

Joan Costa-i-Font, Martin Karlsson and Henning Øien **Careful in the crisis? Determinants of older people's informal care receipt in crisis- struck European countries**

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Careful in the Crisis?

Determinants of Older People's Informal Care Receipt in Crisis-Struck European Countries^{1*}

March 15, 2016

Abstract

Macroeconomic downturns can have an important impact on the receipt of informal and formal long-term care, since recessions increase the number of unemployed and affect net wealth. This paper investigates how the market for informal care changed during and after the Great Recession in Europe, with particular focus on their various determinants. We use data from the Survey of Health, Aging and Retirement in Europe, which includes a rich set of variables covering waves before and after the Great Recession. We find evidence of an increase in the availability of informal care after the economic downturn when controlling for year and country fixed effects. This trend is mainly driven by changes in care provision of individuals not cohabiting with the care recipient. We also find evidence of several determinants of informal care receipt changing during the crisis – such as physical needs, personal wealth and household structures.

Keywords: long-term care, informal care, great recession, downturn, old age dependency.

JEL: J1, I18

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1 Introduction

Informal caregiving refers to unpaid care provided by family members, friends, and charities, to individuals in need of help with everyday tasks. Such care is still to date the most common source of long-term care (??). Slow-moving effects of aging and changes in social norms have gradually modified the demand for long-term care (including informal care), but policy makers are often confronted by the question of how to influence the provision of informal care in the short term. This need raises the issue as to how the demand for and supply of informal care is determined. A sharp change in economic conditions can be useful to learn more about these determinants. In this paper, we exploit the unemployment shock caused by the Great Recession to look at the relationship between informal care availability and macroeconomic fluctuations, and to explore potential mechanisms that can explain the demand for formal and informal long-term care (LTC), such as changes in household wealth, care needs, and availability of informal caregivers.

There is an extensive literature on the relationship between macroeconomic downturns and health. In general, the recent literature finds a counter-cyclical pattern of health – health improves when the economy deteriorates, and there is some evidence of increased use of medical care in good economic times.¹ For instance, an inverse relationship between total mortality and unemployment rates is found using data on US states (?), 16 German states (?), and 23 OECD countries (?). Applying individual-level survey data from the US and using 5 different measures of health status, ? finds that health tends to improve with increasing state unemployment rates. The relationship is strongest for the population of working age and for acute health conditions. In addition, ?? finds that health improvements occur even though the use of medical care declines in bad economic times.²

To our knowledge, there is little evidence on the relationship between macroeconomic fluctuations and various outcomes related to long-term care for older people. There are at least three reasons why this relationship is important and interesting to study. First, it is unlikely that the theoretical predictions and empirical results of the previous studies apply equally to the older population. The empirical analyses focus on the working-age population and find stronger effects for acute health conditions than for chronic illnesses. The hypotheses for the observed countercyclical pattern of health include more time for

¹See ? for a further review of the literature. The observation that health is a countercyclical variable was contrary to conventional knowledge gained from early evidence using time series data, see ? and references therein.

²The decreased use of medical care in the US might be a consequence of lower insurance coverage following a fall in economic activity. ? and ? find that state unemployment rates are negatively related to insurance coverage. However, ? argue that this is unlikely since the associations are just as strong for sub-samples less affected by fluctuations in insurance coverage, and the relationship is still intact after controlling for income.

health improving activities, less exposure to adverse health outcomes related to work, and less drinking and driving (??). All these behavioral responses, and especially the first two, are less relevant for the older (non-working) population. There is some evidence of the relationship between macroeconomic conditions and health among older adults. ? find, using a sample of US adults aged 50 years and older, that mortality increases among those who experience a job loss. Likewise, the self-perceived health of a sample in the same age group from 9 European countries, seems to deteriorate in downturns (?). ? find that the mortality rate among older Mexicans increases in crisis years. Thus, these studies suggest that old-age health shows a pro-cyclical pattern. However, a study using Norwegian registry data (?), shows that disability is pro-cyclical (i.e. an indication of health being counter-cyclical) for older adults in Norway. Long-term care is especially interesting since the market is dominated by informal (unpaid) care and public sector funds (???)

Second, the demand for and supply of long-term care (LTC) are determined by very different forces compared to those determining health care needs and utilization. In most societies, the LTC sector is dominated by informal care provided by (mostly) unpaid family members, friends, neighbors or other acquaintances. Besides, in most OECD countries, the bulk of the expenditure for formal LTC is public (???) and the proportion of public spending is in general higher than for health care (?).³ Both public sector funds for LTC and health services, and informal care availability are expected to be affected by economic downturns. The growth of total and public expenditure for health and social services tends to slow down in recessionary periods (??).

A reduction in the growth of public spending may be particularly relevant for LTC, since an ageing population combined with falling birth rates and higher labor market participation of women (i.e. decreased supply of informal care) will increase the demand for formal LTC (?).⁴ As noted in ?, recessions do not curb the ageing of the population, and therefore the demand for LTC will continue to increase. The question is then, whether informal caregiving will meet the increased demand for LTC in times when public funds are strained. The rate of unemployment is closely related to the supply of informal care, since the decision to provide informal care primarily depends on the opportunity cost of time (?). However, the relationship between this opportunity cost and the business cycle is far from straightforward. It might even be the case that the opportunity cost of time of the traditional caregivers increases during hard economic times. For example, caregiving

³? find in a sample of 25 OECD countries that the public share of LTC expenditure is 75 percent. Looking only at the 18 European countries in the sample, the public share is 88 percent, and disregarding Switzerland, which with a public share of 38 percent is in this respect an outlier, the share is above 90 percent. See figure 1.8, on page 46, and the corresponding data in ?.

