for the fact that the coefficient of caregiving turns non-significant in model III.

When looking at the other variables included, one of the noticeable things is the negative and significant effect of 'sex', indicating a negative effect on hours worked for females. The other variable with a substantial and highly significant coefficient is 'education'. Because either gender differences or differences in education could be the reason for the non significance of caregiving in the full model, table 5 opts to look closer at the gender and education effects. The full model was estimated three times again. The first time sex was excluded, the second time education was excluded and the third time both variables were excluded.

What can be seen is that when sex is excluded, caregiving is not significant anymore. On the other hand, if education is excluded, caregiving is still (although less) significant as it was in model II. The most important difference is that the coefficient turns positive now. Hence, education is probably an important predictor of hours worked in this model. Furthermore, it seems that the variable 'members', a count of the number of household members, can explain the positive sign of caregiving. Only when one is living with 3 or more persons in a household (including the person himself), the caregiver's hours of work do not decrease

(even increase) anymore. This stays in contrast with the situation where someone is living in a household consisting of less than three persons in total. In that case, caregiving still is of negative (although no significant) influence (table 6). We conclude that people who give care actually work more hours, which could possibly be explained by the fact that when a caregiver is living together with sufficiently many others, the caregiving duty can be shared such that it is not a heavy duty anymore. Furthermore, being married or not seems to have influence on the hours of work decision. According to our hypotheses, people who are married work less. This result is interpretable and matches our expectations.

As was the case in the separate samples for men and women, the result that hours of work are increasing in education is intuitive since marginal benefits of working an additional hour increase with education, which makes working more attractive.
The negative coefficient of IQ is against expectations. We actually expected IQ to be of positive influence, since marginal benefits of working are likely to be increasing with IQ. In contrast, one can argue that with increasing marginal benefits of working, one can opt to work less and obtain the same total income, hence reducing total hours worked. It depends on the respondents preferences.

Because in much literature gender differences play a role, we decided to split the sample according to gender (table 8) and to examine the different coefficients for men and women. At first, what can be observed is that for both men and women the effect of caregiving upon hours worked is not significant. The fact that caregiving is not significant for men could be explained by the low number of male caregivers (332) which is a very small percentage of around 6% of the total number of men. For women, we think that because women work less (table 3) and at the same time women give care relatively often (table 7), the effect of caregiving disappears. Furthermore, one of the most striking differences between men and women is that for men, being married yields a positive effect upon hours worked whereas for women the opposite is true. This is intuitive when thinking about the traditional division between men and women (see literature). When people get married, traditionally the wife will make up for most of the household work and the man will take up the role of breadwinner for the household. Another difference is that the a woman's hours worked decline with the number of household members contrary to those of the man. More

household members require more household work which could be the explanation for the observation that women work less when the number of household members increase. Finally, as expected, for both men and women hours worked increase with education.

5.2 Other variables of interest

5.2.1 Productiviy

Lets proceed to the other variables of interest. Starting with the variable 'Loghourlywage' (which was taken as a proxy for productivity), in model I and II, the coefficient of caregiving shows a negative and significant sign. That is, a caregiver is less productive than a non-caregiver. Turning back to our hypotheses, we did expect this. Although a negative effect of caregiving can be observed in the partial models, the full model doesn't show a significant effect of caregiving (table 3). However, we further investigated the reason for this observation and we proceeded in the same manner as in the case of 'hours worked'. Looking at the sign and significance of the variable 'sex', there are suspicions that gender differences cause the non-significance of caregiving. When excluding sex, caregiving still shows the negative and significant sign whereas when sex is included caregiving is not significant anymore (table 5). Hence, we can conclude that gender is an important predictor of productivity. Because women in the sample are on average less productive than men (table 3) and because at the same time most caregivers are women (table 7), we think that the negative effect of caregiving in models I and II is merely caused by gender differences. When controlling for these gender differences, the negative effect of caregiving disappears.

Furthermore, commenting on other significant results, it seems that people who are married are less productive. This could be intuitive since married men or women have the income of their husband or wife (given that the spouse is not unemployed) to fall back to and do not have to fulfill the role of breadwinner. Also, productivity seems to increase with IQ and health which is intuitive. We cannot really explain the other results. The observation that having more children makes you less productive could be expected for respondents with young children (raising up children comes at the costs of paid work in many cases), but in our dataset the respondents are much older (around 45) and so are their children. Also a higher family income leads to more productive employees. Maybe this is explained by the

possibility that family income increases with productivity instead and the relationship between family income and productivity could be two-sided.

