Financial support on long-term elderly care, caregiving behaviour, and labour force participation*

Very preliminary, please do not quote

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Abstract

We analyse how the financial support for long-term elderly care affects the caregiving behaviour. Using a difference-in-differences estimator, we investigate the impact of the 2002 Scottish reform, which introduced free formal personal care for all the elderly aged 65 and above residing in Scotland. We find that the Scottish policy reduced the probability that an individual informally takes care of another adult by 0.65 percentage points, which amounts to a decrease of about 19%. Conditional on giving care, the reduction in the number of hours of informal care amounts to 3 hours. The effect is particularly strong among older and less educated caregivers. Despite the reduction in informal caregiving activities, we observe only marginal changes in working behaviours, with men increasing their labour force participation by 1 percentage points at the extensive margin and by 0.6 hours per week at the intensive margin.

Keywords: Long-term elderly care; ageing; means tested financial support; informal caregiving; difference-in-differences.
JEL classification codes: C21, D14, I18, J14

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1 Introduction

As individuals age, they increasingly face the need to receive long-term elderly care. In most developed countries, financial support system to pay for nursing care, medical care offered by professional nurses, exists. However, the elderly and their families pay the cost of personal care, which is the type of care offered to the elderly to assist with daily activities such as bathing, eating, or dressing.

The elderly and their families often face significant financial burden and uncertainties due to their need to pay for the long-term elderly personal care. For example, an individual receiving personal care in England in 2001 on average required 7.6 hours of personal care per week and paid about £12 per hour (National Statistics, 2002). Moreover, around 39 percent of households receiving home care obtained 6 or more visits and more than 5 hours of care per week. Half of these households required more than 10 contact hours and 6 or more visits during the week. These personal care charges are not the only cost to the elderly. Local authorities often charge for meals delivered to home or participating in day care sessions.

Governments from many developed countries are seeking to build systems to offer financial support to the elderly. When designing such systems, the policy makers must consider potential behavioural changes in people's care usage. For example, a generous financial support to pay for formal personal care may induce the elderly to substitute the informally provided care received from family members and rely more on formal paid care. Such substitution is likely to be strong when it comes to personal care as this type of care requires less professional training compared to nursing care. It is also possible that a financial support induces a moral hazard and the elderly may demand formal care even beyond the total amount of care that they used to consume before the policy introduction. Both types of responses would increase the cost of offering financial coverage to the elderly. Understanding the magnitude of the changes in demand for formal care as a result of the policy is imperative in order to achieve a sustainable system.

In this paper, we present evidence of such behavioural responses from one of the largest natural experiments on the elderly care by investigating the impacts of the 2002 Community Care and Health (Scotland) Act (CCHA). The Act offered free formal personal care to those residing in Scotland without any means testing. Because the policy is only applied to those in Scotland, observations in England and Wales can be used as a control group in order to identify the policy effect. Using the 1999–2007 UK Family Resources Survey and employing a difference-in-differences estimator, we investigate whether CCHA changed the informal personal care giving behaviours both at the intensive margin (i.e., number of hours of care) as well as at the extensive margin (i.e., whether

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provide informal care or not). We find that the Scottish policy reduced the probability that an individual informally takes care of another adult by 0.65 percentage points, which is a reduction in the magnitude of approximately 19%. Conditional on giving care, the reduction in the number of hours of informal care amounts to 3 hours. The observed effect is particularly strong among older and less educated caregivers. Given that we observe a reduction in informal caregiving after the policy introduction, it would be of an interest to find out how they are using the extra time they acquired as a result of this policy. Therefore, we also study how the policy affected caregivers' labour market activities. We find that men significantly increased labour force participation and the hours of work although the economic size of these responses are somewhat limited (1 percentage point increase in the labour market participation and additional 0.6 hours of work).

Existing literature from the US on the impact of financial support on elderly care usage does not often distinguish differences between nursing care and personal care although the responses are likely to be different. Moreover, the sample studied often focus only on the low income or the very frail (e.g., Ettner, 1994; McKnight, 2006; Orsini, 2010; Pezzin et al., 1996). The Scottish policy presents one of the largest natural experiments on the elderly care and the lack of means testing allows us to study how a wider population reacts to financial coverage of the elderly care. Our paper contributes to the existing literature on the 2002 Scottish policy (Bell et al., 2006; McNamee, 2006; Karlsberg Schaffer, 2015) by presenting complementary evidence using a larger dataset that allows us to better identify those who are giving care to the elderly. In addition, we extend the existing evidence by studying how caregivers' labour market behaviours changed as a result of the policy introduction.

This article is set-up as follows. Section 2 provides background and institutional information on the 2002 Scottish reform. Section 3 discusses the literature review. Section 4 presents the econometric model, the data, and the assumptions to identify the effects of the reform on household savings behaviour. Section 5 reports and comments on the estimation results. Section 6 describes a battery of robustness checks of our benchmark findings. Section 7 concludes.

2   Background information

Prior to 2002, formal personal care cost in the UK was paid almost entirely by care recipients themselves. Although subsidies were offered to the elderly in the UK, the stringent means testing meant that only those with wealth below £18,500 (2001 rate) were eligible. The elderly care costs exposed individuals in need of long-term care to a significant

financial burden and uncertainties.

In order to address the financial concerns among the elderly, the Royal Commission on Long Term Care for the Elderly was set up by the Labour government in December 1997 under the chairmanship of Sir Stewart Sutherland. The Commission reported back to the UK Parliament in March 1999 (Sutherland report), recommending that for those aged 65 and above, formal personal care should be provided free of charge after a rigorous need-based assessment is conducted by local authorities.[1]

At the same time as the publication of the Sutherland report, the UK political system went through significant changes as powers were transferred from Westminster to devolved governments in Scotland, Wales and the Northern Ireland. The devolved governments were introduced on 1st July 1999 in Scotland and Wales and on 2nd December 1999 in the Northern Ireland. England remained under the direct control of Westminster.