⁴? and ? refer to projections by the European commission in which LTC expenditure will double in most European countries by 2060.

responsibilities are high close to retirement (?). A fall in household incomes caused by a recession might induce people to postpone retirement (?), and also induce informal caregivers to seek employment outside the household due to potential employment loss of the breadwinner.⁵

A third reason to devote particular attention to social care needs is that the LTC systems of European countries exhibit striking and interesting institutional differences, which make them a useful setting for a comparative case study. Whereas there is evidence of convergence in the European health care systems (?), national LTC systems tend to exhibit a great degree of persistence and path-dependence (??). Thus, important differences persist in many of the dimensions that define a LTC system (?) such as the role of the family in provision of care (??), the balance between residential and home-based services, and the form of the public subsidy (?). Since the last crisis appears to have had a heterogeneous impact even between countries with similar LTC institutions, a comparison between different European regions may tell us something about the robustness of their respective LTC systems to changing economic conditions. This exercise may thus be thought of as a stress test of the challenges ahead when population ageing reaches its full impact on LTC systems in a few decades' time.

We use data from the Survey of Health, Aging and Retirement in Europe (SHARE), which includes a rich set of variables covering waves from before and after the Great Recession. Our main finding is that the proportion receiving informal care increases when the economy deteriorates. The result is driven by increased supply of extra-residential informal care (i.e. care given from a person not living with the recipient). Moreover, we find that trends in informal caregiving during the recession were very heterogeneous across LTC systems: the associations in the Northern and Southern regions correspond to an increase of about 20 and 2 percent, respectively – with the other groups of countries in between. A similar heterogeneity is noticeable in the determinants of informal LTC receipt, where family structures and personal wealth appears to have followed very different trajectories in different parts of Europe.

The structure of the paper is as follows. In the following two sections we present the data and discuss the empirical strategy. Section four reports the results and a final section discusses these results and concludes.

⁵This is likely to be more relevant in developing countries, see e.g. ?.

2 Data, Sample Selection and Variables

Our empirical analysis is based on the Survey of Health, Ageing and Retirement in Europe (SHARE). The SHARE database is a multi-disciplinary survey of the population aged 50 years and older in 18 European countries (?). The data have been collected in four regular panel waves: wave 1 (2004/05); wave 2 (2006/07); wave 4 (2010/11); and wave 5 (2013). In addition, one wave of data (wave 3; 2008/09) was designed exclusively to gather information on retrospective life histories of the respondents. We do not use wave 3 because it does not contain any information on informal care use. The target population for SHARE are all persons who are 50 years and older in the respective survey year and their partners at any age. The survey has a longitudinal dimension in that all respondents who have previously participated are eligible to be interviewed in future waves (?).⁶ We use individuals that have been observed in at least two waves in order to estimate individual-specific effects. The SHARE database is particularly useful in our context because it includes detailed information on health status, informal care, demographics and socioeconomic status and, in particular, samples are taken before (wave 1 and 2) and after the financial crisis (wave 4 and 5).

We estimate the availability of informal care before and after the crisis. Therefore, we are only using countries that participated in the survey before and after the financial crisis. This leaves out Estonia, Hungary, Portugal and Slovenia that joined the survey in wave 4, and Greece, Ireland and Israel that did not participate in the survey after wave 3. In addition, Switzerland is dropped from the sample because we do not have any information on our measures of crisis severity from this country. The data we use to describe the severity of the crisis is described in more detail in section ???. After we discard observations that have missing values in the variables of interest we are left with 109,575 observations across 11 countries, which we divide into the following geographic regions: Sweden and Denmark (North); Germany, France, Netherlands, Austria, and Belgium (Central); Spain and Italy (South); and Poland and the Czech Republic (East).⁷

2.1 Main Outcome Variables

Receiving informal care. The respondents are asked whether they or their partners have received any informal care from someone living in the household, and whether they have

⁶For more in-depth information on survey design and other methodological issues see ? and ?.

⁷This partition is very similar to the one presented by ? and which is designed to capture the most relevant dimensions of the LTC systems. The main differences to that classification are that we include two new EU members (Poland and the Czech Republic) and that we assign the Netherlands to the Central/Continental group. It is acknowledged by ? that the Netherlands has been moving in this direction.

received any informal care from a friend or family member outside the household, during the past 12 months. We call the former intra-residential informal care and the latter extra-residential informal care. Since it is unclear from the question whether it is the respondent or their partner who receives care, we assign care to the person in the couple who has a long-term health problem or disability. If a couple answers that they receive informal care and both in the couple have a health problem, they are coded to both receiving informal care.⁸ In the analysis we are using an indicator for whether the respondent receives one or both types of informal care. The reason we are not analyzing the intensity is that the frequency of informal receipt is not recorded for intra-residential informal care and the number of times informal care is given is not recorded for any of the informal care variables in wave 4. Extra-residential informal care includes help with personal care, practical household help and help with paperwork. Intra-residential informal care consists only of help with personal care and the question is posed only to respondents that are reported to have a mobility limitation.⁹ This is natural since practical household chores represent a shared responsibility within the household and should therefore not be regarded as informal caregiving.

It is of interest to contrast the receipt of extra and intra-residential informal care because it is likely the two are related to the financial crisis for different reasons. For example, intra-residential caregivers are often the partner of the person in need of care and therefore more likely to be older and out of the labor force than extra-residential caregivers. It is not possible to separate the types of extra-residential informal care in wave 4. To make the samples comparable we assign zero intra-residential care receipt if the respondents are not asked this question (i.e. respondents that have no mobility problems). Table (??) shows the descriptive statistics for informal care receipt, which shows that a substantial proportion of the sample, i.e., approximately 30 percent, receives informal care.¹⁰

Determinants of demand and supply. In addition to this main outcome variable, we also consider a range of other outcome variables, which may be affected by the crisis and which may be seen as important determinants of the need for and the availability of informal LTC. These are: the number of limitations to activities of daily living (ADL); net worth; housing wealth; whether one or more children live with the respondent; whether one or more children live within 1 kilometer from the respondent; and cohabitation with a

⁸Respondents are defined to have a long-term health problem and disability if they answer that they have a long-term illness and/or are limited in activities of daily living. ? use a similar approach, but code informal care as missing if both in the couple have a health problem. We think it is reasonable to assume that if a household receives informal care all the household members receives some care if they have a health problem.

⁹The respondents are asked whether they have one or more of out of 10 mobility limitations, and respondents that report to have one or more mobility problem is asked the question about intra-residential informal care.