As in the case of hours worked, we also look closer at gender differences for productivity (table 8). With respect to caregiving, we see that caregiving is non-significant for both males and females. The same reasoning as in the case of hours worked could apply for this observation. Some other observations also deserve attention. First, being married only yields negative effects for women. As expected, after a marriage, it is mainly the wife who declines or completely stops working while the husband retains his job. Second, for both men and women, productivity increases with IQ which is intuitive. An observation we cannot explain is the fact that having more children reduces a woman's productivity. For women with very young children it can be expected that childcare comes at the cost of productivity. However, in our sample the women have already reached the age of 50 and their children have been raised up already. Therefore, we didn't expect a negative coefficient for children.

5.2.2 Working part-time or fulltime

Now we address the question whether caregiving makes employees work more part-time or not. Recall that according to our hypotheses on this ground, we expect that people who give care have less time for their other time-consuming activities like household production and paid work, leading to a high fraction of part-time workers among people who combine their job with caregiving. As what follows from the results of model I and II (table 4), people who give care indeed seem to work more part-time compared to people who don't combine paid work with a caregiving duty. However, in model III the significance of caregiving disappears again. By the same procedure, 'sex' seems again to be the cause of the non-significance of caregiving in the full model; the full model remains significant with sex being excluded (table 5). Because females work more part-time than men (table 5) and at the same time women give more care than men (table 7), the negative relationship between giving care completely vanishes when we control for gender differences.

Talking about the other most striking results, married women seem to work more part-time. This is intuitive for the explanation that they have a husband who earns money and traditionally fulfills the role of breadwinner for the household. Also, respondents with a

higher education work less part-time. This is reasonable since for higher educated people the marginal benefits of working are higher, hence they can be expected to work more.

Looking further at gender differences (table 8), we see again that caregiving is not of significant influence. We expect again that this occurs because of the tiny sample size in case of men and that for women the effect of caregiving is absent because women give both more care and work more parttime. However, other differences can be observed. For example a difference between married men and women can be observed. That is, married men work less parttime while married women work more parttime. We will once again point to the traditional labor division between males and females where it is commonly observed that after a marriage, the wife takes a step back whereas the husband works more to keep the household financially healthy. Further, not much significant differences between men and women can be observed. The fact that women work more parttime when the number of household members increases seems to stroke with the observation that women work less when the number of household members increase. And as argued before, an increasing number of household members could increase household work which could result in a situation where the woman works less.

5.2.3 Participation

Our last labor market aspect of interest is the fact whether or not someone participates into a paid job. Unfortunately, in all three models, there are no interesting significant results. This could be explained by the fact that there is almost no variation in the variable participation: like we already stressed, almost all respondents worked at the time of the questionnaire. What could also be the explanation is the very low R-squared of the models. Hence, the model couldn't fit the data very well. After all, unfortunately we have to conclude that we are unable draw valuable conclusions from the research findings.

5.3 Robustness

We did a few things in order to examine the robustness of the results. First, we wondered whether the effect of age upon hourlywage is not lineair but lineair-quadratic instead. Therefore, we decided to run the full regression model for the variable loghourlywage again

with the variable age² (squared) included next to 'age' (table 9). What can be seen is that age-squared is not only non-significant, but it is also redundant. That is, it adds nothing to the R-squared; the explaining power of the model. Thinking about the reason for the non-significance and redundancy of age-squared, have a look at the descriptive statistics again (table 2). Looking at the variable age, the age of all respondents is 53 on average and the standard deviation is only ,6152. Hence, there is very little variation in age, which is logical because all information comes from one (information collection) wave. As a result, the fact that age, both in a lineair and quadratic term, does not have influence upon loghourlywage is not so strange.

Next, we decided to use an instrumental variable approach in addition to the conventional OLS (ordinary least squares) approach. As already explained earlier in this paper, the reason for using this approach is to take into account the possibility of a two-sided relationship between caregiving and the variables of interest (i.e. dependent variables). To carry this out, we used the Two Stage Least Squares approach in SPSS (following Ettner, 1995). Important is that one should not regard the two different methods as substitutes, but rather as complements which make up for each other's weaknesses. Besides, recall that the possibility of reverse causality is not really large with this type of (obligatory) caregiving, implying that one should not consider these results as being too important.

