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Abstract

Using advanced panel data methods on ECHP (European Community Household Panel) data, female labor force participation at both the intensive and extensive margin is found to be negatively associated with informal caregiving to elderly. The effects of informal caregiving seem to be more negative in the Southern European countries, less negative in the Nordic countries, and in between these extremes in the Central European countries included in the study. That is, not only do women in some countries provide more care, the care they provide also has a stronger negative correlation with the probability of being employed and the number of hours worked. It is argued in this paper that a candidate explanation for the phenomenon of lower marginal effects in countries with more formal care and less pronounced gendered care norms has to do with the degree of coercion in the caring decision.

Keywords: Informal care; Female labor supply; European welfare states

JEL classification: I11; I12; J22

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1. Introduction

Participation in the labor force is likely to affect women's power and status in society. Furthermore, as Korpi (2000) argues, not only do women who do not work in the formal labor market have worse material conditions and often inferior social rights, it is also likely to affect their self perception, identity, and bargaining power in the family. In the current policy debate, some more instrumental goals are also found, especially at the level of the European Union where there are concerns about demographic changes. The European Employment Strategy has as one of its main objectives to increase the total employment rate to 70 percent, the female employment rate to 60 percent and the employment rate of elderly workers (55+) to 50 percent. It is interesting to note that the target of increasing the female employment rate is supported by aims to increase childcare to the best practice level. So far, no such aims exist regarding eldercare.

If the time devoted to informal eldercare is negatively associated with female labor supply, it is a fact that merits consideration when discussing eldercare and especially the increasing reliance on informal care. Furthermore, if different institutions and policies change the impact informal care has on female labor supply, then the results can serve as a base for further normative discussions.

Most previous studies on the relationship between informal care and labor supply have been carried out in the U.S. (e.g., Wolf and Soldo 1994; Ettner 1996; Pavalko and Artis 1997; Johnson and Lo Sasso 2000) and the UK (Heitmueller 2007; Heitmueller and Inglis 2004, 2007; Carmichael et al. 2004, 2008; Carmichael and Charles 1998, 2003a, 2003b), and have generally found a negative relationship. Lilly et al. (2007) conducted a systematic analysis of studies on this topic from 1986 to 2006, and found that caregivers tend to be less likely to be in the labor force. However, since only ten of the examined studies included control variables for other factors influencing labor force participation it is not possible to conclude that caregiving in general reduces the participation rate, but rather that intensive caregiving does.

Although there are few comparative studies in this field, there are three that compare European countries (Spiess and Schneider 2003; Viitanen 2005; and Bolin et al. 2008a). Spiess and

Schneider (2003) use two waves from the European Community Household Panel survey (ECHP) to look at twelve European countries, and find a significant negative relationship between starting (and increasing) caregiving and changes in number of hours worked. The countries are also divided into two groups: those with well developed institutional care and home-help services and those with less.

Viitanen (2005) also uses data from the ECHP to investigate the relationship between labor force participation and informal eldercare in 13 countries. While she looks at micro variables such as age cohort and marital status, she does not consider differences in institutional settings. Bolin et al. (2008a) use the first wave from the Survey of Health, Ageing and Retirement in Europe (SHARE) data and look at the institutional impact on the relationship between informal care and labor force participation. Their total sample is divided into three groups: a Nordic, a Central European, and a South European. The main hypothesis is that the adverse effects of informal caregiving on female labor supply are stronger in the Nordic group since family care is less accepted in these states, leading to less acceptance among, e.g., employers. Considering the employment probability for women, they find a significant negative marginal effect of being a caregiver but no differences among the groups. Looking at women's number of hours worked they find that care has a statistically significant larger negative correlation in Central European countries.

Contrary to Bolin et al. (2008a), the hypothesis in this paper is that the effects should be lowest in the Nordic group and highest in the South European group due to the greater availability of formal care and less coercive gendered care norms in the former group. Informal caregiving is more voluntary for women in those countries, and hence it is argued that all negative effects, including those on the labor force participation, are hampered. The hypothesis is confirmed. It is also argued that the ECHP dataset has important advantages compared to the SHARE dataset since the panel structure allows for controlling for unobserved time-invariant individual heterogeneity and since a broader age span can be included.

2. Data, sample, and descriptive statistics

The dataset that seems most useful for my purposes is the European Community Household Panel survey (ECHP), which focuses on household income and living conditions and contains

eight waves (running from 1994 to 2001). The dataset is input harmonized and provides information on the number of hours of care and work as well as care and work status. The panel contains the 15 "old" EU countries although only 12 were included from the beginning. Furthermore, Sweden did not provide any data on informal care and is therefore excluded. For Germany, Luxembourg, and the UK, ECHP data only exists for the first three waves. We do not have data for Finland the first two waves and, finally, Austria was not included in the first wave.

The best alternative to this dataset would be the Survey of Health, Ageing and Retirement in Europe (SHARE) as used by, e.g., Bolin et al. (2008a). One advantage of the SHARE dataset is the rich information included on the relationships between individuals, which can be used as instrumental variables. However, the disadvantages seem more restrictive. One limitation is that it only contains two waves, and another that it only includes people older than 55. While we know that caring obligations increase with age, an analysis with different age samples and an analysis with age-interaction terms show that the correlations between caregiving and employment probability are actually greater at lower ages.[1] The limitation of using the SHARE data might thereby be greater than what Bolin et al. (2008a) expect when they argue that the care burden is greatest among those older than 55.

When constructing the sample, all men are dropped from the data. Women in education, retirement, or training are also removed. Furthermore, the sample is restricted to only include people aged 20-65.[2] Figures 1 and 2 make evident that labor force participation falls with age while the caring obligations for elderly go up.

(Figure 1 about here)

(Figure 2 about here)

The definitions of the main variables are found in Table 1 and the summary statistics for those variables are found in Table 2.

(Table 1 about here)

[1] The results are available upon request.

[2] A sensitivity analysis was conducted with other age limits, but the qualitative interpretation of the main results was unchanged. The results are available upon request.

(Table 2 about here)

It is interesting to compare the summary statistics in Table 2 with those for the subsample of only caregivers provided in Table 3. We see that caregivers have a 13.5 percentage point lower labor force participation at the extensive margin and that they work fewer hours. In addition, they are more likely to be married, separated or widowed. They are also older, are less educated, and have worse health, and the other members of their household earn less money. Household size and number of children are also greater for caregivers than for non-caregivers. This implies that it is important to control for individual level factors, and that we might expect that doing so would make the correlation between informal care and employment probability lower than 13.5 percentage points.

(Table 3 about here)
(Table 4 about here)

Table 4 shows that the countries do not differ very much in terms of proportion of individuals who provide some care (5 %-10 % of women), while they do differ a lot in the amount of care provided. The lowest median value among caregivers of 6 hours per week is found in Denmark whereas the highest median value of 35 is found in Spain. The differences in labor force participation between caregivers and the total population also differ across countries. There is also a statistically significant correlation of -0.74 between the median number of care hours provided by caregivers and female labor force participation. These findings will be examined further later in this paper.

3. Welfare state typologies[3]

To acknowledge the importance of both micro and macro forces[4] in comparative welfare state research, it has become popular to include typologies in analyses. Bolin et al. (2008a) wanted to focus on the north-south gradient to capture the effects of different cultural and institutional settings, and hence divided their sample into three groups: A Nordic group consisting of Sweden

[3] In the literature typologies are sometimes also called welfare state models, welfare regimes, welfare clusters, or families of nations.
[4] Or the role of both agency and structure.

and Denmark; a Central European group comprising Germany, France, the Netherlands, Austria, and Switzerland; and a South European group consisting of Spain, Italy, and Greece. Typologies are used in the present paper as well, and the specific divisions are motivated by previous welfare state research.

Esping-Andersen's (1990) work, where the three ideal types liberal, conservative, and social democratic welfare states were separated along the lines of social stratification, decommodification and universalism, has been very influential in this respect. Feminist scholars have criticized this typology because nonpaid activities and family issues were neglected (e.g., Lewis 1992, 2002, 2006; Bussemaker and Van Kersbergen 1994; Sainsbury 1994a; 1994b). This critique has opened up a research field where gender issues are integrated into typology building. Previous studies have found that these different regimes have fundamental effects on the gendered division of unpaid work and on time use in general (e.g., Anxo et al. 2006) and on employment in particular (Anxo and Boulin 2006 and Anxo et al. 2007).

Responding to the critique, Esping-Andersen (1999) himself presented a distinction between familialistic and de-familializing welfare regimes. Leitner (2003) argues that the indicators used by Esping-Andersen (1999) do not give us any idea about the relations between different structures and different outcomes, since they merely measure outcomes.[5] Leitner (2003) uses Esping-Andersen's (1999) distinction between familialistic and de-familializing welfare regimes, but offers a more detailed analysis by replacing the outcome indicators with more policy oriented ones.[6] Combining the degree of familization with the degree of de-familization, four ideal types of familialism are created: (i) explicit familialism (strong degree of familialization and weak degree of de-familialization), (ii) optional familialism (strong degree of both familialization and de-familialization) (iii), implicit familialism (weak degree of both familialization and de-familialization) (iv), and de-familialism (weak degree of familialization and strong degree of de-familialization).

[5] The indicators are the percentage of elderly living with children, the percentage of unemployed youths living with their parents, and the number of hours of female weekly household work.
[6] The familialistic policies are operationalized as: (i) time rights (e.g., care leave) (ii) direct and indirect transfers for caring, and (iii) social rights linked to giving care. The de-familializing policies are all those that remove pressure from the families including public provision of care and a functioning system of market care.