¹⁰The indicators of external and internal informal care do not exactly equal the indicator of overall informal care because there are some respondents who receive both types of care.

partner.

The wealth variables are deflated using purchasing power parity adjusted exchange rates provided by the SHARE team, for details see ? and ?. Household net worth is the sum of all real and financial assets net of liabilities (?). Housing wealth is the real value of the respondents' main residence. Since net worth and housing wealth have the common properties that they may take on negative values and have a mass point at zero, we use an inverse hyperbolic sine transformation for these variables (?).

Indicators of whether the respondent lives with at least one child or whether at least one child lives less than one kilometre from the respondents are taken from 'easySHARE'. easySHARE is a ready-made panel/repeated cross section of Share waves 1, 2, 3, 4 and 5 (??). These variables are coded zero if the respondent has no children.

The number of ADL:s are the instrumental and other activities of daily living out of 10 which the respondent has problems with. The activities of daily living include dressing, bathing or showering, eating and cutting up food, walking across a room and getting in or out of bed. The instrumental activities of daily living are making telephone calls, taking medications, managing money, shopping for groceries, and preparing a hot meal.¹¹ The descriptive statistics for these outcome variables are given in Panel 2 in Table (??).

Table 1: Descriptive statistics on key outcome variables

	mean	sd	count
<i>Informal Care Receipt</i>			
Overall (=1)	0.21	0.41	109,575
Internal (=1)	0.04	0.20	109,575
External (=1)	0.18	0.39	109,575

The table shows the means, standard deviations and number of complete observations (count) for the main outcome variables: External informal care receipt is an indicator of whether you have received informal care from someone *outside* the household, internal informal care receipt is an indicator of receiving informal care from someone *within* the household, and overall informal care receipt is whether you receive one or both types of informal care. The same division applies to informal care provision.

¹¹The instrumental activities and activities of daily living used here have been asked in all waves and are the same as those used to make the instrumental activities and activities daily living indices in easySHARE (?).

2.2 Control Variables

As the countries included in our analysis differ in many ways which may be related to the crisis impact, it is desirable to assess whether results are robust to the conditioning on various control variables. Besides, it is necessary to take the ageing of our sample into account. When choosing control variables, one needs to be aware that the estimates may be biased whenever the crisis has an impact on the covariate. Therefore, we choose control variables that are not likely to be affected by the crisis. Our standard set of controls include gender, age and age squared. In addition we control for indicators of primary and secondary education, and whether the respondent is born in the country of interview. To account for different demographic trends we include the dependency ratio – the number of people aged 65 years and older by the working age population (?) – as a control variable. Descriptive statistics for these variables are given in Table (??).

Table 2: Descriptive statistics on additional outcomes and controlvariables

	mean	sd	count
<i>Crisis measure</i>			
Unemployment change, output peak-to-trough	1.91	2.26	109575
<i>Additional outcomes</i>			
Household net wealth in constant Euro (1000)	5.11	2.20	109574
Gross value of main residence in constant Euro (1000)	4.03	2.60	109574
At at least one child lives in household/building (=1)	0.24	0.43	108399
At least one child lives less than 1km away (=1)	0.35	0.48	108403
Living in the same household as a partner (=1)	0.73	0.44	109556
Number of problems with adl out of 10 listed	0.39	1.35	109548
<i>Education</i>			
Tertiary education education (=1)	0.21	0.41	107881
Secondary education (=1)	0.51	0.50	107881
<i>Demographics</i>			
Age in years	65.95	10.23	109575
Female (=1)	0.56	0.50	109575
Born in the country of interview (=1)	0.93	0.25	108556
Dependency ratio (population 65 and over to 15-64)	25.91	2.91	109575

2.3 Measuring Recession Severity

The Great Recession which was triggered in 2007 by the US subprime mortgage crisis, was the worst global recession since World War II. It started in December 2007 in the U.S. and ended there in June 2009; however, the world economy was in a state of global recession – in the sense that a decline in World GDP per capita was observed – only during 2009. The Great Recession led to a sharp decline in international trade, a rapid rise in unemployment in many countries, and slumping prices for many commodities.

To measure the severity of the Great Recession we focus on changes in unemployment. This is in line with the large literature measuring the relationship between macroeconomic fluctuations and health inputs and outcomes (????), and besides, the previous literature suggests that unemployment is a better predictor of health outcomes and inputs than other measures of macroeconomic fluctuations (?). To measure fluctuations in unemployment directly associated with the Great Recession we follow ? and quantify the unemployment change in the recessionary period, 2007-2009. We define a recessionary period for each country following the convention of defining a period of at least two consecutive quarters of negative quarter-on-quarter growth in seasonally adjusted real GDP as a recession (???).¹² For each country, we define the start of the recession as the last quarter of positive output growth, which we call the “peak quarter”, and the end of the recession as the last quarter of negative output growth, which we call the “trough quarter”. Our measure of unemployment associated with the Great Recession is then the percentage point change in unemployment from output peak-to-trough.

An overview of the impact of the crisis in some European countries is provided in Table ???. All the data is from the Eurostat database (?). We have sorted the countries included by the European regions they belong to. The first two columns present the situation in the last year before the crisis, and the following columns picture the duration and impact of the crisis in the different countries. Clearly, the immediate effect of the crisis was a sharp downturn in GDP in all countries but Poland. The impact from peak to trough ranges from 4.0 per cent in France to 8.0 per cent in Denmark. In general, it is not possible to rank the different regions according to the magnitude or duration of the recession. However, in terms of unemployment, it seems clear from Table ?? that the countries in the ‘Central’ region have done better than the three other regions. We see that the recession impact on unemployment rates ranges from -0.4 in Germany to 8.6 per cent in Spain. Germany was the only country that experienced a decrease in unemployment in this period. Overall, the crisis impact has a mean of 1.91 per cent and a standard deviation of 2.26 in our sample (Table (?)).