As a result of the establishment of these devolved governments, each government acquired the power to form its own health care policies and this led regions in the UK to adopt differential long-term care policies. Although the rest of UK decided not to adopt the recommendations made by the Sutherland report and continues to charge for formal personal care to this day, Scotland welcomed the idea of state-funded personal care. The Scottish Executive set up the Care Development Group in January 2001, which was aimed at pursuing options on how to implement state-funded personal care and to evaluate the estimated cost of introducing such a policy. After several revisions, the Bill passed and received Royal Assent on 12 March 2002 to become the CCHA, which in turn was implemented on 1st July 2002.

The amount of state-funding depends on the amount of care needed but also on where the elderly receive care. Table 1 summarises individuals' financial gains due to the reform by care setting and the region of residence. For each group, the maximum possible amount of weekly allowances given to individuals is shown. The calculated amounts reflect other policy reforms that were implemented at the same time (see Appendix A for more information on these reforms).

As Table 1 indicates, when the elderly receive care in residential care homes, they experienced an increase in the allowances of similar magnitude regardless of the region of residence. It is those who received care at home in Scotland that most benefited from the introduction of CCHA.[2] Therefore, our results in this paper are likely to reflect the isolated impact of the free personal care policy affecting those receiving care at home. Given that

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[1]The Commission however argued that the hotel costs and costs of meals on wheels or providing personal assistance with shopping should still be paid by individuals.

[2]Even after the reform, individuals are still asked to pay other costs such as costs of cleaning, day care, laundry or meals on wheels.

approximately 70% of individuals are reported to receive care at home in 2004–2005 (AgeUK, 2014), these changes delivered by the Scottish policy are likely to be relevant to a large part of the population. Based on the amount reported in Table 1, computing the difference between the variation in the allowances of care received at home in Scotland and the one in the rest of the UK yields £145 per week,[3] which amounts to £7,540 per year.

Table 1: Examples of weekly allowance calculations (£ per week)

Care received in care homes	Before the reforms (2000 rate) £ per week	After the reforms (2003 rate) £ per week
England	53.55	200.00
Wales	53.55	176.86
Northern Ireland	53.55	157.20
Scotland	53.55	210.00
Care received at home	Before the reforms (2000 rate) £ per week	After the reforms (2003 rate) £ per week
England	53.55	57.20
Wales	53.55	57.20
Northern Ireland	53.55	57.20
Scotland	53.55	202.20

Notes: This table illustrates how the maximum amounts of weekly allowances changed before and after the reforms depending on where the elderly reside and where they receive care. The pre-reform amounts are calculated using the 2000 rates whereas the 2003 rates are employed for the calculations of the post-reform amounts. Since the formal personal care allowance in Scotland for those receiving care at home is not fixed, we use the average amount provided to the elderly, i.e. £80 (National Statistics, 2012). These calculations also incorporated the other allowances such as the Attendance Allowances and the nursing care allowances to illustrate the overall changes that individuals experienced over time. Details on these allowances are included in the Appendix A.

3   Literature review

Early literature on the impact of financial public support comes from the US and Canada. These papers typically study impacts of financial support on the probability of entering nursing care homes. Others study the effects on nursing and personal care provided at home but do not distinguish between the two types of care.

Ettner (1994) estimates the impact of Medicaid coverage on the probability of entry to nursing homes and the use of formal and informal care. Cutler and Sheiner (1994) and Hoerger et al. (1996) exploit the state-level variations in Medicaid coverage to study the elderly's living arrangement. Stabile et al. (2006) use Canadian province-level variations in the generosity of public home care programs to identify its impact on the use of nursing and personal care. These studies generally find that generous coverage towards the

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[3](£202.20 – £53.55) – (£57.20 – £53.55) = £145.

elderly's personal and nursing care cost at home resulted in the reduction in the probability of nursing care entrance. Moreover, among the non-institutionalized individuals, the demand for formal paid care increased. These papers, however, rely on non-exogenous price variations to identify the effects on the care usages. For example, the state-level variations in Medicaid used by Cutler and Sheiner (1994) and Hoerger et al. (1996) may reflect underlying differential wealth levels across states, which in turn might be correlated to the level of health of the individuals living in these states (Orsini, 2010). A similar criticism applies to Ettner (1994) and Stabile et al. (2006).

Attempts to overcome the problem of endogenous price of the elderly care is made by Pezzin et al. (1996), McKnight (2006), and Orsini (2010). Pezzin et al. (1996) exploits a variation introduced by the Channeling social experiment, which was conducted between 1982–1985. The experiment randomly allocated financial support which was substantially more generous compared to the normal public coverage. They find that generous financial coverage increased the likelihood that the elderly live independently. McKnight (2006), and Orsini (2010) both study the impact of 1997 reductions in the Medicare coverage on the living arrangements and care usage. Orsini (2010) finds that less generous Medicare reimbursement policies led to a greater proportion of the elderly to give up living independently. On the other hand, McKnight (2006) presents evidence that the reduction in the Medicare coverage led to a large decline in the provision of formal nursing care at home. This drop was prominent particularly among the least healthy beneficiaries.

These papers suggest that the care usage is sensitive to the level of public support. However, the evidence is limited to a specific type of care or a specific subpopulation. For example, the Medicare program studied by McKnight (2006), and Orsini (2010) typically only cover a short-term nursing care and not personal care. Given that nursing care is a more specialised care compared to personal care, the degree of substitution between formal and informal care may be limited. It is also possible that the elasticity of demand for nursing care may be less elastic compared to the demand for personal care. This is because nursing care requires more specialised training and is less substitutable by family members compared to personal care. The Channeling experiment exploited by Pezzin et al. (1996) also has limitations. In particular, the experiment selected financially constrained and very frail individuals to participate in the program. The average age of these participants was 79 and many of them reported to have struggled with basic daily tasks. Given that this group of individuals are most in need of the elderly care, they may not respond as much to changes in the financial coverage that changed the price of the care provision.