We tried to find the best instrument for caregiving and considered different variables available from the Wisconsin dataset. Eventually, the best candidate was ever_care (see table 1), a variable describing the fact whether or not someone has given care before for a period of one month or more. We tried a bunch of other instruments as well but 'ever_care' provided the highest R-squared, which was part of the reason for using this variable as an instrument. Results of the IV approach can be found in table 10. We decide to skip robustness analysis for the variable 'participation' because the main results were not interesting enough for conducting further research. Looking at the regression results for the variables 'hours worked' and 'loghourlywage', we can conclude that the results are fairly similar to what we have found in the analysis using OLS. That is, signs and significance levels of the coefficients do not differ much and only some minor differences can be observed.

Hence, it can be concluded that the results are rather robust, based on the very small differences between OLS analysis and 2SLS analysis.

Turning to the regression results for the variable 'Parttime', one can immediately see that the coefficient for caregiving has now turned positive and significant. On basis of 2SLS we can hence conclude that caregivers work more often part-time, which we expected to observe at first sight. As was the case before, a positive relationship between gender and working part-time can be observed, but now including sex does not lead anymore to a non-significant effect of caregiving. Keep in mind however that these 2SLS results should be treated cautiously because it could well be that there are better instruments for caregiving around.

6. Conclusion

In this research paper, we investigated the effect of caregiving upon several work related aspects. Our hypothesis were that giving care to close friends or family comes at the cost of hours worked, participation, productivity and fulltime work. These hypothesis were based on the fact that caregiving is an unpaid and time-consuming activity which has to be fulfilled next to either paid work and/or other activities like household production or leisure activities. To analyze the research question, we decided to run three OLS regressions for each of the four labor market aspects. For each variable, the first model only contains a constant and the variable caregiving, model II captures also specific controls and model III is in essence the full model with all variables being added. In model II, the results seemed to perfectly match our expectations: for all variables of interest except for 'participation', caregiving was of negative and significant influence. However, in model III, there was a significant effect of caregiving for none of the dependent variables anymore.

Further research was done to give the explanation of the non-significance of caregiving. The only exception was the variable 'participation', for which we skipped further analysis because results from OLS were not significant at all. With respect to 'hours worked', we found that only for a household consisting of at least three members, caregiving yields

significant and positive results. We think the reasoning for this observation is that, given that a caregiver's household is big enough, a caregiver can share the caregiving activities with other household members such that it doesn't comes at the cost of other activities like paid work anymore. With respect to the variables 'parttime' and 'productivity', we came to the conclusion that including 'sex' mainly caused the non-significance of caregiving in the full model. It seemed that the negative and significant effect of caregiving only exists when 'sex' is excluded. When excluding sex, caregiving still shows the negative and significant sign whereas when sex is included caregiving is not significant anymore. Because women in the sample are on average less productive and work more part-time than men, and because at the same time most caregivers are women, we think the negative effect of caregiving in models I and II is merely caused by gender differences.

To test the robustness of our findings, we decided to use 'Two-Stage Least Squares'. The reason for using 2SLS is to cope with possible endogeneity in the research findings. To give an example; instead of caregiving having a negative effect on working hours it could be that more hours worked leads to less time spend on caregiving instead. We found a good instrument in the variable 'ever_care', a variable specifying whether or not someone has giving care before. Results were more or less similar to what we have found in the analysis using OLS. That is, signs and significance levels of the coefficients do not differ much and only some minor differences can be observed. However, with respect to the variable 'Parttime', the coefficient for caregiving has turned positive and significant. So, on basis of 2SLS we can conclude that caregivers work more often part-time, which we expected to observe at first sight. As already stressed earlier in the paper, a thing to keep in mind is that it is not completely certain that 'ever_care' is really the best instrument available. We evaluated a number of instruments and selected the instrument with the highest 'R-squared'. Because of the possibility that better instruments for caregiving do exist and because of the fact that endogeneity issues are not very big in our research, one should treat the 2SLS results cautiously.

7. Discussion

On basis of our research findings, it can be concluded that caregivers work less hours, work more often part-time and are less productive when gender differences are not taken into account. However, controlling for education (hours worked) and 'sex' (part-time and productivity) leads to a non-significant effect of caregiving. Hence, our final conclusion on basis of this research is that caregiving does not yield negative consequences for labor market aspects. Eventually, the research points to traditional differences between men and women which exist for many centuries. That is, women work and earn less than men, women give more care than men and married women work less than men. Although we observe these differences, times are changing and women start to both earn and work more and start catching up to their male counterparts. Hence, when this research is repeated in the near future, results could turn out to be quite different.