It is argued that implicit familialism leaves the families with little choice. This "simply reproduces and thus confirms the status quo of gendered care provision within the family" (Leitner 2003; 366 cf Beck 1992 and Ferrarini 2003; 2006). De-familializing care policies weaken the male breadwinner assumption and thus have a positive impact on gender equality. The optional familialism adds the alternative of family care to the de-familializing care policies. Explicit familialism strengthens the gendered division of labor if it is not combined with measures to ensure an equal division. I agree with Leitner who argues that, "If familialism means that public policy wants private households to secure the welfare of their members, the ways and means used to enforce this goal should be at the centre of the analysis" (Leitner 2003; 357). Since states can actively support or relieve families from caring responsibilities, it is argued that both service provisions and policies that affect the caring function of the family should be included. The focus will here be on eldercare services specifically.

Few comparative empirical studies have been conducted in the eldercare service area, partly due to the difficulties of finding good comparable data. Some studies have been conducted, however, starting with the pioneering work by Anttonen and Sipilä (1996). They compare the proportions of elderly over 65 who receive institutional care or home help across 14 European countries, and conclude that there is a Scandinavian model of public services where both childcare and eldercare are widely available. Universalism is the guiding principle, which means that women benefit and that the middle class uses the services, which in turn facilitates public funding. There is also a family care model (consisting of Portugal, Spain, Greece, and Italy) characterized by a limited supply of social care services. A means-tested model is also identified where public services are often means-tested as the name suggests; the countries included in this group are Ireland and the UK. Regarding eldercare there is also a Central European model (Germany and the Netherlands and to a lesser degree France and Belgium) where the responsibility for eldercare formally falls on the family. In these countries, religious and other organizations provide a large range of services and the state has the main responsibility for funding. The volume of eldercare services is at an intermediate level, except in the Netherlands where it is high.

Anxo and Fagan (2005) compare Denmark, Italy, Finland, the Netherlands, Sweden, and the UK with respect to eldercare and classify the countries according to different welfare regimes. The

Nordic social democratic universalist system of eldercare is the most extensive in terms of services provided, and pensions are generally higher in those countries than in others. The key elements of this system are the universal citizen rights, extended public childcare, and – regarding eldercare – that Sweden and Finland have abolished children's legal obligation to care for their parents. Public eldercare is assigned according to need and financed mainly through general taxation. In contrast, the Italian family-based system of eldercare has the lowest rate of publicly provided eldercare. There is an implicit male breadwinner ideology underlying this system and families provide care for three-quarters of all needing elderly, alongside the explicit legal obligation for families to provide care. Eligibility for public eldercare is not only based on need but also on social situation and economic resources. The income-related contributions are calculated based on own income and income of other relatives living in the household. The supply of public eldercare is very low and there is a growing informal sector.

Also Leitner (2003) incorporates eldercare-specific social services in her analysis, and her ideal types are applied to elderly care in the 15 old EU countries. The indicator used for familization is cash transfers to families for eldercare, while for de-familization she uses percentage of persons aged 65 and older who receive home help. No country ends up in the de-familialism box. The Nordic countries are regarded as having a system of optional familialism, and the conservative countries are divided into implicit (Austria, Belgium, France, and Germany) and explicit familialism (Greece, Italy, the Netherlands, Portugal, and Spain). The liberal countries (only Ireland in her analysis) also exhibit explicit familialism according to this clustering.

The differences in quality of formal eldercare services are great across countries and also follow the typology lines. The level of education and skills required are lowest in the Southern European countries and the UK, highest in the Nordic countries, while Austria and Germany place in between (Simonazzi 2008; Anxo and Fagan 2005).

For comparability with Bolin et al. (2008a) I have chosen to include three groups that also represent Northern, Central, and Southern Europe. It should be noted, however, that the results presented here are not completely comparable to those in Bolin et al. (2008a) since different data sources are used. Most notably the differences may be due to different operationalizations of the Nordic group; while Denmark and Finland are used in this paper, Bolin et al. (2008a) use

Denmark and Sweden as a proxy for the Nordic countries. As a complement I have also included Spiess and Schneider's division of countries according to level of formal care.[7] The country groups included in the analysis are shown in Table 5.

(Table 5 about here)

4. Hypotheses

The hypothesis in Bolin et al. (2008a) is that the adverse effects of informal care on labor supply outcomes are lower in countries characterized by institutions favoring family care. It is argued that since family care is less accepted in these states, there will also be less acceptance among, e.g., employers. In my view, this hypothesis disregards not only the possible involuntary care imposed by a lack of formal care but also the restriction of women's free choice imposed by cultural norms.

The main hypothesis in this paper is that there is a smaller correlation between informal eldercare and female labor force participation in countries with more developed formal care services and in countries where the social norms of family care are weaker. With caregiving being more of a free choice for women, it is plausible to argue that all of its negative effects are likely to be hampered, including the ones on labor supply. The theoretical reasons for this are compelling.

There are several different motives for informal caregiving, with altruism and social norms being commonly stated. Looking at the altruism motive it is common to assume that the caregiver considers the utility (e.g., Johnson and Lo Sasso 2000) or the health (e.g., Ettner 1996) of the one needing care when making the care decision. The costs of caregiving are often discussed as a loss of time that could be spent on leisure or work. In equilibrium the marginal rate of substitution between leisure, work, and caregiving should be equal. If one then considers care provided by others (e.g., formal care) and assumes that this care enters the utility function of the one needing care, it is not hard to imagine (or model) that labor supply increases if more formal

[7] In the countries classified as having less developed formal care, less than five percent of the population over 65 years old receive formal home care or institutional care.

care is available (see for instance Fevang et al. 2008). Whether informal care decreases depends on whether informal care and formal care are substitutes or complements, however.

The studies using versions of Grossman's (1972) health production function to investigate the relationship between formal and informal care (e.g., Van Houtven and Norton 2004) usually find that the two forms of care are substitutes but that the relationship is complementary if only doctoral and hospital visits (Bolin et al. 2008b) or high skilled care (or care for highly disabled persons) are considered (Bonsang 2009). Viitanen (2007) looks at government spending on in-kind eldercare (home care as well as institutional care) and the effects it has on informal care, and finds a statistically significant negative correlation implying that more formal care reduces informal care. Another reinforcing factor is the quality of the formal eldercare services, which has already been shown to follow our typology lines. That the quality of public services affect their utilization rate is not difficult to understand, and it has also been argued in other settings to affect the "ethics of care" so that the gendered division of household labor is affected (Ellingsæter and Gulbrandsen 2007). However, not only formal care affects the relationship between female labor supply and informal care; so do gendered norms. At the individual level there are gendered norms that condition the choices made by women and men. The behavior and choices of men and women are also influenced by the gender ideologies present at the macro level since these structure the incentives for individual action. Individual action is thereby constrained, enabled, and conditioned by societal rules and norms (Sjöberg 2004; Åmark 2005; Swedberg 2003; and Anxo et al. 2006).

Spiess and Schneider (2003) suggest that gendered social norms impose severe limitations on free-choices in the work-care relationship. Other authors have also highlighted the degree of choice in the work-care relationship (e.g., Stark 2005 and Heitmueller 2007). Carmichael and Charles (2003a) even argue along the same lines as I do when they link the larger negative effect of caring on employment probabilities for women than for men to the more limited degree of choice for women. It is also plausible that there is a link between gendered norms and formal care since formal institutions may structure gender relations. When formal institutional solutions to care are not present, the personal choices of women are restricted since the distribution of these tasks "are ascribed by birth and gender" (Beck 1992; 107 cf. Ferrarini 2006 and Fuwa and Cohen 2007). The low level of formal care in the Southern European countries and the gender

norms in these countries are thereby expected to reinforce each other's adverse effects on the female labor supply.

This leads one to expect that the effects are lower in the countries characterized by Spiess and Schneider (2003) as having more formal care, i.e., that the effects are lower in SSA than in SSB. It is also fair to expect the Nordic countries (or optional familialism countries as Leitner calls them) to stand out as having the lowest effects. This is due not only to the high level and high quality of formal institutions in these countries, which should create a less stringent obligation to care for elderly, but also to the Nordic exceptionality as a society characterized by more equality between men and women in general (see for instance Kautto et al. 2001), which further promotes the free choice of women. Another hypothesis is that the Central European model entails intermediate effects since the level of formal eldercare is intermediate and since voluntary organizations produce some of the care and thereby relieve families of some responsibilities. The Southern European family care countries are expected to exhibit more pronounced negative effects due to a strong breadwinner ideology and low supply (and quality) of formal eldercare, both factors making informal care more compulsory for women.

5.1 Effects of informal eldercare on the employment probability: estimation models

In analyzing the effect of informal eldercare on the employment probability, several different panel data methods will be employed. In general, two different specifications will be used, namely:

i) $\Pr(lfp = 1|x) = \alpha + \beta_1 care + \boldsymbol{\beta}\mathbf{x}$,

ii) $\Pr(lfp = 1|x) = \alpha + \beta_1 realhrs + \boldsymbol{\beta}\mathbf{x}$,

where *lfp* is a binary variable representing labor force participation, *care* is a binary variable representing whether or not the individuals provide informal eldercare, *realhrs* is the number of weekly hours of care provided, and **x** is a vector of control variables.[8] The different specifications will be applied to different samples corresponding to the groupings offered above.