The 2002 Scottish policy fills the gap in the US literature as it was applied to a wider population and it allows to study personal care changes, rather than nursing care changes,

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in response to the governmental financial support. To the best of our knowledge, there are three papers studying the impact of the 2002 Scottish policy on care usage: Bell et al. (2006), McNamee (2006), and Karlsberg Schaffer (2015).

McNamee (2006) studies the policy by using the Scottish sample observed in the 2001–2005 Scottish Community Care Statistics and the 2001–2004 Scottish Household Survey. She compares a set of outcomes such as hours of informal and formal care use before and after 2002. She finds that the policy increased the demand for formal care at home and increased the demand for formal care within care homes. She also observe a reduction in the supply of informal care. However, a simple difference before and after for Scottish sample may reflect effects of factors other than the 2002 policy.

Bell et al. (2006) study the impacts of the 2002 Scottish policy on informal personal caregiving by using the 1999–2003 British Household Panel Survey (BHPS) and applying a difference-in-differences estimator. Since they only cover until one year after the policy introduction, they present an immediate impact of the policy. They study the effects on the co-residential care and extra-residential care giving behaviours separately. The age of the care recipients can be observed only if they receive care in the the co-residential setting. If care is received from a caregiver outside of their house, this information is not available. In order to avoid including those who cared for children and young relatives and friends with disabilities, the authors restrict the sample to middle-aged caregivers who care for a parent or parent in law or grandparent. This definition, however, omits one important category of people, namely those who provide long-term care to their spouses. They find that neither the average co-residential or extra-residential caregiving behaviours were affected by the policy although their descriptive evidence indicate that caregiving behaviour may have changed at the intensive margin. More specifically, they show that the top end of the distribution of care hours in Scotland experienced a significant drop after the policy.

Karlsberg Schaffer (2015) extends the work of Bell et al. (2006) by employing the 1996–2008 BHPS. She also employs a difference-in-differences estimator and use the co-residential and extra-residential care information available in the data. She faces the same problem with the outcome variables as those faced by Bell et al. (2006). She restricts the sample to caregiving individuals aged 45 or older with no children in the household, in order to ensure that co-residential carers are not caring for sick/disabled children. This definition, however, does not allow her to restrict caregiving sample to those giving care towards the elderly among the extra-residential sample. Due to the sample size limitations with the Scottish sample, she pools the co-residential and extra-residential care observations. She finds that 2002 Scottish policy increased the probability that women give informal care by 6 percentage points.

To summarise, the US literature does not differentiate different types of care, nor does it allow us to study the impact of financial coverage among a wider population. The existing UK studies on the 2002 Scottish policy fill the gap in the US literature. Our contribution to the existing UK literature stems from the choice of our dataset, the Family Resources Survey (FRS). FRS presents several advantages over BHPS. Firstly, FRS is larger than BHPS and this helps us to achieve more precise estimates. Secondly, our data allows us to identify whom they are caring for regardless of whether the care recipients live with the caregivers or not. Our data also allows us to look at caregiving to spouses as well as to parents and other relatives/friends. According to FRS, approximately 30% of informal care is given to spouses. Thirds, FRS will allows us to provide an evaluation of the impact of the 2002 Scottish policy on caregiving behaviour both at the extensive and the intensive margins. A further contribution of our study consists in extending the existing literature by studying also the labour market responses to the policy: whether eventual changes in the caregiving behaviour translate to changes in labour market participation, at the extensive and intensive margins.

4 Data, estimation strategy, and identification

4.1 Data, sample, and variable definition

This study employs the repeated cross sectional dataset of the UK Family Resources Survey (FRS). FRS was collected by the Department for Work and Pension on a yearly basis since 1992. Every year approximately 24,000 private households and 45,000 individuals are interviewed and information is collected at the household, benefit unit, and individual levels. The final sample covers the years from 1998 until 2007. We removed the waves before 1998 because of the lack of information on regional macroeconomic indicators. We exclude the waves after 2007 because of the financial crisis, which may have led to asymmetric impacts across regions on individuals' time endowment and thereby on the availability of these individuals to give care. We exclude Northern Ireland from our analysis, since FRS does not collect data from the area prior to the 2002/2003 survey. After keeping the 1998-2007 waves and removing individuals in Northern Ireland, the sample was made up of 439,410 individuals. Removing individuals younger than 25 reduces the sample to 399,124 units. Finally, we dropped those individuals who did not report the number of hours of caregiving, so that the sample size very marginally shrinks to 399,098 individuals.

We have several outcomes of interest. The dependent variables in our model will be

- An indicator variable that equals to 1 if the individual looked after an adult (family members or friends/neighbours), to evaluate the impact of the reform on the informal caregiving at the extensive margin.

- The number of hours per week of informal care given to an adult (family members or friends/neighbours), to assess the effects of the policy on caregiving at the intensive margin.

- An indicator variable that equals to 1 if the individual is employed, to understand if there is an indirect effect on labour supply at the extensive margin;

- The number of weekly working hours, to unveil if the policy generated an indirect impact on labour supply at the intensive margin.

When the outcome variable is labour force participation, we further restrict the sample to those individual aged between 25 and 64 years of age, who report less than 60 weekly working hours, who are not retired, not student, not permanently or temporarily sick/disabled. The sample size, in this case, amounts to 243,449 observations.