According to Table (?), the central European countries in our sample weathered the crisis best. This is confirmed when looking at the Euro area in total (?). Spain, Denmark, Ireland and the Baltic countries experienced the largest increases in unemployment, while in Central European countries the unemployment increase was limited. However, looking at unemployment increases in the recessionary period conceals the different recovery paths across Europe. For instance, in Northern Europe the unemployment rates started to decrease already in 2010 while in Southern Europe the unemployment rates stabilized at high levels (?). To account for the different impacts and recovery paths across Euro-

¹²? use *annual* data in defining their recessionary periods. We follow the convention and use quarterly data which give a more detailed picture of output fluctuations (?).

Table 3: Crisis Impact by Country.

<i>Region</i> Country	Pre-Crisis (2007)		Crisis Impact		
	GDP per capita (€)	Unemployment <i>Percent</i>	Duration <i>Quarters</i>	GDP <i>Percent</i>	Unemployment <i>Percent</i>
<i>North</i>					
Denmark	30,600	3.9	5	8.0	2.8
Sweden	31,200	6.4	6	7.6	1.3
<i>Central</i>					
Austria	30,900	4.4	6	5.1	0.9
Belgium	28,900	7.8	4	4.4	0.8
France	26,900	8.4	6	4.0	1.9
Germany	28,800	9.0	5	6.9	-0.4
Netherlands	33,000	3.9	6	4.9	0.4
<i>South</i>					
Italy	26,000	5.9	6	7.2	1.0
Spain	26,200	8.0	6	4.6	8.6
<i>East</i>					
Czech Republic	20,600	5.9	4	5.5	2.2
Poland	13,600	10.8	0	.	.

The Table shows the impact of the Great Recession for the countries listed in Column (1). Column (2) and (3) show real GDP per capita and unemployment rate in the last quarter before the beginning of the crisis (i.e. the peak quarter). Column (4) lists the duration of the crisis in quarters, while the last two Columns show the percentage decline (absolute value) in real GDP and percentage point change in the unemployment rate from output peak-to-through respectively.

pean regions we will include region-specific time trends in the empirical analyses and do subsample analysis for specific regions.

Since Poland did not experience a recession we are not able to make a country-specific recession impact measure for Poland. Instead of discarding Poland from the analysis we calculated our recession measures for Poland using the first quarter in 2008 as the peak quarter and the second quarter of 2009 as the trough quarter, which is defined as the “official” recession period for the European Union as a whole (??). In this period, Poland experienced a 0.4 percentage point increase in the unemployment rate.

Some previous studies include the location specific unemployment rate instead of constructing a specific measure of recession severity (?????).¹³ Increases in the unemployment rate are “loosely” interpreted as measuring macroeconomic downturns/recessions (??). We are however specifically interested in measuring how variation in severity of the Great Recession is associated with informal care supply and demand, and we therefore use a more technical definition of a downturn.

3 Empirical Specification

To estimate the relationship between informal care and the country-specific depth of the Great Recession we estimate the following model using OLS

$$IC_{ijt} = \alpha_j + \lambda_t + X_{itj}\beta + \gamma(E_j \times d_t) + \epsilon_{ijt}, \quad (1)$$

where IC_{ijt} is an indicator of informal care receipt by individual i in country j at wave t , α_j and λ_t are country and wave fixed effects respectively, X_{ijt} is a row vector of individual covariates and the countries’ dependency ratio, the term $E_j \times d_t$ is our measure of severity of the financial crisis times a dummy variable for observations after the Great recession (SHARE wave 4 and 5), and ϵ_{ijt} is the regression error. The variation we exploit is at the country-wave level; we therefore estimate robust standard errors under the assumption that observations can be arbitrarily correlated within countries for a given wave, but independent across waves and countries. This assumption will allow for shocks common to observations within countries for a given wave.

The parameter of interest, γ , captures the association between the outcome IC_{ijt} a one-point increase in unemployment induced by the crisis. This parameter will thus reflect the influence of general macroeconomic conditions in a country.

¹³For instance, ? investigates the effect of the Great Recession on health insurance coverage in the US by regressing indicators for health insurance coverage on state monthly unemployment rates over the period 2004-2010

The empirical specification in equation (??) follows the literature on the effect of macroeconomic conditions on health status and inputs (?).¹⁴ It exploits within-country variation to identify the relationship between the recession indicator and availability of informal care. Controlling for country fixed effects, we cancel out differences between countries that are constant over time. For example, we know that Southern European countries were hit harder by the financial crisis, and we know from studies that filial responsibility norms are stronger in Southern European countries than elsewhere (??). The wave specific effects will control for common time trends across locations that are correlated with informal care availability and macroeconomic conditions, such as general changes in old-age health and technological progress. The specification however will not control for confounding factors varying within countries over time. In the recessionary period, Sweden and Denmark experienced a sharper increase in unemployment than Italy, but had a faster and stronger recovery than Italy. To address such regional differences, we extend the baseline specification with region-specific time trends. One concern is that such trends are likely to absorb a lot of the variation needed to efficiently estimate the relationship of interest. This is especially true in short panels with serially correlated dependent variables (?). However, as a sensitivity analysis we will include region-specific linear wave trends and quadratic time trends in interview month.¹⁵ This is to assess whether the inclusion of region-specific time trends changes the direction or the size of the estimated associations (implying that the country-specific time trends represent unobserved confounders) or merely make the estimations less efficient.

Another potential source of bias comes from unobserved heterogeneity at the individual level. The example used by ? is that the recession could have hit particular hard in areas where a high share of the population are relatively poorly educated. Human capital is known to be correlated with health status and with the subsequent need for long-term care. Exploiting the longitudinal dimension of the SHARE survey, we follow ? and ? and include individual fixed effects into our specification. These models will exploit within-individual variation over time to identify the relationship between the recession indicator and availability of informal care. ? argues that macroeconomic fluctuations are likely to be largely exogenous and therefore individual-specific factors should have limited importance. Our most restrictive/conservative model is then

$$IC_{ijt} = \alpha_i + \lambda_t + X_{itj}\beta + \gamma(E_j \times d_t) + \alpha_j t + \alpha_j t^2 + \epsilon_{ijt}, \quad (2)$$

¹⁴The specification is strongly advocated by ???, showing to evidence that time and location fixed effects are needed to control for factors having common time trends across locations (such as medical technologies), and for factors that are time invariant and location specific (such as life-style differences).