It is important that more literature about caregiving will follow up in the upcoming years since informal care is necessary more than ever with the growing fraction of elderly in many countries nowadays. Almost all literature regarding caregiving is about the effects upon hours worked, whereas literature about other labor market aspects such as productivity, part-time versus fulltime, or participation is very scarce or even absent. Hence, we stress the importance that that literature about these other labor market aspects is going to be extended in the future. Also, every country is different and it is the question whether findings in one country can be generalized to other countries as well. For example, this study covers the United States and it is clear that the system for social care insurance is very different compared to, say, the Netherlands. In the former country, very much (poor) people are uninsured when they get ill or wounded whereas in the latter country almost all people are insured very well. Hence, it can be expected that informal caregiving is more at play in the United States than it is in the Netherlands. One can think about more differences between countries which may make generalization more difficult. Think of cultural differences between (western and eastern) countries, differences in the age of the population, differences in economic wellbeing and so forth.

The third and last point we want to stress is the comparability with related literature. As could be noticed from the literature part of this paper, we investigated literature from all over the world. Like stressed above, country differences do occur and could may make comparision between papers more difficult. Next, some authors are using a longitudinal approach whereas we have used a cross-sectional approach which could generate differences. However, in terms of data we think that the Wisconsin Longitudinal Database is a very decent database and unique in its existence. Therefore, for doing a cross sectional study, we think that this database comes close to the optimal database.

8. Bibliography

Becker, Gary S. (1965), A Theory of the Allocation of Time. *Economic Journal no. 75.*

Berger, C. and Fleisher, M. (1982), Husband's Health and Wife's Labor Supply. *Journal of Health Economics.*

Boer, A de. Et al. (2007), Mantelzorg. *Sociaal Cultureel Planbureau Netherlands.*

Bazzoli, GT. (1985), The Early Retirement Decision: New Empirical Evidence on the Influence of Health. *The Journal of Human Resources.*

Bittman et al. (2007), The Impact of Caring on Informal Carers' Employment, Income and Earnings: a Longitudinal Approach. *Australian Journal of Social Issues.*

Do, YK. (2008), The Effect of Informal Caregiving on Labor Market Outcomes in South Korea. *The Walter H. Shorenstein Asia-Pacific Research Center.*

Ettner, Susan L. (1995), The Impact of "Parent Care" on Female Labor Supply Decisions. *Demography.*

Ettner, Susan L. (1995), The Opportunity Costs of Elder Care. *The Journal of Human Resources.*

Gronau, R. (1977), Leisure, Home Production and work: The Theory of the Allocation of Time revisited. *Journal of Political Economy.*

Heitmueller, A. and Inglis, K. (2004), Carefree? Participation and Pay Differentials for Informal Carers in Britain. *IZA discussion paper.*

Innman, Robert P. (1987), The Economic Consequences of Debilitating Illness: The Case of Multiple Sclerosis. *The Review of Economics and Statistics.*

Kimmel, J. and Connelly, R. (2007), Mothers' Time Choices: Caregiving, Leisure, Home Production, and Paid Work. *The Journal of Human Resources.*

Leigh, A. (2009), Informal care and labor market participation. *Elsevier.*

Muurinen, Jaana-Marja. (1986), The Economics of Informal Care: Labor Market Effects in the National Hospice Study. *Medical Care.*

Mincer, Jacob. (1985), Intercountry Comparisons of Labor Force Trends and of Related Developments: An Overview. *Journal of Labor Economics.*

Parsons, Donald O. (1977), Health, Family Structure, and Labor Supply. *The American Economic Review.*

Stone, Robyn I. and Short, Pamela F. (1990), The Competing Demands of Employment and Informal Caregiving to Disabled Elders. *Medical Care.*

Timmermans et al. (2001), Vrij om te helpen. *Sociaal Cultureel Planbureau.*

Wolf, Douglas A. and Soldo, Beth T. (1994), Married Women's Allocation of Time to Employment and Care of Elderly Parents. *The Journal of Human Resources.*

Borjas, George J. (2010). *Labor Economics (fifth edition).*

Ashenfelter, Orley C. and Card, D. (1999). *Handbook of Labor Economics, Volume 1*