The number of hours per week of informal caregiving is an interval-coded variable, resulting from the sum of two underlying interval-coded variables. One variable reports the number of hours of informal care given to adults within the same benefit unit. The other variable reports the number of hours of informal care given to adults in different benefit units. For both of these variables, the information on the number of weekly hours of informal caregiving is reported with the following interval structure: 0 hours, between 1 and 4 hours, between 5 and 9 hours, between 10 and 19 hours, between 20 and 34 hours, between 35 and 49 hours, between 50 and 99 hours, 100 hours or more, under 20 hours, 35 hours or more. We build the number of hours per week of informal caregiving to adults by assigning to each individuals an interval whose lower bound is given by the sum of the lower bounds of the two underlying variables and whose upper bound is the sum of the upper bounds of the two underlying variables.

Table 2 presents descriptive analysis of all the outcome variables, except for the number of hours of informal caregiving, before and after March 2002 for Scotland and the rest of the UK. Summary statistics of the number of weekly hours of informal caregiving are instead reported separately in Table 3, because of its interval-coded nature. Table 2 shows that the fraction of people providing informal care to other adults slightly decreased from the before- to the after-period both in Scotland and in the rest of the UK. However, the decrease is larger in Scotland: -0.9 percentage points in Scotland compared to -0.2 percentage points in England and Wales. The difference-in-differences amounts to -0.7 percentage points and it is significantly different from zero. Comparing the employment status and working hours before and after 2002, Scottish individuals increased

their labour market participation both at the intensive and extensive margins compared to those in England and Wales. Whilst the participation rate and the weekly working hours increased by 6.8 percentage and 2.4 hours in Scotland, the counterparts in England and Wales amount to 5 percentage points and 1.6 hours. In the raw data we therefore find some evidence suggesting that the informal caregiving and labour force participation behaviours changed in Scotland compared to England and Wales after 2002. In the multivariate analysis that follows we will check whether this raw evidence survives after controlling for a rich set of time-varying and time-constant determinants of the outcome variables and of possible heterogeneity across different regions caused by a changing economic and social environment.

Table 2: Summary statistics of the outcome variables before and after the reform of the treatment and control groups

	Scotland			England & Wales		
	Mean	SD (SE)	Observations	Mean	SD (SE)	Observations
Informal care giver						
Before: 1998-2001	0.0390	0.1937	13,631	0.0367	0.1881	141,723
After: 2002-2007	0.0302	0.1712	41,682	0.0346	0.1827	202,062
Mean difference after-before	-0.0088***	0.0019	55,313	-0.0022***	0.0006	343,785
Difference-in-differences	-0.0067***	0.0010	399,098			
Employment indicator						
Before: 1998-2001	0.8295	0.3761	8,200	0.8276	0.3778	89,221
After: 2002-2007	0.8977	0.3030	23,816	0.8780	0.3273	122,212
Mean difference after-before	0.0682***	0.0046	32,016	0.0504***	0.0016	211,433
Difference-in-differences	0.0177***	0.0031	243,449			
Weekly working hours						
Before: 1998-2001	31.2946	17.9028	8,200	31.3283	18.3406	89,221
After: 2002-2007	33.6682	15.6944	23,816	32.9774	16.7988	122,212
Mean difference after-before	2.3736***	0.2223	32,016	1.6491***	0.0780	211,433
Difference-in-differences	0.7246***	0.1332	243,449			

Notes: *** Significant at 1%. SD and SE stand for standard deviation and standard error, respectively.

Table 4 reports descriptive statistics of the covariates used in the econometric analysis, computed both on the larger sample that will be used to model caregiving and on the subsample for modelling labour force participation.

Table 4: Summary statistics

	Sample for modelling caregiving		Sample for modelling labour force participation	
	Mean	Std. Dev.	Mean	Std. Dev.
Outcome variables				
Informal caregiver	0.0350	0.1839	–	–
			Continued on next page	

Table 4 – continued from previous page

	Sample for modelling caregiving		Sample for modelling labour force participation	
	Mean	Std. Dev.	Mean	Std. Dev.
Employment indicator	–	–	0.8598	0.3472
Average weekly working hours	–	–	32.3839	17.3383
Regressors				
Female	0.5316	0.4990	0.5280	0.4992
Age	51.0938	15.9717	42.5640	10.3975
Age of the spouse (if present)	45.2865	21.7107	37.7709	18.8835
White	0.9392	0.2390	0.9285	0.2577
Region of residence				
North-East	0.0449	0.2071	0.0418	0.2002
North West and Merseyside	0.1138	0.3176	0.1122	0.3157
Yorkshire and the Humber	0.0835	0.2766	0.0824	0.2750
East Midlands	0.0730	0.2601	0.0742	0.2622
West Midlands	0.0858	0.2801	0.0852	0.2791
Eastern	0.0910	0.2876	0.0942	0.2921
London	0.0998	0.2997	0.1087	0.3112
South East	0.1356	0.3424	0.1430	0.3501
South West	0.0832	0.2762	0.0811	0.2730
Wales	0.0508	0.2195	0.0456	0.2086
Scotland	0.1386	0.3455	0.1315	0.3380
Employment status				
Full-time employee	0.3753	0.4842	–	–
Part-time employee	0.1182	0.3228	–	–
Full-time self-employed	0.0564	0.2308	–	–
Part-time self-employed	0.0178	0.1324	–	–
Not employed	0.4323	0.4954	–	–
Employment status of the spouse (if present)				
Full-time employee	0.1229	0.3283	–	–
Part-time employee	0.3314	0.4707	–	–
Full-time self-employed	0.1215	0.3267	–	–
Part-time self-employed	0.0559	0.2296	–	–
Not employed	0.0183	0.1341	–	–
Civil status				
Married	0.6173	0.4860	0.6442	0.4788
Couple	0.0848	0.2786	0.1177	0.3223
Single	0.1168	0.3211	0.1328	0.3394
Widowed	0.0895	0.2855	0.0136	0.1160
Separated	0.0251	0.1563	0.0284	0.1660
Divorced	0.0665	0.2492	0.0633	0.2434
Education (age left)				
0 − 12	0.0038	0.0619	0.0022	0.0467
13 − 15	0.3443	0.4751	0.1937	0.3952
16 − 18	0.4671	0.4989	0.5683	0.4953
19 − 21	0.0922	0.2893	0.1180	0.3226
22 − 23	0.0596	0.2368	0.0794	0.2704
24 − 27	0.0252	0.1567	0.0319	0.1758
28 or more	0.0078	0.0880	0.0066	0.0810
Education (age left) of the spouse (if present)				
0 − 12	0.0030	0.0544	0.0020	0.0449
13 − 15	0.3012	0.4588	0.1864	0.3895
16 − 18	0.4098	0.4918	0.4623	0.4986
			Continued on next page	