¹⁵Because of the short panel and since the recession measure is serially correlated we are not able to identify higher order trends in waves. We therefore use interview month, which is closer to a continuous variable, when calculating a quadratic trend.

where α_i now represent individual-specific effects and the interaction term $\alpha_j t$ and $\alpha_j t^2$ are region-specific quadratic time trends. This most restrictive specification would thus identify the impact of the crisis as deviations from the region-specific time trend. If it can be assumed that countries within a region would have followed a common path in the absence of the crisis, the estimated γ picks up the crisis effect.

4 Results

4.1 Informal Care Receipt

In this section we discuss the results of linear probability models of receiving informal care on the recession severity indicator. Firstly, we estimate the probability of receiving informal care from someone *outside* the household, then we estimate the probability of receiving informal care from someone *within* the household, and lastly we estimate an indicator of the two measures combined. Informal care received within the household is only asked to respondents who report to have a mobility problem. As discussed above, to make the samples comparable we code the indicator of internal informal care receipt as zero if the respondent reports to have no mobility limitations.¹⁶ In all specifications we control for gender, age, age squared and time-specific effects. In subsequent models, we add controls that can be considered to be unrelated to our crisis measure: indicators of primary and secondary education, and whether the respondent is born in the country of interview. In the specifications with individual fixed effects, variables that do not show variation over time for a given individual are left out of the analysis. In all tables, we report the mean of the dependent variable to easily evaluate the size of the predicted effects.

The top panel of table (??) summarizes the results of estimating the three measures of informal care receipt on the recession severity indicator of the three baseline specifications. The third row presents the results for the linear probability model with extra-residential informal care as the dependent variable. The recession severity indicator is positively and significantly correlated with receiving extra residential informal care across all specifications. Column (1) shows results when we control for year-specific and country-specific effects. We find that a one-point change in the unemployment increase from output peak-to-trough is associated with a 0.78 percentage points increase in the probability of receiving informal care from someone **outside** the household. The size of the association remains largely unchanged when including individual characteristics, individual-specific

¹⁶An alternative would be to only use respondents who have a mobility problem and therefore answers both informal care receipt questions. However, as we show below, old age dependency could be an endogenous variable and could therefore bias our results.

Table 4: Informal Care Receipt: DID Results

	(1)	(2)	(3)	(4)	(5)	(6)
Entire Population						
DID Overall	0.0067*** (0.001)	0.0067*** (0.001)	0.0087*** (0.001)	0.0087*** (0.001)	0.0073*** (0.002)	0.0070*** (0.002)
ymean	0.211	0.211	0.211	0.211	0.211	0.211
r2	0.065	0.067	0.007	0.007	0.008	0.008
N	109,575	107,833	107,833	107,833	107,833	107,833
DID Internal	0.0001 (0.001)	0.0001 (0.001)	0.0020*** (0.001)	0.0019*** (0.001)	0.0001 (0.001)	0.0001 (0.001)
ymean	0.043	0.043	0.043	0.043	0.043	0.043
r2	0.019	0.020	0.008	0.008	0.009	0.009
N	109,575	107,833	107,833	107,833	107,833	107,833
DID External	0.0078*** (0.001)	0.0079*** (0.001)	0.0085*** (0.001)	0.0085*** (0.001)	0.0083*** (0.002)	0.0079*** (0.002)
ymean	0.184	0.184	0.184	0.184	0.184	0.184
r2	0.055	0.056	0.005	0.005	0.005	0.006
N	109,575	107,833	107,833	107,833	107,833	107,833
Children > 0						
DID Overall	0.0067*** (0.001)	0.0068*** (0.001)	0.0082*** (0.002)	0.0082*** (0.002)	0.0069*** (0.002)	0.0065*** (0.002)
ymean	0.208	0.208	0.208	0.208	0.208	0.208
r2	0.069	0.071	0.008	0.008	0.008	0.009
N	99,255	97,630	97,630	97,630	97,630	97,630
DID Internal	-0.0000 (0.001)	-0.0001 (0.001)	0.0017** (0.001)	0.0017** (0.001)	-0.0002 (0.001)	-0.0001 (0.001)
ymean	0.044	0.044	0.044	0.044	0.044	0.044
r2	0.021	0.022	0.009	0.009	0.010	0.010
N	99,255	97,630	97,630	97,630	97,630	97,630
DID External	0.0080*** (0.001)	0.0082*** (0.001)	0.0083*** (0.001)	0.0083*** (0.001)	0.0082*** (0.002)	0.0078*** (0.002)
ymean	0.180	0.180	0.180	0.180	0.180	0.180
r2	0.058	0.059	0.005	0.005	0.006	0.006
N	99,255	97,630	97,630	97,630	97,630	97,630
No children						
DID Overall	0.0063*** (0.002)	0.0061*** (0.002)	0.0155*** (0.002)	0.0156*** (0.002)	0.0132*** (0.003)	0.0128*** (0.003)
ymean	0.243	0.243	0.243	0.243	0.243	0.243
r2	0.040	0.043	0.007	0.007	0.007	0.008
N	10,320	10,203	10,203	10,203	10,203	10,203
DID Internal	0.0011 (0.001)	0.0013* (0.001)	0.0054*** (0.001)	0.0053*** (0.001)	0.0040*** (0.001)	0.0041*** (0.001)
ymean	0.035	0.035	0.035	0.035	0.035	0.035
r2	0.007	0.009	0.003	0.003	0.004	0.005
N	10,320	10,203	10,203	10,203	10,203	10,203
DID External	0.0059** (0.002)	0.0055** (0.002)	0.0115*** (0.003)	0.0115*** (0.003)	0.0095*** (0.003)	0.0088*** (0.003)
ymean	0.220	0.220	0.220	0.220	0.220	0.220
r2	0.033	0.036	0.006	0.006	0.007	0.008
N	10,320	10,203	10,203	10,203	10,203	10,203
Year FE	✓	✓	✓	✓	✓	✓
Country FE	✓	✓				
Individual controls		✓	✓	✓	✓	✓
Individual FE			✓	✓	✓	✓
Old age dep. rat.				✓	✓	✓
Trends:						
Regional linear in wave					✓	✓
Regional qua. in int. month						✓

The table shows regression results obtained using a linear probability model of receiving informal care. All of the models control for age, age squared, gender, and wave dummies. Individual controls comprise whether the subject live with a partner, whether they were born in the country where the interview occurred, and indicators of secondary and tertiary education. The standard errors are clustered at the country-wave level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

effects and the dependency ratio in the second third and fourth column respectively. It corresponds to an increase of about 4 percent at the sample average. In column 5 and 6, we show results including region-specific trends. The results are less precise, but generally agree with the overall conclusions. We therefore choose to focus on the results without region specific time trends.