Ashenfelter, Orley C., and Card, D. (1999). *Handbook of Labor Economics, Volume 3C*

9. Internet references

1. Wisconsin Longitudinal Study (WLS) [graduates, siblings, and spouses]: 1957-2005 Version 12.23. [machine-readable data file] / Hauser, Robert M. and Sewell, William H. [principal investigator(s)]. Madison, WI: University of Wisconsin-Madison, WLS. [distributor]; <http://www.ssc.wisc.edu/wlsresearch/documentation/>

2. http://www.rijksoverheid.nl/ministeries/szw/documenten-en-publicaties/persberichten/2011/08/09/kamp-maakt-aanpassing-werkweek-en-opname-verlof-flexibeler-voor-werkende-ouders-en-mantelzorgers.html

3.http://www.werkenmantelzorg.nl/nieuws/nieuwe_cao_afspraken_gunstig_voor_werkende_mantelzorgers/715

4. http://www.volkskrant.nl/vk/nl/2672/Wetenschap-Gezondheid/article/detail/2809068/2011/07/18/Zorgsector-is-banenmotor-van-Nederland-vooral-voor-vrouwen.dhtml

10. Appendix

Table 1 List of used variables			
Variable name	*Description*	*Type*	*Codes*
Independent Variables			
Caregiving	During the last 12 months has respondent given personal care for a period of one month or more to a family member or friend because of a physical or mental condition, illness, or disability?	Scale	0 = no 1 = yes
Members	Number of members living in the household (including the respondent).	Scale	Integer
Married	Is respondent currently married?	Scale	0 = no 1 = yes
Familyincome	Total Income. Sum of Respondent's total income, spouse's total income, and other household members' total income.	Scale	Integer
Whom_Care	Who gave the respondent most	Scale	0 = Husband or Wife 1 = Father or Mother

	personal care during the past 12 months?		2 = Brother or Sister 3 = Son or Daughter 4 = other
Children	Number of children	Scale	Integer
IQ	Best measure of IQ score mapped from raw Henmon-Nelson test score	Scale	Integer
Sex	Sex of the respondent	Scale	0 = male 1 = female
Education	Highest educational level respondent	Scale	0 =hs grad/<1 yr col 1 =1 yr col/cert 2 =2 yr col/cert/asoc 3 =dg+ 1-2,3+col yr 4 =bachelor degree 5 =mas dg w/crtn mjr 6 =2 yr mas w/df mjr 7=+2yr mas degree 8 =doctorates 9 =post-doc edu
Industry	Major Industry code for the industry the respondent is working in.	Scale	0 =agriculture, forestry, fisheries 1 =mining 2 =construction 3 =manufacturing 4 transport, communication, other public utilities 5 =wholesale and retail trade 6 =finance, insurance and real estate 7 =business and repair services 8 personal services 9 =entertainment and recreation services 10= public administration 11 =professional and related services 12 =active duty military

Occup	Major occupation code for current or last job	Scale	0 =prof, tech, kindred; self-employed, without pay 1 =prof, tech, kindred; salaried 2 =managers, officials, proprietors; salaried 3 =managers, officials, proprietors; self-employed, without pay 4 =sales, no retail 5 sales, retail 6 =administrative support, including clerical 7 =craftsmen, foremen and kindred, manufacturing 8 =crafts, construction 9 =crafts, all other 10 =operatives; manufacturing 11 =operatives; all other 12 =service and private household 13 =laborers; manufacturing 14 =laborers; all other 15 =farmers and farm managers 16=farm laborers and foremen
Education_father	Highest educational level father	Scale	0 =no high school 1 =attended high school 2 =graduated from high school 3 =attended trd/bus school 4 =attended college 5 =graded from college 6 =has masters or phd
Education_mother	Highest educational level mother	Scale	0 =no high school 1 =attended high school 2 =graduated from high school 3 =attended trd/bus school 4 =attended college 5 =graded from college 6 =has masters or phd

Age	Age of the respondent	Scale	Integer
			43
Healthrate	How would you rate your health at the present time?	Scale	0 = very poor 1= poor 2 = fair 3 = good 4 = excellent
dependent variables			
Hours_worked	Total hours worked per week on all jobs.	Scale	Integer
Parttime	Did you work fulltime or parttime during last or current job?	Scale	0 = fulltime 1 = parttime
Hourlywage	Most recent base hourly wage	Scale	Integer
Participation	Did respondent work or not during last or current job?	Scale	0 = respondent did not work 1 = respondent did work
Ever_care (instrument)	Have you ever given care for a period of one month or more?	Scale	0 = yes 1 = no