Table 4 – continued from previous page

	Sample for modelling caregiving		Sample for modelling labour force participation	
	Mean	Std. Dev.	Mean	Std. Dev.
$19 - 21$	0.0826	0.2753	0.0970	0.2960
$22 - 23$	0.0533	0.2246	0.0648	0.2462
$24 - 27$	0.0220	0.1468	0.0260	0.1592
28 or more	0.0052	0.0718	0.0051	0.0713
Presence of dependent kids	0.6140	1.0131	0.8776	1.1067
Long standing illness	0.3510	0.4773	0.1893	0.3917
Long standing illness of the spouse (if present)	0.2855	0.4517	0.1933	0.3949
Regional activity rate by gender	0.7554	0.0830	0.7568	0.0833
Regional unemployment rate by gender	0.0452	0.0148	0.0453	0.0148
Per capita regional gross value added (£)	16335.9700	4633.5280	16452.0800	4742.8070
Per capita regional gross disposable income (£)	12247.1500	1943.1560	12284.5400	1966.8840
Variation in the regional activity rate by gender	-0.0003	0.0164	-0.0002	0.0162
Variation in the regional unemployment rate by gender	-0.0021	0.0105	-0.0022	0.0104
Variation of per capita regional gross value added (£)	744.7233	355.4676	749.7119	361.5429
Variation of per capita regional gross disposable income (£)	449.8639	166.9045	453.5637	169.3621
Wave				
1998	0.0921	0.2892	0.0942	0.2922
1999	0.1003	0.3004	0.1039	0.3051
2000	0.0953	0.2936	0.0971	0.2961
2001	0.1016	0.3021	0.1049	0.3065
2002	0.1077	0.3100	0.1074	0.3096
2003	0.1072	0.3094	0.1048	0.3063
2004	0.1037	0.3049	0.1016	0.3022
2005	0.1045	0.3059	0.1027	0.3036
2006	0.0958	0.2943	0.0937	0.2914
2007	0.0918	0.2888	0.0896	0.2855
Observations	399,098		243,449	

4.2 The econometric model

In Section 2 we mentioned that individuals in Scotland receiving care at home are the major beneficiaries of the CCHA. The Scottish implementation of free formal personal care policy in the second half of 2002 stands out from the rest of the UK. In what follows, we will therefore evaluate the impact of the introduction of free formal personal care in Scotland on caregiving and labour market behaviours. Identification of the policy effect relies on the fact that the free personal care was introduced only for a specific group of individuals in the UK and that both the treated population (those in Scotland) and the untreated population (those in the rest of UK) are observed before and after the reform. More specifically, we employ a difference-in-differences (DD) estimator and estimate changes in the differences of various outcomes between Scotland and the rest of the UK before and after the reform.

Table 3: Weekly hours of informal care given

Weekly hours of informal care giving	Scotland		England & Wales		Whole sample	
	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency	Absolute frequency	Relative frequency
0	53,527	0.9677	331,638	0.9647	385,165	0.9651
1–4	119	0.0022	922	0.0027	1,041	0.0026
1–19	39	0.0007	313	0.0009	352	0.0009
2–38	0	0.0000	2	0.0000	2	0.0000
5–9	130	0.0024	1,144	0.0033	1,274	0.0032
6–13	0	0.0000	6	0.0000	6	0.0000
6–28	0	0.0000	1	0.0000	1	0.0000
10–18	2	0.0000	2	0.0000	4	0.0000
10–19	222	0.0040	1,522	0.0044	1,744	0.0044
11–23	0	0.0000	1	0.0000	1	0.0000
11–38	0	0.0000	1	0.0000	1	0.0000
15–28	0	0.0000	3	0.0000	3	0.0000
20–34	275	0.0050	1,881	0.0055	2,156	0.0054
20–38	1	0.0000	4	0.0000	5	0.0000
21–53	0	0.0000	1	0.0000	1	0.0000
25–43	1	0.0000	4	0.0000	5	0.0000
30–53	0	0.0000	6	0.0000	6	0.0000
35–49	180	0.0033	1,045	0.0030	1,225	0.0031
36–53	1	0.0000	1	0.0000	2	0.0000
40–68	1	0.0000	3	0.0000	4	0.0000
45–68	0	0.0000	1	0.0000	1	0.0000
50–99	183	0.0033	1,247	0.0036	1,430	0.0036
51–103	0	0.0000	3	0.0000	3	0.0000
55–83	1	0.0000	3	0.0000	4	0.0000
60–118	1	0.0000	2	0.0000	3	0.0000
70–98	0	0.0000	4	0.0000	4	0.0000
70–133	0	0.0000	2	0.0000	2	0.0000
85–148	0	0.0000	2	0.0000	2	0.0000
100–198	0	0.0000	2	0.0000	2	0.0000
35 or more	210	0.0038	1,606	0.0047	1,816	0.0046
36 or more	0	0.0000	3	0.0000	3	0.0000
45 or more	0	0.0000	3	0.0000	3	0.0000
55 or more	0	0.0000	3	0.0000	3	0.0000
70 or more	1	0.0000	14	0.0000	15	0.0000
100 or more	414	0.0075	2,356	0.0069	2,770	0.0069
101 or more	0	0.0000	2	0.0000	2	0.0000
105 or more	0	0.0000	3	0.0000	3	0.0000
110 or more	0	0.0000	1	0.0000	1	0.0000
120 or more	1	0.0000	4	0.0000	5	0.0000
135 or more	0	0.0000	5	0.0000	5	0.0000
150 or more	1	0.0000	6	0.0000	7	0.0000
200 or more	2	0.0000	14	0.0000	16	0.0000
Total	55,312	1.0000	343,786	1.0000	399,098	1.0000