[8] The control variables in this setting include marital status, age, age squared, education, health, children, and household wage. For further information see Table 1.

Applying a probit model, the estimable equation will be: $\Pr(lfp = 1|x) = G(\mathbf{x}\beta)$, where the function for $G(\mathbf{x}\beta)$ is the standard normal cumulative density function. Note that the vector **x** now includes either the *realhrs* or the *care* variable. The panel nature of the data will however be explored by estimating $\Pr(lfp = 1|x_{it}, c_i) = G(x_{it}\beta + c_i)$, where c_i represents individual fixed effects. As a first step a random effects probit model will be estimated. A major limitation of this model is that it assumes that the fixed individual effects are uncorrelated with the other explanatory variables. A complementary alternative is to use Chamberlain's random effects probit model which allows for some correlation between the fixed effects and the other explanatory variables by adding the means (over time) of the time-varying explanatory variables as control variables.

Since the probit and logit models are non-linear, the individual effects cannot simply be eliminated by applying the fixed effects estimator. What can be done is to use a fixed effects logit model with the minimal sufficient statistic $\sum_{t=1}^{T} y_{it}$ for the individual fixed effects (Baltagi 2005). A problem with this method is that we cannot compute the conventional marginal effects since we do not get any consistent estimates of the fixed individual effect. However, this model will serve as an important test of whether the previously found marginal effects are biased by time invariant unobserved individual heterogeneity. Another problem with the fixed effects logit model is that the minimum sufficient statistic requires that there is a change in the dependent variable and drops all observations that do not change. One could thereby argue that the control for unobserved individual heterogeneity is a bit strange since it is conducted on another sample. To cope with this problem a linear fixed effects panel model is finally estimated as yet another complement.

If we get significant results in all panel data models used we can be more confident in saying that individual heterogeneity does not play a major role in driving our results, and hence view the random effects probit model as more trustworthy. For that reason, all four models will be estimated

5.2 Effects of informal eldercare on the employment probability: results

We start by analyzing the results obtained in the random effects probit models. The marginal effects of *care* in the total sample and in the different subgroups are shown in Table 6. All marginal effects are evaluated at the mean value of *care* for the corresponding sample.[9]

(Table 6 about here)

As can be seen in the total sample, the negative marginal effect of being an informal caregiver is statistically and economically significant (i.e. the magnitude is large enough to be deemed important) as predicted. We see that there are large differences between the Nordic countries and the other groups. While the marginal effect of being an informal caregiver on the female labor supply is insignificant in the Nordic subsample, it is about 10 percentage points in the Southern group and the difference between the Nordic group and the Southern group is significant at the 1 % level.[10] Note that the insignificance in the Nordic sample is not driven by exceptionally high standard errors; in fact they are smaller for this sample than for all other samples. The marginal effect of being a caregiver in the Central European group is also in between the ones for the Southern group and the Nordic group, as expected. The difference between the Central European group and the Southern group is not statistically significant, however. We can also observe that the classification by Spiess and Schneider points in the predicted direction, i.e., that countries with more formal eldercare seem to entail a lower correlation between caregiving and work although the difference is not statistically significant.

(Table 7 about here)

Table 7 shows the corresponding marginal effects for *realhrs*.[11] The marginal effect in the total sample is large, negative, and statistically significant. Applying the grouping offered by Spiess and Schneider implies marginal effects that point in the expected direction (although the difference is not statistically significant), and the picture once again becomes even clearer when

[9] The underlying regressions are available upon request.
[10] The tests of significant differences between the groups are carried out by interacting care/realhrs with Central and Nordic in a pooled regression, letting South be the comparison group (dropping all countries not included in the typologies). The tests of differences between SSA and SSB were carried out in a similar fashion. The test results are available upon request.
[11] The underlying regressions are available upon request.

applying the more sophisticated typologies. The Nordic subsample has the lowest marginal effect of providing one extra hour of informal eldercare; it is statistically insignificant, which again is not driven by high standard errors. The Southern European group has the largest marginal effects and the Central European group places in between, as expected. The difference between the Nordic group and the Southern group is statistically significant at the 5 % level but for the Central European group, the difference is statistically insignificant.

5.3 Sensitivity analysis of the correlation between care and employment probabilities

As discussed in the empirical strategy, we are not completely satisfied with the random effects probit model, especially since it assumes that c_i and x_{it} are independent. In fact, we have reason to worry about individual heterogeneity biasing the results, especially since all the likelihood-ratio tests show that rho (which measures the fraction of the variance that is due to c_i) is significantly different from zero.[12]

A way to proceed is to apply Chamberlain's approach and add the means (over time) of all time varying regressors as additional explanatory variables to allow for some correlation between c_i and x_{it}. The marginal effects of Chamberlains random effects probit model are shown in Table 8.[13]

(Table 8 about here)

Regarding the *care* variable, all subsamples retain a significant marginal effect except the Nordic one. However, the marginal effect in the Nordic subsample was not significant before either and has the lowest standard errors, which indicates that the insignificance stems from the actual close to zero value. The Southern European countries seem to show the strongest correlations, and again we find more pronounced marginal effects of being a caregiver in the countries characterized by Spiess and Schneider as having less formal care than in the ones with more formal care.

[12] The test results are available upon request.
[13] The underlying regressions are available upon request.

Regarding *realhrs* we see that the marginal effect in the Nordic subsample is insignificant, but the standard errors are still lower than in all other subsamples. All marginal effects are smaller with this specification, but the differences between the groups still point in the same direction. The marginal effects seem to be higher in the countries with less formal care as specified by Spiess and Schneider (the country group with more formal care is even marginally insignificant at the 5 % level in this specification) and the Southern European countries exhibit the highest values.

(Table 9 about here)

(Table 10 about here)

Another way to check whether individual heterogeneity is biasing our results is to see whether the effect is still significant in a fixed effects logit model. The results from the fixed effects logit models are shown in Tables 9 and 10.[14]

For *care* we see that all samples except the Nordic exhibit a statistically significant negative coefficient. It is however noteworthy that the standard errors for this sample are now high. The sample has very few observations left compared to the others though. The coefficients for all other samples still point in the predicted directions. With this model we can unfortunately not calculate marginal effects, but an interpretation is that a significant result in this specification gives further strength to the marginal effects calculated in the random effects probit model. For *realhrs* we note qualitatively the same group results as for *care*, and again that the coefficient in the Nordic subsample is statistically insignificant with high standard errors. A possible reason for this may be the loss of many observations. Since the fixed effects logit model is estimated using the minimal sufficient statistic, $\sum_{t=1}^{T} y_{it}$, for the individual fixed effects the sample is reduced (i.e., the model conditions on there being a change in the dependent variable over time).[15] For all the other subsamples the results are significant. We may thus conclude that unobserved individual heterogeneity probably does not drive the significance of the results obtained for

[14] Note that the specification is slightly changed for this model to work properly. Instead of including *age* and *agesq,* nine age dummies are included since this estimation technique relies on changes in the variables (and we have more variation with the age dummies). It may actually make sense to drop the age dummies as well since we can not distinguish between age effects and time effects. This is so since the model is estimated in differences. In fact, a separate regression was run without age variables, and the interpretation of the results was the same.

[15] As Viitanen (2005) found using a dynamic model in the ECHP data, positive state dependence of labor force participation is indeed an issue.

these groups in the random effects probit model. Regarding the Nordic group, more analysis is needed.

As mentioned, one might worry about the results from the fixed effects logit model serving as a control for individual heterogeneity since the effects are actually estimated on another sample. We also have the problem of distinguishing between the low number of observations and actual heterogeneity as causes for the high standard errors in the Nordic subsample. To overcome this problem we estimated linear fixed effects panel regressions as well. The results from these regressions are presented in Tables 11 and 12.

(Table 11 about here)
(Table 12 about here)

Table 11 shows that all group differences for *care* point in the predicted direction. However, judging the coefficients together with their standard errors we can not conclude any real differences except for the Nordic exceptionality. Regarding the insignificance of the Nordic sample we still observe quite high standard errors, indicating that unobserved heterogeneity may be a serious issue in this sample (the reasons for this will be discussed below). Table 12 shows the results for *realhrs*. We observe that the standard errors do not drive the insignificance of the Nordic sample, and again no differences are found between the other groups.

Some of the differences between the groups in the *realhrs* regressions may be obscured since they are evaluated at very different mean values. A related worry might be that the Nordic distinctiveness is driven merely by this group's low mean number of hours of care provided. In order to investigate this issue further, the samples have been estimated in random effects probit models at the total mean number of care-hours for those caring, at the mean number of hours for caregivers in the Nordic countries (lowest), and at the mean number of hours for caregivers in the Southern European countries (highest). Table 13 presents the results.[16]

(Table 13 about here)

[16] The underlying regressions are available upon request.

Looking at all levels of evaluation, several patterns emerge. First of all, the Nordic exceptionality is indeed a persistent feature, and so are the other group differences. Secondly, the magnitudes of the marginal effects seem to be stable in the sense that they do not differ much depending on which mean value they are evaluated at.[17]

A preliminary conclusion is that providing informal care is negatively associated with the employment probability for women in Europe. A persistent feature is that the countries characterized as having more formal care seem to entail lower marginal effects than the countries with less formal care in the grouping offered by Spiess and Schneider. Even though the difference is not statistically significant in the random effects probit model the direction of the difference is robust to a number of different specifications. In the sophisticated typologies created by Anttonen and Sipilä and by Leitner, we systematically find that the Southern European family care countries entail larger marginal effects. There are also clear differences between the Nordic countries and the others and the reason for the insignificance of this sample in the Chamberlain model seems to be its actual close to zero value. What is problematic though is the high standard errors in the fixed effects logit model and in the linear fixed effects model. This indicates that individual unobserved heterogeneity is important in the Nordic sample. We also conclude that there is a statistically significant negative correlation between providing one more hour of informal care and the female employment probability and that the group differences for this correlation are qualitatively the same as for the overall caring decision.