Table 2 Descriptives and Frequencies

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Missing Values
Caregiving	8324	0	1	,1254	,33121	1993
Members	8493	1	12	2,57	1,065	1824
Married	8491	0	1	,8820	,38250	1826
Familyincome	8485	0	300000	62544,73	55696,773	1832
Children	8485	0	14	2,96	1,701	1832
Spouse_work	3249	0	1	,7141	,45193	7068
Whom_Care	229	0	4	,9563	1,53549	10088
IQ	10317	61	145	100,46	14,916	0
Sex	10317	0	1	,5162	,49976	0
Education	8492	0	9	1,6079	2,26015	1825
Industry	8123	0	12	6,4214	3,51657	2194
Occup	8124	0	17	5,7834	4,13348	2193
Education_father	9488	0	6	1,5481	1,68707	829
Education_mother	9606	0	6	1,6478	1,57339	711
Age	9137	51	56	53,4781	,6152	1180
Healthrate	6862	0	4	3,1511	,67373	3455
Hours_worked	8081	0	95	43,78	14,035	2236
Fulltime	8108	0	1	,1581	,36487	2209
Hourlywage	3442	0	20000	1152,28	1038,988	6875
Participation	8081	0	1	,9994	,02487	2236
Ever_Care	8493	0	1	,6806	,46629	1824

Table 3 Does caregiving influence labor market aspects?
(Reported are the regression coefficients with p values between brackets)

Included but not reported: Industry and Occupation

Variable	Hours worked			LogHourlywage		
Model	I	II	III	I	II	III
Constant	43,961 (0,000)***	43,627 (,000)***	70,078 (,000)***	6,910 (,000)***	6,836 (,000)***	6,945 (,000)***
Caregiving 1 = caregiver	-1,638 (0,001)***	-1,776 (,000)***	NS	-,110 (,000)***	-,111 (,000)***	NS
Married 1 = married		-2,726 (,000)***	-2,443 (,000)***		-,118 (,000)***	-,114 (,000)***
Members		,597 (,001)***	-,536 (,005)***		,027 (,003)***	NS
Familyincome		,00002873 (,000)***	NS		0,00000423 (,000)***	0,000002599 (,000)***
Children		-,274 (,006)***	NS		-,036 (,000)***	-,011 (,031)**
IQ			-,024 (,064)*			,003 (,000)***
Sex 1 =female			-8,960 (,000)***			-,436 (,000)***
Education			,578 (,000)***			NS
Education Father			-,221 (,054)*			NS
Edcuation Mother			-,376 (,063)*			NS
Age			NS			NS
Healthrate			NS			,025 (,031)**
R-squared	,001	,018	,223	,005	,119	,500
* = p<0.1	**= p<0.05	***= p<0.01	NS = Not Significant			

Table 4 Does caregiving influence labor market aspects?
(Reported are the regression coefficients with p values between brackets)

Included but not reported: Industry and Occupation

Variable	Parttime			Participation		
Model	I	II	III	I	II	III
Constant	,152 (,000)***	,085 (,000)***	NS	,999 (,000)***	1,001 (,000)***	1,038 (,000)***
Caregiving 1 = Caregiver	,054 (,000)***	,056 (,000)***	NS	NS	NS	NS
Married 1 = Married		,078 (,000)***	,089 (,000)***		NS	NS
Members		NS	,018 (,001)***		NS	,000 (,033)**
Familyincome		-,00000035 (,000)***	NS		NS	NS
Children			NS			NS
IQ			NS			NS
Sex 1 = Female			,216 (,000)***			NS
Education			-,010 (,000)***			NS
Education Father			,006 (,041)**			NS
Edcuation Mother			NS			NS
Age			NS			NS
Healthrate			NS			NS
R-squared	,002	,014	,171	,000	,000	,005

Table 5 Isolating the effect of IQ and Sex, Model III

(reported are regression coefficients with p-values between brackets)

Included but not reported: Industry and Occupation.