Our empirical evaluation will be in a repeated cross sections framework. We specify the following model for a generic outcome variable y for the ith individual in region r and in tax year t

$$y_{irt} = \mathbf{x}'_{irt}\boldsymbol{\beta} + \boldsymbol{\gamma}_r + \boldsymbol{\phi}_t + \delta_{DD}I_{rt} + \varepsilon_{irt}, \tag{1}$$

where:

- $\mathbf{x}_{irt}$ is the $K \times 1$ vector of relevant individual characteristics and $\boldsymbol{\beta}$ is the conformable vector of coefficients. The regressors in $\mathbf{x}_{irt}$ are gender, living in a couple, age of individual i and of the spouse (if present), race, education of individual i and of the spouse (if present), presence of kids, employment status of individual i, health condition of individual i and of the spouse (if present), and a set of controls for time-varying regional heterogeneity and regional specific trends, like the regional unemployment rate, per capita gross value added, and per capita gross disposable income.

- $\boldsymbol{\gamma}_r$ is a set of regional fixed effects (regional dummies).

- $\boldsymbol{\phi}_t$ is a set of time fixed effects (tax year dummies).

- I_{rt} is the regressor of interest. It is an indicator variable equal to 1 if individual i resides in Scotland after the reform, i.e. after March 2002. We chose this cut off month since the Scottish bill introducing free personal care for the elderly passed on 12 March 2002. The corresponding parameter δ_{DD} is the effect of the introduction of free personal care in Scotland on caregiving.

- ε_{irt} is the error term at individual level.

The parameters of Eq. (1) are estimated using Ordinary Least Squares (OLS). Standard errors are corrected to take into account the correlation of shocks within each region. More specifically, given R the number of regions, we will compute $\sqrt{R/(R-1)}$-clustered robust standard errors and t_{R-1} critical values as suggested in Brewer et al. (2013). Specifying the informal caregiving indicator and the labour force participation indicator using the linear model in Equation (1) implies that we will estimate linear probability models for the probability of giving informal care and of being employed.

The variable for the number of hours of informal care given to adults has a limited support since it is interval-coded, suffers from right or left censoring for some observations, and presents a relevant mass of observations at 0, as clarified by Table 3. We model this interval-coded variable using a generalization of the type-I Tobit model. We assume that Equation (1) represents the latent variable model for the number of hours of caregiving, if it were observed without the interval-coding problem, and that the error term, conditional on all the control variables, has a zero-mean normal distribution with variance

equal to σ^2. This is enough to derive the probabilities of observing the realization of the latent variable being equal to zero (corner solution), larger or smaller than an observed cut points (right or left censoring), and between two observed cut points (interval censored). The sample density is fully determined by these response probabilities up to a finite number of parameters (the parameters in Equation (1) and σ) and, therefore, the model can be estimated by maximum likelihood. Let us define $w_{irt} \equiv \mathbf{x}'_{irt}\boldsymbol{\beta} + \boldsymbol{\gamma}_r + \boldsymbol{\phi}_t + \delta_{DD}I_{rt}$. The contribution to the sample log-likelihood of individual i living in region r and in tax year t, with an observed number of hours of caregiving in $(c_i^{j-1}, c_i^j]$, is:

$$
\ell_{irt} = \begin{cases} \log\left\{\Phi[(c_i^j - w_{irt})/\sigma]\right\}, & \text{if } c_i^{j-1} = 0 \text{ and } y_{irt} \leq c_i^j; \\ \log\left\{\Phi[(c_i^j - w_{irt})/\sigma] - \Phi[(c_i^{j-1} - w_{irt})/\sigma]\right\}, & \text{if } c_i^{j-1} < y_{irt} \leq c_i^j; \\ \log\left\{1 - \Phi[(c_i^{j-1} - w_{irt})/\sigma]\right\}, & \text{if } y_{irt} > c_i^{j-1} \text{ and } c_i^j = +\infty; \end{cases}
$$
$$(2)$$

where $\Phi(\cdot)$ is the standard normal cumulative distribution function.

4.3   Identification assumptions

The identification of the policy effects through a DD approach is based on some underlying assumptions.

Assumption 1 (Parallel trend assumption): Conditional on $(\mathbf{x}_{irt}, \boldsymbol{\gamma}_r, \boldsymbol{\phi}_t)$, individuals residing in Scotland experience similar trends in the outcome variable as those in the rest of the UK in the absence of the 2002 reform.