6. Results on the relationship between number of hours worked and informal care

The relationship between number of hours worked and informal care is here investigated in the same way as in Bolin et al. (2008a), i.e., by running regressions conditional on being employed. The analysis is however improved by exploiting the panel structure of the ECHP dataset and running random and fixed effects models. Table 14 presents the results from the random effects model.[18] Note that the dependent variable is logged hours worked.

(Table 14 about here)

[17] A final examination of the differences between the country groups was performed by evaluating the effects for caregivers only, and the differences pointed in the same direction. The results are available upon request.
[18] We use the same control variables as before, except that hourly wage is added.

The first column of Table 14 shows that the correlation is negative and statistically significant. We see that we get the same difference as before where countries with more developed formal care as specified by Spiess and Schneider seem to have lower correlations between being a caregiver and labor force participation. Specifically testing for the significance of this difference in the same way as before does, however, reveal that it is not statistically significant. The correlation is not significant in the Nordic countries, and is highest in the Southern European countries and the difference between these two groups is statistically significant at the 5 % level. To account for time-invariant unobserved individual heterogeneity, the model is also estimated using the fixed effects estimator. The results are presented in Table 15 below.[19]

(Table 15 about here)

As expected, the magnitudes of the effects are lower with this specification, and it can be noted that the coefficients for care are only significant in the family care countries and the countries classified as having less developed formal care. We now turn to a discussion of endogeneity and unobserved heterogeneity.

7. Endogeneity

Why would the results go in the direction proposed here? The work-care relationship is delicate and it would of course be good to take into account the simultaneous decision making that goes on. The endogeneity problem is important since we might suspect that caregivers self-select from a pool of underemployed individuals or labor force nonparticipants (Lilly et al. 2007). Crespo (2006) argues, however, that the direction of the endogeneity bias is uncertain a priori; there might also be a positive correlation between caregiving and the error term in the participation equation if some women are more active than others and perform a lot of both caregiving and paid work. She actually finds that the effect of informal caregiving on labor supply becomes underestimated if endogeneity is not controlled for.

Carmichael et al. (2004) acknowledge the endogeneity problem and try to find the characteristics of people who later became informal caregivers. The strategy is to identify people who started to provide informal care in their two panels and examine their employment histories before and

[19] The underlying regressions are available upon request.

after. Regarding joint endogeneity, they find it to be important for men but not for women, and argue that this may indicate that care provision is less of a free choice for women. Carmichael et al. (2008) also look at caregivers' employment before and after they start to give care, and relate it to hours of care and duration of caregiving spells. They find that many gave up working when they started to provide care, especially women. Both intensity and duration of a care spell are found to be important factors in this respect. They also asked intensive care respondents directly if they had changed their working behavior due to caregiving and 68 percent of the caregivers who were still in employment answered that they had changed their number of work hours and 54 percent said they had changed jobs. They can thereby conclude that at least some of the employment-related difference between caregivers and non-caregivers are explained by caring.

In the review by Lilly et al. (2007) the endogeneity problem does not seem to be a big issue once education, age, and bad health are controlled for. Two studies in their review that used an instrumental variables approach and where the instruments were found to be valid both failed to show that caregiving is endogenous to female labor force participation.

Bolin et al. (2008a) argue that it is likely that the effects of informal care on employment outcomes are overestimated if endogeneity is not controlled for. To investigate the issue they use an instrumental variables approach where health of parents, distance to parents' home, and the number of siblings of the respondents are used as instruments. In the cases where the instruments are found to be relevant, the estimated marginal effects are larger (albeit insignificant due to high standard errors) than when care is treated as exogenous. Furthermore, they are not able to reject the hypothesis that informal care is exogenous and therefore argue that unobserved heterogeneity and/or reversed causality is unlikely to drive their results.

Heitmueller (2007) also tries to account for the fact that caring and working may be endogenous by using an instrumental variable approach. He mainly uses the number of sick and disabled persons in the household as an instrument for caring, controlling for the individuals' own health statuses and household incomes. This instrument is correlated with the caring decision (and hence relevant) and is not likely to impact labor participation other than via caring once personal health is controlled for. However, household income is also included as a control variable since disability may be correlated with poverty, which might influence the work decision. In addition,

the following instruments are included in order to be able to do over-identification tests and get more correlation in the first stage regression: age of three closest friends, age of parents, and geographic proximity of parents and friends. When treating care as endogenous in the total sample the effects of caregiving increase substantially. Heitmueller (2007) further argues that the endogeneity is likely to differ between different types of care provision according to the degree of freedom inherent in the decision. The results indicate that there is no endogeneity problem for high intensity caregivers or for co-residential caregivers. For extra-residential low intensity care there are indications of a simultaneous endogeneity problem, although the instruments used were weak in the first stage regression for this group.

Fevang et al. (2008) argue that the instrumental variable approach used in previous studies in the field has relied on questionable, potentially invalid, or weak instruments (e.g., strong intergenerational correlation in health and labor market performance), and try to assess the causal relationship in another way. Since the heaviest care burden for children arises in the final years of the life of the last living parent they look at labor market outcomes during these final years and the years after the death of the parent. They find that children's labor force participation (at both the intensive and extensive margin) in Norway decreases in the years prior to the death of the last living parent, which they interpret as care causing reduced participation. While this is plausible it does not reject the hypothesis of there being an endogeneity problem, but only that the whole effect is not due to reversed causality.

The analysis of endogeneity in Heitmueller (2007) is complemented in a panel data framework by controlling for fixed unobserved heterogeneity, and there he finds that the effects become overestimated if endogeneity is not controlled for. The parts of the unobserved heterogeneity that can affect both the caring decision and labor force participation will bias the results if they are not controlled for. Examples of such factors suggested by Heitmueller (2007) are ability and the level of altruism. By applying fixed effects estimators one can control for the part of the unobserved heterogeneity that is time invariant, and assuming that this part is the most important, fixed-effects estimation will result in unbiased and consistent estimates. The present

analysis includes a fixed effects logit estimation and thereby some of the endogeneity can be said to be controlled for.[20, 21]

It is interesting that controlling for unobserved heterogeneity seems to inflate the standard errors in the Nordic group in the employment probability regressions, also when adjusting for the loss of observations. Following Heitmueller (2007) and Carmichael et al. (2004), the differences in unobserved heterogeneity can be interpreted as also stemming from differences in choice possibilities. That is, when informal care is more of a free choice we may expect a greater endogeneity problem since people actually have a choice. If no real choice exists, there can be no simultaneity in the decision. It is noteworthy that in the regressions on number of hours worked, controlling for unobserved heterogeneity led to results that were only significant in the Southern European countries and in the countries with less formal care, i.e., the countries with less free choice for women regarding the care decision.

To sum up, there does not seem to be a strong case for a general joint endogeneity bias, especially not in the sense that the whole effect is driven by reverse causality. Furthermore, by applying fixed effects estimations, part of the endogeneity can be said to be controlled for, and the results from that exercise further point in the direction that the effects of informal care are lower in the countries where it is argued that women's free choice is enhanced.

8. Conclusion

This paper finds female labor force participation at both the intensive and extensive margin to be negatively associated with informal caregiving to elderly. The amounts of both formal and informal eldercare clearly differ across countries, and when applying sophisticated regime typologies the effects of informal caregiving seem to be more negative in the Southern European countries, less negative in the Nordic countries, and in between in the Central European countries. That is, not only do women in some countries provide more care, the care they provide also has a stronger negative correlation with the probability of being employed and the

[20] Note that the specification differs from the one used by Heitmueller (2007). He uses a "quasi fixed effects" specification where lags and leads of the care dummy variable are included.

[21] Note however that nothing in the analysis controls for time variant endogeneity. I cannot account for the fact that people might provide care since they are for instance temporarily unemployed for non permanent reasons.

number of hours worked. It is argued in this paper that a candidate explanation for the phenomenon of lower effects in countries with more formal care and less pronounced gendered care-norms has to do with the degree of coercion in the caring decision. With formal care being a viable alternative, informal caregivers may feel less forced to engage in providing the care that would otherwise harm them in terms of (for instance) decreased labor force participation.

Although welfare regimes are to some extent institutionally resilient to change, they do change, and concerning specific areas the policies are not written in stone. Europe also has an important supranational agent, the EU, which may influence policies in different ways. As the EU has as a main goal to increase the female employment rate to 60 %, these results indicate that not only childcare but also eldercare should be integrated into policy packages and recommendations.