Row (2) in panel 1, summarizes the results for informal care provided **within** the household. For this variables, the point estimates are much smaller and not generally significant. An intuitive reasoning explaining these results is that co-residential caregivers are older and more likely to be out of the labor force than extra-residential caregivers, and are therefore less likely to be experience a lower opportunity cost of time following the crisis. When we combine the two measures of informal receipt in Row (1) of the top panel, we find a positive and statistically significant correlation across all specifications.

To further explore whether there is a substitution effect between intra-residential and extra-residential caregiving we split the sample into respondents with and without children. Children are a common source of informal care second only to spousal care (?). The middle panel shows the results for respondents who have children. We find that the share of respondents who have children and receive extra-residential informal care increases while the share receiving intra-residential informal care is unrelated our crisis measure in three out of four specifications. For the respondents without children both types of informal caregiving is positively associated with our crisis measure, as is seen in the bottom panel of the table.

A potential confounding factor are contemporaneous changes in LTC policies. We have found that Spain had a major long-term care reform in 2007, while there were minor reforms in Italy and Czech Republic. Spain had a complete restructuring of its LTC funding system (?)¹⁷, Czech Republic improved care allowances and community care services (?), while in Italy the reform did not seem to lead to any significant changes, as argued by ?. To make sure our results are not driven by these reforms and to see how the results vary across different institutional and cultural contexts we follow ? and divide the sample into European regions. ? find that the intensity of informal caregiving (number of hours of care per caregiver) exhibits a clear European north-south gradient. Moving from the south to the north, filial responsibility norms become weaker, expenditure and use of formal long-term care increases and the opportunity cost of time of women increases. However, the share of people receiving and giving informal care (extensive margin) is

¹⁷The Spanish 2007 reform (implemented the so called System for the Autonomy and Attention to Dependent People) was a major budgetary expansion of LTC funding in Europe that universalised a previously means tested tax financed system. In principle it was design only to cover formal LTC but progressively it developed an unconditional caregiving allowance, which individuals could claim, based on need alone. However, in 2012, in the context of austerity reforms, it exhibited a major reform which reduced 10-15% its intensity of care, and costs (?).

higher in Central and Northern Europe (??). An explanation for this may be that more women in Southern Europe take on the whole caregiving responsibility of dependent older people, while in Northern Europe where a larger share of women are working, the caregiving responsibility is shared among siblings and provided in addition to public formal services.

Table (??) summarizes the results for informal care receipt by regions. There is a positive and statistically significant correlation between the recession severity and the share receiving extra-residential informal care in all regions but in the Eastern group. The size of the association is strongest in the Northern region, a one-percentage point increase in recession unemployment is associated with a 4.6 percentage point increase in the probability of receiving informal care, and much weaker in the Southern region, where the predicted increase is 0.39 percentage points. These associations correspond to an increase of about 20 and 2 percent at the respective sample averages. In the Central region the association is closer in magnitude to that of the Northern region: 13 percent. Although, the association is much weaker in the Southern region, compared to the Northern and Central region, we cannot rule out that this in part can be explained by the LTC reforms in the Southern region, and not only because of different responses to the crisis.

4.2 Determinants of Demand and Supply

We now turn to care needs and a range of possible determinants of availability of carers. Results are presented in Table ???. In the first panel, we estimate the association between the crisis and care needs, measured by the number of ADL:s. The next two panels of the table present estimates of the impact of the crisis on net wealth and housing wealth (using the inverse hyperbolic sine transformation discussed in section ?? above); after which we turn to family structures.

As previously discussed, macroeconomic conditions might be associated with care needs. For instance, ? finds that medical conditions and activity limitations become more common when the economy improves, while ?, who investigate the relationship between old age health and the Great recession, find that self-reported health worsens when the economy contracts. Our results support ?, in that we find a positive robust relationship between recession severity and the number of difficulties with activities of daily living (see the bottom panel): each point increase in unemployment is associated with 0.015 additional ADL:s, from a baseline of 0.4. The estimates are very precise and thus rule out large correlations. Still, the estimates are strongly significant and thus raise the issue of whether changes in informal care receipt are partly driven by changing needs. We will return to this issue below.

Table 5: Informal Care Receipt: DID Results by Region.

	Overall	External	Internal
North			
DID Crisis	0.0464*** (0.010)	0.0493*** (0.010)	-0.0025 (0.004)
ymean	0.227	0.214	0.022
r2	0.011	0.011	0.004
N	16,394	16,407	16,454
Central			
DID Crisis	0.0261*** (0.006)	0.0277*** (0.005)	-0.0014 (0.003)
ymean	0.199	0.175	0.037
r2	0.003	0.003	0.005
N	56,589	56,745	56,825
South			
DID Crisis	0.0039** (0.002)	0.0050*** (0.002)	-0.0002 (0.001)
ymean	0.180	0.131	0.072
r2	0.025	0.016	0.020
N	20,407	20,440	20,528
Eastern			
DID Crisis	-0.0057 (0.017)	0.0031 (0.016)	-0.0009 (0.008)
ymean	0.288	0.264	0.049
r2	0.009	0.007	0.008
N	14,443	14,473	14,484
Year FE	✓	✓	✓
Individual controls	✓	✓	✓
Individual FE	✓	✓	✓