We test the validity of Assumption 1 by comparing the trends in care supply of England-Wales and Scotland. Figure 1 shows the trends of the different outcome variables in Scotland and England-Wales. We conduct a formal test by first regressing each outcome variable on a full set of tax year dummies and their interaction to an indicator for Scotland and by testing the joint equality of these interactions before 2002. We also include as further control variables all the regressors reported in Table 4. The coefficients of the interactions between the tax year dummies and the Scotland indicator represent the distance between the Scottish trend and the one of England-Wales. If these distances do not significantly change from year to year, the two lines are parallel to each other. Our joint significant tests suggest that the trends between the two regions are parallel to each other. This is true for all outcome variables (see the footnote of Table 1 for the p-values of the significance tests).

Assumption 2 (Stable sample composition): Conditional on $(\mathbf{x}_{irt}, \boldsymbol{\gamma}_r, \boldsymbol{\phi}_t)$, the composition of the treated and control groups is assumed to be stable before and after the policy.

Figure 1: Testing the parallel trend assumption of the outcome variables
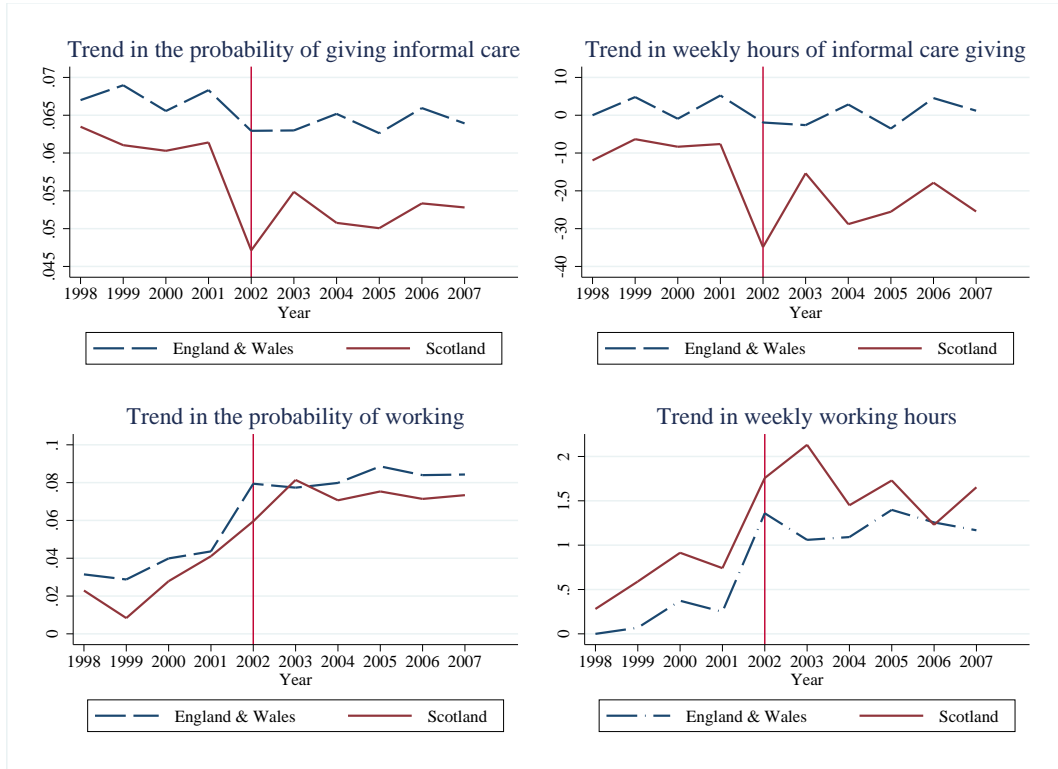
Notes: In this figure we report the least squares estimates (or interval regression estimates if the dependent variable is the number of hours of caregiving) of the coefficients of the year dummies for Scotland and England-Wales. We obtained them by regressing each outcome variable on a set of time dummies whose coefficients are allowed to be different between Scotland and England-Wales and, as further control variables, all the other regressors reported in Table 4. We check the parallel trend assumption by jointly testing whether the difference between Scotland and England-Wales in the coefficient of a given time dummy is constant from 1998 until 2001, i.e. before the policy reform. We cannot reject the null hypothesis of parallel trends before the reform with the following p-values: 0.813 when the outcome variable is the indicator for giving informal care; 0.926 when it is the number of hours of caregiving; 0.515 when it is the indicator for the employment status; 0.960 when it is the number of working hours.

According to Assumption 2, the sample compositions of those in Scotland, England, and Wales need to be stable over the years, conditional on observed covariates. This assumption eliminates the possibility that there is no movement of individuals from England and Wales to Scotland that are motivated by greater needs for formal personal care. The analysis in Ohinata and Picchio (2015), which was conducted by using the 1999–2007 British Household Panel Survey, indicates that the policy introduction did not modify the probability of the British and the Welsh of moving to Scotland.[4]

Assumption 3 (No anticipation): The Scottish individuals were not able to anticipate the introduction of the personal care reform.

The decision of the Scottish government to take up the recommendation received wide media coverage as early as January 2002. For example, BBC announced that the free personal care for Scotland would be introduced in July of the same year on 15 January 2002. Similarly, the Guardian published an article after one of the Bills passed in the Scottish Parliament (Inman, 2002). As a result of this wide media coverage, households could have anticipated the introduction of the policy. The Scottish individuals might then have faced the incentives to alter their caregiving behaviour and labour force participation decisions before April 2002. If this were the case, the estimated effects would be biased towards zero. In order to test for this identification assumption, we run a robustness check in Section 6 by eliminating observations in tax years 2001 and 2002. As we will see, we find that removing these two years from our sample does not affect our conclusions.