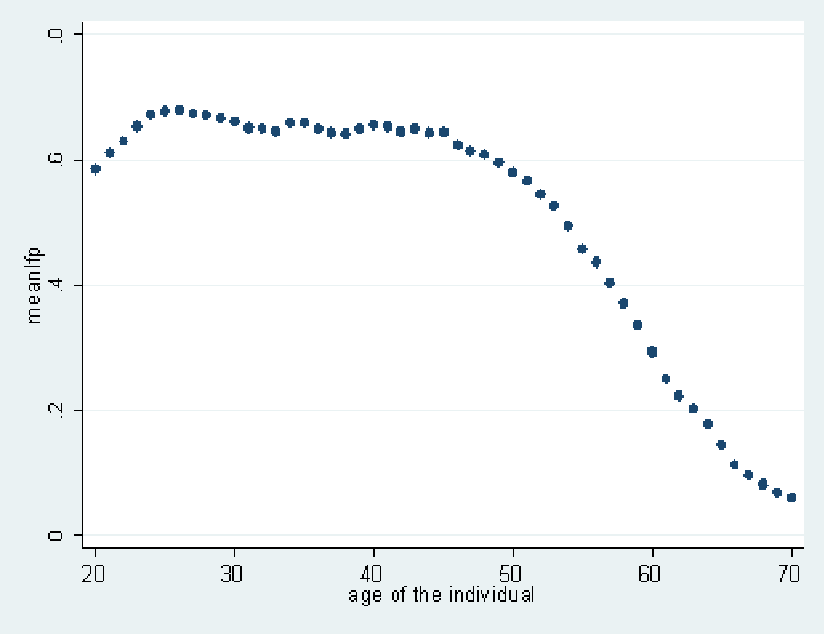
It is important to highlight the underpinnings of the normative conclusions. Female labor force participation seems to be crucial for fostering female agency. Moreover, social services, for childcare as well as eldercare, act as emancipatory tools (cf. Anttonen and Sipilä, 1996). Proponents of the so-called demoralization thesis would disagree and argue that increased female labor force participation and less informal care undermines family solidarity (Junge and Krettenauer, 1998). Their normative conclusions would probably be to focus on re-familialization policies rather than trying to enhance women's employment possibilities. Yet, looking at family relations from a quality perspective, intergenerational relations may very well improve when informal care becomes a less coercive option (cf. Finch and Mason 1993). The reciprocity may be enhanced and relations can be built on love and affection instead of guilt and responsibility, even though these concepts may be hard to disentangle in practice (cf. Finch and Mason 1993; Lewinter 1999; and Kohli and Künemund 2003). In line with the family democratization thesis (e.g. Morgan 1996) a move away from traditional family responsibilities is most likely deeply democratizing. It implies possibilities for individuals to create their own families and to change their boundaries. This is especially important seen from a feminist perspective.

Further research is definitely warranted on the links between informal eldercare and female employment. Especially the link between number of hours worked and informal eldercare merits more analysis. Technically, it would be interesting to incorporate more elaborate statistical tools

such as panel-heckit models. On the more qualitative side of the analysis there is scope for further typology building that incorporates work-schedule flexibility and leave-rights.

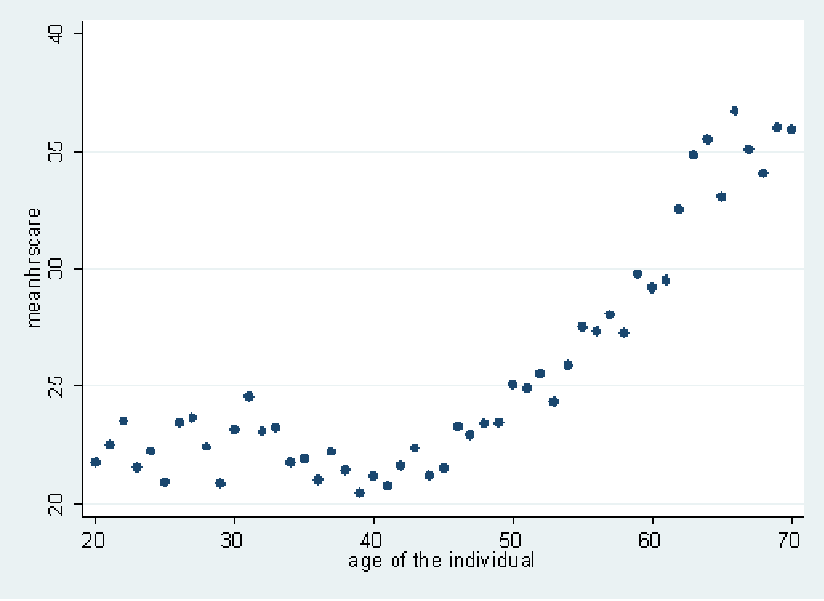
Figures:

Figure1: Female labor force participation in the sample, by age.



Source: Own calculation based on ECHP data.

Figure 2: Female eldercare hours in the sample, by age for caregivers only.



Source: Own calculation based on ECHP data.

Tables 1-5: Descriptive statistics

Table 1: Definition of variables

Dependent variables	
lfp	1 if in paid employment (incl. self employment and paid apprenticeship), 0 otherwise
hrsworked	Number of hours worked per week (logged)
Main independent variables	
realhrs	Number of hours per week that informal eldercare is provided
care	1 if caring for an elderly or disabled adult, 0 otherwise
Control variables	
mars1	1 if married, 0 otherwise
mars2	1 if separated or divorced, 0 otherwise
mars3	1 if widowed, 0 otherwise
mars4	1 if never married, 0 otherwise
age	Age of the individual
agesq	Age squared/100 (Scaled by 100 for presentational purposes)
age1	1 if individual is aged 20-24, 0 otherwise
age2	1 if individual is aged 25-29, 0 otherwise
age3	1 if individual is aged 30-34, 0 otherwise
age4	1 if individual is aged 35-39, 0 otherwise
age5	1 if individual is aged 40-44, 0 otherwise
age6	1 if individual is aged 45-49, 0 otherwise
age7	1 if individual is aged 50-54, 0 otherwise
age8	1 if individual is aged 55-59, 0 otherwise
age9	1 if individual is aged 59-65, 0 otherwise
hiq1	1 if highest level of schooling is 3rd level or above, 0 otherwise
hiq2	1 if highest level of schooling is 2nd level, 0 otherwise
hiq3	1 if highest level of schooling is below 2nd level, 0 otherwise
badh	1 if health is assessed to be poor or very poor, 0 otherwise
hhsize	Number of people living in the household
wage	Hourly wage[22]
hwage	(Monthly household wage – monthly personal wage)/ 1000
ch	1 if there are dependent children living in the household, 0 otherwise

[22] Measured in Euro.

Table 2: Summary statistics of main variables:

Var	Obs	Mean	Std. Dev.	Min	Max
Dependent variables					
lfp	300752	.5833145	.4930107	0	1
hrsworked	296795	2.012308	1.755713	0	4.564348
Main independent variables					
care	301142	.0808888	.2726646	0	1
realhrs	300363	1.923897	9.109428	0	96
Control variables					
mars1	301590	.6956	.4601536	0	1
mars2	301590	.0615969	.2404223	0	1
mars3	301590	.0355416	.1851446	0	1
mars4	301590	.2072615	.4053452	0	1
age	301883	41.01139	11.92602	20	65
agesq	301883	18.24163	10.09389	4	42.25
hiq1	296740	.1750354	.379998	0	1
hiq2	296740	.312826	.4636449	0	1
hiq3	296740	.5121386	.4998535	0	1
badh	300218	.0630475	.2430488	0	1
hwage	301883	.8205934	1.02561	0	40.42229
hhsize	301883	3.450217	1.44968	1	16
ch	298764	.5536845	.4971105	0	1

Source: Own calculation based on ECHP data.

Table 3: Summary statistics of main variables for caregivers:

Variable	Obs	Mean	Std. Dev.	Min	Max
Dependent variables					
lfp	24275	.4476622	.4972635	0	1
hrsworked	23986	1.500193	1.729805	0	4.564348
Main independent variables					
care	24359	1	0	1	1
realhrs	23580	24.50668	22.44133	1	96
Control variables					
mars1	24341	.7636498	.4248484	0	1
mars2	24341	.0621585	.2414482	0	1
mars3	24341	.0442874	.2057372	0	1
mars4	24341	.1299043	.336205	0	1
age	24359	46.38663	10.35298	20	65
agesq	24359	22.58899	9.276163	4	42.25
hiq1	24110	.1118623	.3152035	0	1
hiq2	24110	.275197	.4466228	0	1
hiq3	24110	.6129407	.4870875	0	1
badh	24303	.086944	.2817588	0	1
hwage	24359	.7147092	.9468031	0	24.52682
hhsize	24359	3.685948	1.563626	1	16
ch	23930	.5023402	.500005	0	1

Source: Own calculation based on ECHP data.

Table 4 *lfp, care,* and *realhours* by country:

country	mean lfp	lfp for caregivers	mean care	median realhrs given care
Germany	0.67	0.55	0.10	15
Denmark	0.85	0.83	0.06	6
Netherlands	0.63	0.45	0.08	14
Belgium	0.67	0.51	0.09	8
Luxembourg	0.56	0.39	0.07	10
France	0.66	0.51	0.05	8
Ireland	0.51	0.36	0.08	20
Italy	0.47	0.37	0.10	19
Greece	0.46	0.43	0.08	19
Spain	0.41	0.28	0.10	35
Portugal	0.66	0.49	0.07	25
Austria	0.66	0.58	0.08	15
Finland	0.83	0.80	0.07	6.5
UK	0.69	0.54	0.10	15

Source: Own calculation based on ECHP data.

Table 5 Country groups:

Spiess and Schneider's groups

SSA: Spiess and Schneider group A. Countries with well developed formal care.
Belgium, Denmark, France, Germany, Luxembourg, the Netherlands, UK.

SSB: Spiess and Schneider group B. Countries with less developed formal care
Greece, Ireland, Italy, Spain, Portugal.

From Anttonen and Sipilä's social service typology:

South: Family care model.
Portugal, Spain, Greece, Italy.