All of the models control for age, age squared, gender, and wave dummies. The individual controls include whether they were born in the country where the interview occurred, and indicators of secondary and tertiary education. The standard errors are clustered at the country-wave level. Northern countries are Sweden and Denmark. Central countries are Germany, France, the Netherlands, Belgium, and Austria. Eastern countries are Poland and the Czech Republic. Southern countries are Italy and Spain. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 6: Additional Outcomes

	(1)	(2)	(3)	(4)
No. of ADL:s				
DID Crisis	0.0153*** (0.003)	0.0150*** (0.004)	0.0269*** (0.004)	0.0214*** (0.005)
ymean	0.394	0.394	0.394	0.394
r2	0.126	0.131	0.079	0.080
N	109,548	107,807	107,807	107,807
Wealth				
DID Crisis	-0.0153 (0.013)	-0.0114 (0.013)	-0.0017 (0.011)	-0.0101 (0.010)
ymean	5.108	5.108	5.108	5.108
r2	0.022	0.066	0.013	0.015
N	109,574	107,832	107,832	107,832
Housing wealth				
DID Crisis	-0.0059 (0.035)	-0.0042 (0.035)	-0.0029 (0.039)	-0.0313* (0.018)
ymean	4.033	4.033	4.033	4.033
r2	0.031	0.056	0.065	0.139
N	109,574	107,832	107,832	107,832
Children in household				
DID Crisis	-0.0009 (0.001)	-0.0015 (0.001)	-0.0019 (0.001)	-0.0006 (0.001)
ymean	0.237	0.237	0.237	0.237
r2	0.103	0.104	0.104	0.105
N	108,399	106,777	106,777	106,777
Children < 1 km				
DID Crisis	0.0020 (0.001)	0.0011 (0.001)	0.0011 (0.002)	0.0014 (0.002)
ymean	0.349	0.349	0.349	0.349
r2	0.044	0.048	0.059	0.059
N	108,403	106,779	106,779	106,779
Partner in household				
DID Crisis	0.0027** (0.001)	0.0029*** (0.001)	-0.0011* (0.001)	-0.0004 (0.001)
ymean	0.731	0.731	0.731	0.731
r2	0.114	0.116	0.060	0.061
N	109,556	107,814	107,814	107,814
Year FE	✓	✓	✓	✓
Country FE	✓	✓		
Individual controls		✓	✓	✓
Individual FE			✓	✓
Regional trends				✓

The regressions control for age, age squared, gender, and wave dummies. The individual controls include whether they were born in the country where the interview occurred, and indicators of secondary and tertiary education. The standard errors are clustered at the country-wave level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Interestingly, the crisis seems not to be strongly related to household wealth. The estimates for both wealth variables have the expected negative sign throughout, but they are typically not statistically significant at conventional levels. The exception is housing wealth, which turns out significant in the most restrictive specification in column (4). According to this estimate, a one percentage point increase in unemployment is associated with a 3 per cent reduction in housing wealth. All other estimates for wealth are smaller in magnitude. Thus, we may think of this variable as bounding the impact of the crisis on household wealth.

Concerning family structures, a slightly different picture emerges. There is some evidence suggesting that the crisis was associated with a reduction in the likelihood of living with children in the household; this parameter turns out negative throughout, even though it does not reach statistical significance at conventional levels. To the extent that this results reflects a crisis effect, it appears to be driven by moves within a very small range, since there is no corresponding effect on the presence of children within 1 kilometre from the household. Concerning the presence of a partner in the household, this variable is positive and significant but changes sign when individual fixed effects are included. In combination, these results suggest that the crisis-struck countries have experienced an inflow of people into the group of older people who are more likely to be living with a partner and less likely to be living with their children. These trends may in themselves be an effect of the crisis, but they may also be driven by unrelated cohort effects.

Next, we perform the same country-group heterogeneity analysis as for the main specification above. Results are presented in Table ???. This table reveals many interesting differences between the regions. Starting with the number of ADL:s, we see that some statistical significance are lost due to the smaller sample sizes, but there is no evidence suggesting that the association between needs and crisis levels is different in different parts of Europe. The two wealth variables, seem to suggest that the crisis had a very heterogeneous impact in different regions. In the North, the crisis is associated with a large reduction in household wealth, which is to a great extent driven by housing wealth: each percentage point increase in unemployment is associated with a 15 per cent reduction in housing wealth. For Southern Europe there is a similar, albeit much smaller, coefficient: each p.p. increase in unemployment is associated with a 2-per cent reduction in wealth, which is entirely driven by housing wealth. The two other countries exhibit strikingly different patterns: in the central group, net wealth tends to increase with the crisis,¹⁸ and in the eastern group, the two wealth variables deviate. Also concerning family structures, these two regions tend to deviate from the rest, since only in the East and

¹⁸This result might seem surprising but it is supported by official house price statistics: in France, where GDP fell by only 4 percentage points, experienced a drop in house prices by 3.3 per cent between 2007 and 2010. In Austria, where the downturn was much sharper, house prices actually *increased* by 6.4 per cent over the same period (?).

Central regions we observe a relationship between the magnitude of the crisis and the availability of carers. In these two regions, the crisis is associated with a decline in the availability of children nearby – mainly driven by children (not) cohabiting with their parents – and in the Eastern countries, this reduction is partly compensated by an increase in the availability of a partner living with the respondent. A potential explanation of the crisis being negatively associated with the likelihood of living with children in the Central and Eastern region might be that the recession require further mobility to find a suitable job opening which reduces cohabitation, particularly among female employees (?).

Table 7: Additional outcomes: Results by Region.