Variable	Hours Worked			LogHourlywage		Parttime	
Caregiving 1=caregiver	NS	NS	,841 (,095)*	-,056 (,023)**	NS	,027 (,060)*	NS
Sex 1=male	-8,960 (,000)***	Excluded	-9,443 (,000)***	Excluded	-,477 (,000)***	Excluded	,216 (,000)***
Education	,578 (,000)***	1,027 (,000)***	Excluded				
* = p<0.1	**= p<0.05	***= p<0.01					

Table 6 The number of HH members isolated

#HHmembers	Hours worked	
1	Caregiving	Negative but NS
2	Caregiving	Negative but NS
3	Caregiving	3,181***
4	Caregiving	Positive but NS
* = p<0.1 ** = p< 0.05 *** = p< 0.01 NS = not significant		

Table 7 Crosstabulation between Sex and Caregiving

		Sex of the respondent		
		Male	**Female**	**Total**
Caregiving	**No**	3554 **91,5%**	3726 **84,0%**	7280
	Yes	332 **8.5%**	712 **16,0%**	1044
	Total	3886 **100%**	4438 **100%**	8324

Table 8 Splitting the sample according to gender
(Reported are regression coefficients with p-values between brackets)
Included but not reported: Industry and Occupation.

	Variable	Hours worked	Loghourlywage	Parttime
	Constant	70,254 (,001)***	4,846 (,000)***	NS
	Caregiving 1=caregiver	NS	NS	NS
	Married 1=married	2,132 (,004)***	NS	-,023 (,050)**
	Members	NS	NS	NS
Male	Familyincome	0,00001331 (,002)***	,000005188 (,000)***	NS
	Children	NS	NS	NS
	IQ	-,043 (,016)**	,002 (,099)*	NS
	Education	,393 (,004)***	NS	NS
	Education_father	NS	NS	,004 (,071)*
	Education_mother	NS	NS	NS
	Age	NS	NS	NS
	Healthrate	NS	NS	NS
	Constant	77,231 (,004)***	8,084 (,000)***	NS

	Caregiving	NS	NS	NS
	Married 1=married	-4,640 (,000)	-,164 (,000)***	,139 (,000)***
	Members	-,921 (,001)***	NS	,046 (,000)***
Female	Familyincome	NS	,000001768 (,000)***	NS
	Children	NS	-,019 (,001)***	NS
	IQ	NS	,003 (,000)***	NS
	Education	,750 (,000)***	NS	-,019 (,000)***
	Education_father	NS	NS	NS
	Education_mother	NS	-,013 (,069)*	NS
	Age	NS	-,032 (,057)*	NS
	Healthrate	NS	,033 (,019)**	NS
* = p<0.1 ** = p<0.05 *** = p<0.01 NS = not significant				

Table 9 Testing a quadratic effect of age

(Reported are regression coefficients with p-values between brackets)
Included but not reported: Industry and Occupation.

	Loghourlywage
Constant	6,945 (,000)***
Caregiving 1 = caregiver	NS
Married 1 = married	-,114 (,000)***
Members	NS

Familyincome	0,000002599 (,000)***
Children	-,011 (,031)**
IQ	,003 (,000)***
Sex 1 =Female	-,436 (,000)***
Education	NS
Education Father	NS
Edcuation Mother	NS
Age	NS
Age squared	NS(!)
Healthrate	,025 (,031)**
* = p<0.1 ** = p<0.05 *** = p<0.01 NS = not significant (!) = variable is set zero because it is redundant	

Table 10 Two Stage Least Squares (IV), Model III

(Reported are the regression coefficients with p values between brackets)

Included but not reported: Industry/Occupation

Variable	Hours worked	LogHourlywage	Parttime
Constant	68,827 (,000)***	7,818 (,000)***	NS
Caregiving	NS	NS	,045

1=caregiver			(,095)*
Married 1=married	-2,206 (,000)***	-,113 (,000)***	,091 (,000)***
Members	-,553 (,003)***	NS	,018 (,001)***
Familyincome	NS	,0000025 (,000)***	NS
Children	NS	-,010 (,051)*	NS
IQ	NS	,003 (,000)***	NS
Sex 1=Female	-8,776 (,000)***	-,442 (,000)***	,215 (,000)***
Education	,636 (,000)***	NS	-,010 (,001)***
Education Father	-,264 (,020)**	NS	,007 (,028)**
Edcuation Mother	NS	NS	NS
Age	NS	NS	NS
Healthrate	NS	,028 (,014)**	NS
* = p<0.1 ** = p<0.05 *** = p<0.01 NS = not significant			