Central: Central European subsidiarity model.
The Netherlands, Germany, Belgium, France.

From Leitner's social service typology:

Nordic: Optional familialism.
Denmark, Finland.

Tables 6-15: Result Tables

Table 6: Marginal effects of a discrete change from 0 to 1 in *care* in an r.e. probit model:

xtprobit	dy/dx	Std. Err.	z	P>z	X	Obs
Total:	-.0815466	.00695	-11.73	0.000	.08097	290776
SSA:	-.0564254	.0086	-6.56	0.000	.071533	103784
SSB:	-.0889364	.00932	-9.55	0.000	.088296	159010
nordic:	-.0069324	.00553	-1.25	0.210	.064679	25186
south:	-.0977288	.00988	-9.90	0.000	.088664	140102
central:	-.0665819	.01098	-6.06	0.000	.069986	81059

Table 7: Marginal effects of *realhrs* in an r.e. probit model:

xtprobit	dy/dx	Std. Err.	z	P>z	X	Obs
Total:	-.0037022	.0002	-18.24	0.000	1.93607	290022
SSA:	-.0020993	.00027	-7.87	0.000	1.21146	103496
SSB:	-.004167	.00028	-15.05	0.000	2.52671	158638
nordic:	-.0003371	.00021	-1.59	0.111	.703955	25130
south:	-.0044102	.0003	-14.76	0.000	2.51538	139844
central:	-.0022732	.00036	-6.37	0.000	1.16061	80807

Table 8: Marginal effects of Chamberlains r.e. probit model for *care* and *realhrs*:

xtprobit	dy/dx	Std. Err.	z	P>z	X	Obs
care						
Total:	-.048966	.00731	-6.70	0.000	.08097	290776
SSA:	-.0221076	.00826	-2.68	0.007	.071533	103784
SSB:	-.058563	.01005	-5.82	0.000	.088296	159010
nordic;	-.0052036	.00562	-0.93	0.355	.064679	25186
south:	-.0697023	.01067	-6.54	0.000	.088664	140102
central:	-.0339973	.01081	-3.14	0.002	.069986	81059
realhrs						
Total:	-.0022365	.00022	-10.32	0.000	1.93607	290022
SSA:	-.0005402	.00029	-1.86	0.063	1.21146	103496
SSB:	-.0029141	.00029	-9.96	0.000	2.52671	158638
nordic:	-.0002459	.00022	-1.13	0.259	.703955	25130
south:	-.0032231	.00031	-10.25	0.000	2.51538	139844
central:	-.0008082	.00038	-2.14	0.032	1.16061	80807

Table 9: Fixed effects logit model with *care*:

	(1) total	(2) ssa	(3) ssb	(4) nordic	(5) south	(6) central
care	-0.270***	-0.188***	-0.280***	-0.155	-0.337***	-0.259***
	(0.038)	(0.069)	(0.047)	(0.152)	(0.051)	(0.077)
mars1	-0.531***	-0.200*	-0.695***	-0.066	-0.634***	-0.311**
	(0.057)	(0.106)	(0.075)	(0.159)	(0.078)	(0.127)
mars2	-0.302***	-0.499***	0.036	-0.531**	0.133	-0.531***
	(0.093)	(0.151)	(0.141)	(0.231)	(0.150)	(0.185)
mars3	-0.699***	-0.561*	-0.798***	-0.294	-0.837***	-0.676**
	(0.138)	(0.291)	(0.168)	(0.580)	(0.179)	(0.320)
age2	0.383***	0.197**	0.513***	0.066	0.536***	0.221**
	(0.048)	(0.094)	(0.060)	(0.176)	(0.062)	(0.106)
age3	0.638***	0.440***	0.824***	0.752***	0.887***	0.353**
	(0.072)	(0.134)	(0.093)	(0.260)	(0.098)	(0.150)
age4	1.005***	0.869***	1.127***	1.404***	1.189***	0.745***
	(0.095)	(0.173)	(0.124)	(0.345)	(0.131)	(0.192)
age5	1.404***	1.298***	1.464***	1.385***	1.465***	1.234***
	(0.119)	(0.212)	(0.155)	(0.430)	(0.165)	(0.236)
age6	1.434***	1.546***	1.396***	1.124**	1.298***	1.532***
	(0.143)	(0.254)	(0.187)	(0.517)	(0.199)	(0.282)
age7	1.030***	1.125***	1.038***	0.435	0.839***	1.112***
	(0.167)	(0.297)	(0.218)	(0.601)	(0.233)	(0.330)
age8	0.217	0.316	0.255	-0.594	-0.007	0.173
	(0.192)	(0.343)	(0.250)	(0.689)	(0.268)	(0.382)
age9	-1.078***	-1.369***	-0.907***	-2.972***	-1.199***	-1.470***
	(0.222)	(0.403)	(0.287)	(0.851)	(0.307)	(0.447)
hiq1	0.362***	0.181*	0.477***	0.106	0.527***	0.012
	(0.061)	(0.096)	(0.089)	(0.192)	(0.095)	(0.112)
hiq2	0.191***	0.098*	0.234***	-0.067	0.253***	0.033
	(0.037)	(0.056)	(0.058)	(0.149)	(0.063)	(0.061)
badh	-0.545***	-0.735***	-0.453***	-0.902***	-0.423***	-0.597***
	(0.044)	(0.079)	(0.056)	(0.171)	(0.057)	(0.088)
hhsize	-0.140***	-0.292***	-0.101***	-0.232***	-0.057***	-0.345***
	(0.015)	(0.033)	(0.019)	(0.066)	(0.020)	(0.038)
ch	-0.521***	-0.381***	-0.503***	-0.743***	-0.531***	-0.334***
	(0.035)	(0.071)	(0.043)	(0.140)	(0.046)	(0.079)
hwage	0.022	0.034*	-0.017	0.148***	-0.079**	0.028
	(0.015)	(0.019)	(0.026)	(0.056)	(0.033)	(0.021)
wave2	0.031	-0.055	0.102***	0.020	0.102**	-0.136***
	(0.029)	(0.045)	(0.038)	(0.133)	(0.041)	(0.053)
wave3	0.069**	0.103**	0.050	0.158	0.025	0.059
	(0.030)	(0.049)	(0.040)	(0.129)	(0.043)	(0.056)
wave4	0.185***	0.156***	0.203***	0.305**	0.151***	0.111*
	(0.034)	(0.060)	(0.044)	(0.138)	(0.047)	(0.067)
wave5	0.276***	0.187***	0.320***	0.554***	0.276***	0.092
	(0.037)	(0.068)	(0.048)	(0.150)	(0.052)	(0.076)
wave6	0.331***	0.232***	0.356***	0.696***	0.313***	0.103
	(0.041)	(0.075)	(0.053)	(0.163)	(0.057)	(0.084)
wave7	0.447***	0.302***	0.487***	0.814***	0.440***	0.175*
	(0.045)	(0.083)	(0.059)	(0.179)	(0.063)	(0.092)
wave8	0.505***	0.325***	0.573***	0.876***	0.555***	0.197*
	(0.050)	(0.091)	(0.065)	(0.192)	(0.069)	(0.102)
Obs	84046	26409	50389	6559	44349	21574
Ind	14501	4929	8149	1306	7150	3792

Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 10: Fixed effects logit model with *realhrs*:

	(1) total	(2) ssa	(3) ssb	(4) nordic	(5) south	(6) central
realhrs	-0.013***	-0.006**	-0.014***	-0.011	-0.015***	-0.007**
	(0.001)	(0.003)	(0.001)	(0.007)	(0.001)	(0.003)
mars1	-0.527***	-0.197*	-0.691***	-0.065	-0.630***	-0.307**
	(0.057)	(0.106)	(0.075)	(0.159)	(0.078)	(0.127)
mars2	-0.290***	-0.493***	0.053	-0.532**	0.151	-0.521***
	(0.093)	(0.151)	(0.141)	(0.231)	(0.150)	(0.185)
mars3	-0.707***	-0.584**	-0.789***	-0.335	-0.831***	-0.666**
	(0.140)	(0.296)	(0.170)	(0.584)	(0.180)	(0.324)
age2	0.384***	0.196**	0.513***	0.067	0.536***	0.218**
	(0.048)	(0.094)	(0.060)	(0.176)	(0.062)	(0.106)
age3	0.636***	0.437***	0.825***	0.753***	0.887***	0.347**
	(0.072)	(0.134)	(0.093)	(0.260)	(0.098)	(0.151)
age4	1.001***	0.862***	1.126***	1.403***	1.186***	0.734***
	(0.096)	(0.173)	(0.124)	(0.345)	(0.131)	(0.193)
age5	1.401***	1.291***	1.466***	1.379***	1.464***	1.221***
	(0.119)	(0.212)	(0.156)	(0.430)	(0.166)	(0.236)
age6	1.426***	1.537***	1.390***	1.077**	1.299***	1.516***
	(0.143)	(0.254)	(0.187)	(0.518)	(0.200)	(0.283)
age7	1.011***	1.115***	1.016***	0.369	0.831***	1.094***
	(0.167)	(0.297)	(0.219)	(0.602)	(0.234)	(0.330)
age8	0.203	0.307	0.242	-0.651	-0.008	0.150
	(0.193)	(0.344)	(0.251)	(0.690)	(0.269)	(0.383)
age9	-1.100***	-1.379***	-0.931***	-3.025***	-1.211***	-1.495***
	(0.223)	(0.403)	(0.288)	(0.852)	(0.308)	(0.448)
hiq1	0.362***	0.179*	0.482***	0.101	0.527***	0.007
	(0.061)	(0.096)	(0.089)	(0.192)	(0.095)	(0.112)
hiq2	0.191***	0.093*	0.237***	-0.064	0.252***	0.026
	(0.037)	(0.056)	(0.058)	(0.149)	(0.063)	(0.061)
badh	-0.549***	-0.733***	-0.462***	-0.903***	-0.429***	-0.593***
	(0.044)	(0.080)	(0.056)	(0.172)	(0.057)	(0.088)
hhsize	-0.137***	-0.293***	-0.096***	-0.230***	-0.053***	-0.346***
	(0.015)	(0.033)	(0.019)	(0.066)	(0.020)	(0.038)
ch	-0.528***	-0.384***	-0.511***	-0.758***	-0.535***	-0.338***
	(0.035)	(0.071)	(0.043)	(0.141)	(0.046)	(0.079)
hwage	0.021	0.034*	-0.020	0.148***	-0.081**	0.029
	(0.015)	(0.020)	(0.026)	(0.056)	(0.033)	(0.021)
wave2	0.029	-0.053	0.099***	0.020	0.099**	-0.132**
	(0.029)	(0.045)	(0.038)	(0.133)	(0.041)	(0.053)
wave3	0.067**	0.104**	0.047	0.159	0.022	0.062
	(0.030)	(0.049)	(0.040)	(0.129)	(0.043)	(0.056)
wave4	0.184***	0.158***	0.202***	0.314**	0.150***	0.114*
	(0.034)	(0.060)	(0.044)	(0.138)	(0.047)	(0.067)
wave5	0.276***	0.188***	0.318***	0.567***	0.276***	0.093
	(0.038)	(0.068)	(0.048)	(0.151)	(0.052)	(0.076)
wave6	0.331***	0.231***	0.354***	0.707***	0.311***	0.102
	(0.041)	(0.075)	(0.053)	(0.163)	(0.057)	(0.084)
wave7	0.445***	0.301***	0.485***	0.819***	0.440***	0.176*
	(0.045)	(0.083)	(0.059)	(0.179)	(0.063)	(0.092)
wave8	0.505***	0.322***	0.576***	0.881***	0.557***	0.195*
	(0.050)	(0.092)	(0.065)	(0.192)	(0.069)	(0.102)
Obs	83789	26315	50258	6545	44276	21487
Ind	14478	4919	8140	1304	7144	3784

Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 11: Linear fixed effects panel regression with *care* as the main variable of interest:

	(1) total	(2) ssa	(3) ssb	(4) nordic	(5) south	(6) central
care	-0.020***	-0.015***	-0.022***	-0.009	-0.025***	-0.020***
	(0.003)	(0.005)	(0.003)	(0.009)	(0.004)	(0.005)
mars1	-0.064***	-0.033***	-0.084***	-0.021*	-0.079***	-0.042***
	(0.004)	(0.007)	(0.006)	(0.012)	(0.007)	(0.009)
mars2	-0.043***	-0.059***	-0.014	-0.057***	-0.010	-0.061***
	(0.007)	(0.011)	(0.011)	(0.016)	(0.012)	(0.013)
mars3	-0.061***	-0.056***	-0.073***	-0.038	-0.075***	-0.067***
	(0.009)	(0.017)	(0.012)	(0.033)	(0.013)	(0.019)
age	0.048***	0.042***	0.052***	0.070***	0.054***	0.039***
	(0.001)	(0.002)	(0.001)	(0.004)	(0.001)	(0.002)
agesq	-0.052***	-0.047***	-0.056***	-0.078***	-0.058***	-0.044***
	(0.001)	(0.002)	(0.002)	(0.005)	(0.002)	(0.003)
hiq1	0.026***	0.009	0.039***	0.002	0.045***	-0.000
	(0.004)	(0.006)	(0.007)	(0.013)	(0.008)	(0.007)
hiq2	0.013***	0.004	0.018***	-0.011	0.019***	0.001
	(0.003)	(0.004)	(0.004)	(0.010)	(0.005)	(0.004)
badh	-0.039***	-0.055***	-0.032***	-0.082***	-0.031***	-0.042***
	(0.003)	(0.006)	(0.004)	(0.013)	(0.004)	(0.006)
hhsize	-0.013***	-0.024***	-0.011***	-0.017***	-0.007***	-0.028***
	(0.001)	(0.002)	(0.001)	(0.004)	(0.002)	(0.002)
ch	-0.044***	-0.035***	-0.045***	-0.058***	-0.047***	-0.031***
	(0.002)	(0.005)	(0.003)	(0.009)	(0.003)	(0.005)
hwage	0.002**	0.003**	0.000	0.008**	-0.006**	0.003*
	(0.001)	(0.001)	(0.002)	(0.004)	(0.002)	(0.001)
wave2	-0.003*	-0.006**	0.001	-0.006	0.001	-0.010***
	(0.002)	(0.003)	(0.002)	(0.008)	(0.003)	(0.003)
wave3	-0.006***	0.000	-0.009***	-0.009	-0.010***	0.000
	(0.002)	(0.003)	(0.002)	(0.007)	(0.003)	(0.003)
wave4	-0.003	0.001	-0.004	-0.006	-0.007***	0.002
	(0.002)	(0.003)	(0.002)	(0.006)	(0.003)	(0.003)
wave5	-0.001	-0.000	-0.000	0.002	-0.002	-0.001
	(0.002)	(0.003)	(0.003)	(0.006)	(0.003)	(0.004)
wave6	-0.002	-0.000	-0.004	0.004	-0.006**	-0.002
	(0.002)	(0.003)	(0.003)	(0.006)	(0.003)	(0.004)
wave7	0.001	0.001	-0.000	0.003	-0.003	-0.000
	(0.002)	(0.004)	(0.003)	(0.006)	(0.003)	(0.004)
wave8	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Const	-0.340***	-0.080*	-0.511***	-0.543***	-0.543***	0.013
	(0.024)	(0.042)	(0.031)	(0.093)	(0.033)	(0.047)
Obs	290776	103784	159010	25186	140102	81059
Ind	63967	25528	31722	6094	27268	18114
R^2	0.01	0.01	0.02	0.02	0.02	0.01

Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 12: Linear fixed effects panel regression with *realhrs* as the main variable of interest:

	(1) total	(2) ssa	(3) ssb	(4) nordic	(5) south	(6) central
realhrs	-0.001***	-0.000**	-0.001***	-0.000	-0.001***	-0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
mars1	-0.064***	-0.033***	-0.084***	-0.021*	-0.079***	-0.042***
	(0.004)	(0.007)	(0.006)	(0.012)	(0.007)	(0.009)
mars2	-0.042***	-0.058***	-0.014	-0.057***	-0.009	-0.061***
	(0.007)	(0.011)	(0.011)	(0.016)	(0.012)	(0.013)
mars3	-0.063***	-0.058***	-0.074***	-0.038	-0.076***	-0.067***
	(0.009)	(0.017)	(0.012)	(0.033)	(0.013)	(0.019)
age	0.048***	0.042***	0.053***	0.070***	0.054***	0.038***
	(0.001)	(0.002)	(0.001)	(0.004)	(0.001)	(0.002)
agesq	-0.052***	-0.047***	-0.056***	-0.078***	-0.058***	-0.044***
	(0.001)	(0.002)	(0.002)	(0.005)	(0.002)	(0.003)
hiq1	0.026***	0.009	0.040***	0.001	0.045***	-0.000
	(0.004)	(0.006)	(0.007)	(0.013)	(0.008)	(0.007)
hiq2	0.013***	0.004	0.018***	-0.011	0.019***	0.001
	(0.003)	(0.004)	(0.004)	(0.010)	(0.005)	(0.004)
badh	-0.039***	-0.055***	-0.033***	-0.082***	-0.031***	-0.042***
	(0.003)	(0.006)	(0.004)	(0.013)	(0.004)	(0.006)
hhsize	-0.013***	-0.024***	-0.010***	-0.017***	-0.007***	-0.029***
	(0.001)	(0.002)	(0.001)	(0.004)	(0.002)	(0.002)
ch	-0.045***	-0.034***	-0.046***	-0.059***	-0.047***	-0.031***
	(0.002)	(0.005)	(0.003)	(0.009)	(0.003)	(0.005)
hwage	0.002**	0.003**	-0.000	0.008**	-0.006**	0.003**
	(0.001)	(0.001)	(0.002)	(0.004)	(0.002)	(0.001)
wave2	-0.003*	-0.006**	0.000	-0.006	0.001	-0.010***
	(0.002)	(0.003)	(0.002)	(0.008)	(0.003)	(0.003)
wave3	-0.006***	0.000	-0.009***	-0.009	-0.010***	0.001
	(0.002)	(0.003)	(0.002)	(0.007)	(0.003)	(0.003)
wave4	-0.003	0.001	-0.004	-0.005	-0.007***	0.002
	(0.002)	(0.003)	(0.002)	(0.006)	(0.003)	(0.003)
wave5	-0.001	-0.000	-0.000	0.003	-0.003	-0.001
	(0.002)	(0.003)	(0.003)	(0.006)	(0.003)	(0.004)
wave6	-0.002	-0.000	-0.004	0.005	-0.006**	-0.002
	(0.002)	(0.003)	(0.003)	(0.006)	(0.003)	(0.004)
wave7	0.001	0.001	-0.001	0.003	-0.003	0.000
	(0.002)	(0.004)	(0.003)	(0.006)	(0.003)	(0.004)
wave8	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Const	-0.339***	-0.075*	-0.513***	-0.545***	-0.544***	0.019
	(0.024)	(0.043)	(0.031)	(0.093)	(0.033)	(0.047)
Obs	290022	103496	158638	25130	139844	80807
Ind	63942	25519	31713	6088	27264	18105
R^2	0.01	0.01	0.02	0.02	0.02	0.01

Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 13: Evaluation of marginal effects in an r.e. probit model at different mean values of *realhrs*:

Evaluated at mean value of the Nordic sample given that care=1 (11.2463)

Sample	*dy/dx*	*standard error*	*p-value*
total	-.0038955	.00022	0.000
ssa	-.0023448	.00033	0.000
ssb	-.0041286	.00027	0.000
nordic	-.0003729	.00026	0.147
south	-.0043575	.00029	0.000
central	-.0024936	.00042	0.000

Evaluated at mean value of the total sample given that care=1 (24.6381)

Sample	*dy/dx*	*standard error*	*p-value*
total	-.0041174	.00024	0.000
ssa	-.0026746	.00041	0.000
ssb	-.0040048	.00025	0.000
nordic	-.0004221	.00032	0.190
south	-.0042007	.00026	0.000
central	-.0027798	.00051	0.000

Evaluated at mean value of the family care sample given that care=1 (28.9182)

Sample	*dy/dx*	*standard error*	*p-value*
total	-.0041724	.00025	0.000
ssa	-.0027787	.00044	0.000
ssb	-.0039496	.00024	0.000
nordic	-.0004216	.00032	0.189
south	-.0041326	.00025	0.000
central	-.0028682	.00054	0.000

Table 14: Random effects model for *care*. Dependent variable is logged hours of work.

	(1) total	(2) ssa	(3) ssb	(4) nordic	(5) south	(6) central
care	-0.029***	-0.021***	-0.035***	-0.012	-0.029***	-0.020**
	(0.004)	(0.007)	(0.006)	(0.007)	(0.006)	(0.008)
wage	-0.022***	-0.015***	-0.042***	-0.031***	-0.047***	-0.014***
	(0.001)	(0.001)	(0.003)	(0.002)	(0.005)	(0.001)
mars1	-0.079***	-0.101***	-0.058***	-0.031***	-0.043***	-0.114***
	(0.004)	(0.007)	(0.006)	(0.008)	(0.006)	(0.009)
mars2	-0.020***	-0.027***	-0.015	-0.001	0.007	-0.027**
	(0.007)	(0.010)	(0.011)	(0.009)	(0.011)	(0.013)
mars3	-0.063***	-0.086***	-0.045***	-0.024	-0.037**	-0.095***
	(0.012)	(0.018)	(0.016)	(0.022)	(0.016)	(0.023)
age	0.013***	0.018***	0.016***	0.041***	0.020***	0.018***
	(0.001)	(0.002)	(0.002)	(0.003)	(0.002)	(0.003)
agesq	-0.020***	-0.028***	-0.023***	-0.050***	-0.026***	-0.028***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)
hiq1	0.068***	0.084***	0.084***	0.043***	0.077***	0.077***
	(0.005)	(0.007)	(0.009)	(0.009)	(0.012)	(0.008)
hiq2	0.015***	0.016***	0.043***	0.006	0.041***	0.003
	(0.004)	(0.006)	(0.006)	(0.008)	(0.006)	(0.007)
badh	-0.015**	-0.019**	-0.024***	-0.005	-0.029***	-0.013
	(0.006)	(0.009)	(0.008)	(0.014)	(0.008)	(0.010)
hhsize	-0.014***	-0.040***	-0.012***	-0.017***	-0.008***	-0.045***
	(0.001)	(0.003)	(0.002)	(0.004)	(0.002)	(0.003)
ch	-0.050***	-0.072***	-0.021***	-0.002	-0.017***	-0.078***
	(0.003)	(0.006)	(0.005)	(0.006)	(0.005)	(0.008)
hwage	-0.002	0.002	0.015***	0.012***	0.018***	-0.000
	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)	(0.002)
wave2	0.003	-0.004	0.006*	0.005	0.005	-0.014***
	(0.002)	(0.003)	(0.004)	(0.005)	(0.004)	(0.004)
wave3	0.007***	0.003	0.009**	0.019***	0.009**	-0.005
	(0.002)	(0.003)	(0.004)	(0.006)	(0.004)	(0.004)
wave4	0.011***	0.008*	0.017***	0.018***	0.016***	0.001
	(0.003)	(0.004)	(0.004)	(0.007)	(0.005)	(0.005)
wave5	0.021***	0.031***	0.024***	0.034***	0.022***	0.022***
	(0.003)	(0.005)	(0.005)	(0.007)	(0.005)	(0.005)
wave6	0.031***	0.040***	0.039***	0.050***	0.034***	0.026***
	(0.003)	(0.005)	(0.005)	(0.007)	(0.006)	(0.006)
wave7	0.043***	0.057***	0.054***	0.063***	0.046***	0.042***
	(0.004)	(0.006)	(0.006)	(0.008)	(0.007)	(0.006)
wave8	0.052***	0.065***	0.068***	0.069***	0.056***	0.052***
	(0.004)	(0.006)	(0.006)	(0.008)	(0.007)	(0.007)
Constant	3.469***	3.390***	3.464***	2.988***	3.366***	3.413***
	(0.024)	(0.042)	(0.033)	(0.050)	(0.035)	(0.053)
Obs	165033	66783	77773	20894	68176	49690
Ind	43834	18734	19574	5451	16710	13044

Robust standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

Table 15: Fixed effects model for *care*. Dependent variable is logged hours of work.

	(1) total	(2) ssa	(3) ssb	(4) nordic	(5) south	(6) central
care	-0.020***	-0.009	-0.023***	-0.010	-0.019***	-0.009
	(0.003)	(0.006)	(0.005)	(0.007)	(0.005)	(0.007)
wage	-0.022***	-0.016***	-0.045***	-0.035***	-0.050***	-0.015***
	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)
mars1	-0.049***	-0.056***	-0.039***	-0.026***	-0.033***	-0.071***
	(0.005)	(0.008)	(0.007)	(0.010)	(0.008)	(0.009)
mars2	-0.012	-0.018	-0.004	-0.013	0.004	-0.026*
	(0.008)	(0.011)	(0.013)	(0.013)	(0.013)	(0.015)
mars3	-0.041***	-0.075***	-0.017	-0.037	-0.012	-0.090***
	(0.012)	(0.021)	(0.017)	(0.025)	(0.018)	(0.026)
age	0.024***	0.025***	0.034***	0.049***	0.036***	0.024***
	(0.001)	(0.002)	(0.002)	(0.004)	(0.002)	(0.003)
agesq	-0.024***	-0.025***	-0.031***	-0.045***	-0.035***	-0.026***
	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)	(0.004)
hiq1	0.004	0.005	0.030***	0.015	0.032***	-0.001
	(0.005)	(0.006)	(0.009)	(0.010)	(0.009)	(0.008)
hiq2	-0.008***	-0.010**	0.012**	-0.005	0.010	-0.012**
	(0.003)	(0.004)	(0.006)	(0.008)	(0.006)	(0.005)
badh	-0.013***	-0.015*	-0.020***	0.004	-0.019***	-0.011
	(0.005)	(0.008)	(0.006)	(0.011)	(0.006)	(0.009)
hhsize	-0.013***	-0.033***	-0.008***	-0.012***	-0.004*	-0.040***
	(0.001)	(0.003)	(0.002)	(0.004)	(0.002)	(0.003)
ch	-0.042***	-0.065***	-0.019***	-0.010	-0.019***	-0.079***
	(0.003)	(0.005)	(0.004)	(0.007)	(0.005)	(0.006)
hwage	0.002**	0.001	0.016***	0.006*	0.015***	0.001
	(0.001)	(0.001)	(0.003)	(0.003)	(0.003)	(0.002)
wave2	-0.005**	-0.011***	-0.003	-0.005	-0.003	-0.018***
	(0.002)	(0.003)	(0.003)	(0.006)	(0.003)	(0.004)
wave3	-0.008***	-0.011***	-0.010***	-0.004	-0.007**	-0.016***
	(0.002)	(0.003)	(0.003)	(0.005)	(0.003)	(0.004)
wave4	-0.013***	-0.015***	-0.012***	-0.014***	-0.009***	-0.016***
	(0.002)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)
wave5	-0.011***	-0.010***	-0.014***	-0.008*	-0.009***	-0.010**
	(0.002)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)
wave6	-0.007***	-0.007*	-0.008**	-0.002	-0.005	-0.010**
	(0.002)	(0.004)	(0.003)	(0.005)	(0.003)	(0.004)
wave7	-0.003	-0.002	-0.004	0.000	-0.002	-0.004
	(0.002)	(0.004)	(0.003)	(0.005)	(0.004)	(0.005)
wave8	0.000	0.000	0.000	0.000	0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Constant	3.189***	3.144***	2.967***	2.684***	2.937***	3.211***
	(0.030)	(0.050)	(0.042)	(0.076)	(0.044)	(0.060)
Obs	165033	66783	77773	20894	68176	49690
Ind	43834	18734	19574	5451	16710	13044
R^2	0.07	0.09	0.09	0.14	0.09	0.09

Standard errors in parentheses.
* significant at 10%; ** significant at 5%; *** significant at 1%.

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