	No. of ADL:s	Wealth	Housing wealth	Children in hh.	Children < 1km	Partner in hh.
North						
DID Crisis	0.0380 (0.026)	-0.2327*** (0.049)	-0.1540*** (0.035)	0.0065 (0.006)	0.0068 (0.008)	-0.0014 (0.007)
ymean	0.308	5.095	3.518	0.107	0.186	0.738
r2	0.080	0.036	0.442	0.129	0.064	0.078
N	16,461	16,476	16,476	16,320	16,320	16,474
Central						
DID Crisis	0.0164 (0.016)	0.1478*** (0.021)	0.0548** (0.022)	-0.0188*** (0.005)	-0.0221*** (0.006)	0.0051 (0.003)
ymean	0.368	5.205	4.281	0.195	0.298	0.715
r2	0.081	0.014	0.014	0.119	0.064	0.049
N	56,847	57,044	57,044	56,230	56,231	57,029
South						
DID Crisis	0.0202*** (0.007)	-0.0204*** (0.007)	-0.0231*** (0.007)	0.0007 (0.002)	0.0032* (0.002)	-0.0008 (0.001)
ymean	0.552	5.391	5.061	0.408	0.556	0.787
r2	0.103	0.017	0.015	0.095	0.058	0.079
N	20,561	20,596	20,596	20,343	20,344	20,592
Eastern						
DID Crisis	0.0371 (0.042)	0.0740 (0.062)	-0.8379*** (0.054)	-0.0265** (0.013)	-0.0205 (0.013)	0.0135* (0.008)
ymean	0.421	4.323	2.141	0.311	0.442	0.710
r2	0.062	0.010	0.401	0.055	0.034	0.059
N	14,490	14,527	14,527	14,354	14,354	14,527
Year FE	✓	✓	✓	✓	✓	✓
Individual controls	✓	✓	✓	✓	✓	✓
Individual FE	✓	✓	✓	✓	✓	✓

All of the models control for age, age squared, gender, and wave dummies. The individual controls include whether they were born in the country where the interview occurred, and indicators of secondary and tertiary education. The standard errors are clustered at the country-wave level. Northern countries are Sweden and Denmark. Central countries are Germany, France, the Netherlands, Belgium, and Austria. Eastern countries are Poland and the Czech Republic. Southern countries are Italy and Spain. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

4.3 Discussion of Results

The picture emerging from our Europe-wide specifications is relatively clear: the Great Recession was associated with an increase in informal care receipt, and this increase was driven by caregivers from outside the household. A parallel deterioration in the physical functioning of older people is discernible; thus, it appears to be the case that physical needs have deteriorated disproportionately in crisis-struck countries, and that informal care has had to cover a large part of this increase in demand (ADL:s increase by 3.75

per cent; informal care receipt by 3.1 per cent for each percentage point increase in unemployment).

In order to get a better feeling for the magnitudes, we also estimated the general relationship between functional limitations and informal care receipt, by replacing the crisis variable with the number of ADL:s in the main regression equations (regression output available on request). According to these estimates, each new ADL limitation is associated with an increase in the probability of receiving informal care by 5-8 percentage points, and roughly half of this increase is driven by external care. There are no big differences between European regions. If the crisis was associated with an increase by 0.015–0.027 ADL:s per percentage point increase in unemployment (cf. Table (??)), we would then have expected an increase in informal care receipt in the range 0.001–0.002 per unit of crisis impact. This is significantly less than the observed estimate of around 0.007 (cf. Table (??)). This is possibly indicative of the crisis leading to a substitution away from formal care services – in particular in the North – but this conclusion would of course only hold if no other determinants of the demand for and supply of care were affected.

At a first glance, this indeed seems to be the case: most of the determinants of resources and carer availability seem not to be related to the crisis in any systematic fashion. However, at the regional level, some heterogeneity in the relationships emerges. The care needs appear to be associated with the crisis to largely the same extent in all parts of Europe – but the impact on informal care receipt exhibits striking differences between the regions. Interestingly, the association is the strongest in the North and the weakest in the South – and completely absent in the East. It thus seems as if a comprehensive LTC system like the Nordic model requires informal carers to carry a larger part of the burden of cushioning macroeconomic shocks. At the same time, we have found some evidence that the interplay between family structures and household wealth might be important mediators determining informal care receipt: the countries in the North also exhibit the strongest (negative) association between unemployment and household wealth. However, the picture is complicated by the Central group, where the relationship between the two variables is positive.

5 Conclusion

Informal care is still the main source of long-term care in most European countries (either as a sole or combined source of care), however our knowledge of the determinants of informal caregiving is still incomplete. Recessions provide quasi-experimental evidence to examine the impact of employment shocks on the availability of informal care. We

have argued that the effect of a recession on informal caregiving is mediated by several different mechanisms, the relative importance of which remain an open, and empirical issue. This paper takes advantage of the large variation in both the exposure to the great recession in Europe (?) and models of caregiving (?), alongside the associated austerity measures.

Our analysis shows that the downturn was associated with a marked increase in informal care receipt, and that this change was almost entirely driven by informal care from outside the household. As in previous studies, we find a strong North/South divide in Europe. When comparing estimates for different European regions, the impact of the crisis appears to have been stronger in the North and weaker in the South, with the countries in between being closer to Scandinavia than to Southern Europe. This might be unexpected given that the countries in the north have much more extensive provision of formal care. However, considering the labor market attachment of relatively old workers in different European regions, this North/South gradient does make perfect sense in the light of opportunity costs being an essential determinant of informal care provision.

One aspect that might be important is that population ageing advances from different levels and at different speeds in the different countries. This is not a big obstacle to the empirical analysis, which is conducted at the individual level and conditional on the age and sex composition of the older part of the population, and conditional on the countries' dependency ratios. However, population ageing may of course matter a lot for the availability of formal care, and for how the political process and the public sector deal with competing demands from different demographic groups. Amongst the countries included in this study, the South and the East experienced a particularly rapid increase in the 80+ population in the aftermath of the crisis; whereas the Scandinavian countries and in particular Sweden have been essentially flat. These diverging demographic trends represent a puzzle in the sense that we would have expected the needs to grow faster in the South during the crisis – as a growing number of old people competed for the austerity-struck public resources – which in turn should have strengthened the association between the crisis and informal caregiving in those countries. The fact that we observe the opposite thus corroborate the conclusion from above that the Southern European LTC systems are largely isolated from labor market shocks. In addition, when seen in the light of these demographic trends, our results also suggest that Southern European LTC systems are much more compartmentalized between formal and informal care than their Scandinavian counterparts.

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Notes

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