5 Estimation results

5.1 The impact of the reform on caregiving behaviour

Table 5 reports the estimation results of all the parameters of the benchmark models for the probability of giving care and the weekly number of hours of caregiving. The estimated parameter related to the effect of the Scottish elderly personal care reform is reported in bold at the top of the table. The 2002 Scottish reform significantly reduced the probability of people of giving care to other adults by 0.65 percentage points. Given that the fraction of individuals giving care in our sample is 3.5%, the estimated effect implies a reduction in the probability of giving care by approximately 19% of the sample average.

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[4]See Table 4 in Ohinata and Picchio (2015).

Table 5: Estimation results of the caregiving equations

	Linear probability model for informal caregiving			Interval regression for hours of informal caregiving		
	Coeff.		S.E.[†]	Coeff.		S.E.
After*Scotland (I_{rt})[§]	**-0.0065**	*******	**0.0008**	**-13.2455**	*******	**3.8218**
Female	0.0005		0.0008	-0.5902		1.7125
Age	-0.0007	***	0.0001	-1.1578	***	0.0613
Age of the spouse (if present)	0.0004	***	0.0000	-0.0344		0.0449
Couple	0.0072	***	0.0011	14.0535	***	2.4448
White	-0.0025		0.0026	-10.4595	***	2.6409
Region of residence - Reference: North-East						
North West and Merseyside	-0.0017		0.0016	-4.2367		4.1997
Yorkshire and the Humber	-0.0021		0.0015	-5.5930		4.1320
East Midlands	-0.0060	**	0.0024	-11.0461	**	5.1165
West Midlands	-0.0042	***	0.0013	-8.7043	**	4.2527
Eastern	-0.0130	*	0.0067	-23.3802	**	11.3286
London	-0.0248	***	0.0043	-46.5588	***	16.4858
South East	-0.0214	**	0.0076	-42.2505	***	13.5386
South West	-0.0080		0.0048	-12.2349		8.2438
Wales	0.0069	***	0.0018	9.5941	**	4.1530
Scotland	-0.0065	***	0.0014	-11.7188	**	5.2588
Education (Age left) - Reference $0-15$						
$16-18$	-0.0100	***	0.0016	-12.0525	***	1.4508
19 or more	-0.0156	***	0.0017	-31.5193	***	2.2680
Education (age left) of the spouse (if present) - Reference $0-15$						
$16-18$	-0.0050	***	0.0015	-8.4460	***	1.5993
19 or more	-0.0059	***	0.0016	-16.9349	***	2.6962
Employment status - Reference: Full-time employee						
Part-time employee	0.0044	***	0.0009	20.2886	***	2.3681
Full-time self-employed	0.0018	*	0.0010	8.8554	***	3.2678
Part-time self-employed	0.0089	***	0.0016	31.8739	***	4.7543
Not employed	0.0180	***	0.0019	45.7029	***	1.7784
Employment status of the spouse (if present) - Reference: Full-time employee						
Part-time employee	-0.0426	***	0.0031	-77.5463	***	2.2327
Full-time self-employed	-0.0423	***	0.0034	-82.0783	***	3.3378
Part-time self-employed	-0.0409	***	0.0033	-59.5403	***	3.9974
Not employed	-0.0435	***	0.0040	-67.5597	***	6.5247
Presence of dependent kids	-0.0058	***	0.0011	-27.3107	***	1.7624
Long standing illness	-0.0031	***	0.0009	-6.1541	***	1.2508
Long standing illness of the spouse (if present)	0.0923	***	0.0057	133.6439	***	2.0704
Regional unemployment rate by gender	-0.0001		0.0006	-0.8481		1.0151
Per capita regional gross value added (£)	0.0000		0.0000	0.0032	*	0.0019
Per capita regional gross disposable income (£)	-0.0000		0.0000	-0.0020		0.0054
Variation of per capita regional gross value added (£)	-0.0000	**	0.0000	-0.0093	***	0.0029
Variation of per capita regional gross disposable income (£)	-0.0000		0.0000	0.0002		0.0067
Wave -Reference: 1998						
1999	0.0013		0.0019	4.4452		2.9124
2000	-0.0021		0.0030	-0.6038		4.1485
2001	0.0002		0.0048	5.0960		6.1908
2002	-0.0062		0.0054	-5.1417		8.0373
2003	-0.0050		0.0058	-2.7201		9.4293
2004	-0.0043		0.0063	-1.3853		10.8594
2005	-0.0067		0.0068	-6.4231		11.9023

Table 5 – continued from previous page

	Linear probability model for informal caregiving		Interval regression for hours of informal caregiving		
	Coeff.	S.E.[†]	Coeff.		S.E.
2006	-0.0033	0.0071	1.8723		13.0329
2007	-0.0055	0.0081	-3.2508		14.4280
Constant	0.0489 **	0.0196	-222.1169	***	32.9023
Average partial effect of the policy					
$\Delta \text{E} \left(y \vert z, y > 0 \right)$	–	–	-3.0225	***	0.8778
$\Delta \text{E} \left(y \vert z \right)$	–	–	-0.9372	***	0.2782
Average partial effect of the policy on the treated					
$\Delta \text{E} \left(y \vert z, \text{Scotland} = 1, y > 0 \right)$	–	–	-3.0805	***	0.9237
$\Delta \text{E} \left(y \vert z, \text{Scotland} = 1 \right)$	–	–	-0.9973	***	0.3288
Observations	399,098		399,098		
Log-likelihood	–		-74,639.03		
σ (standard error in parenthesis)	–		133.6633 (1.2751)		
R^2	0.0720		–		

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%.

[§] After is equal to 1 if the observation is collected after 2002 and 0 otherwise.

[†] $\sqrt{R/(R-1)}$-clustered robust standard errors and t_{R-1} critical values as suggested in Brewer et al. (2013).

The impact of the personal care reform on the number of weekly hours of caregiving is significantly negative, as it is shown in the right columns of Table 5. Because of the interval-coded nature of the outcome variable and the resulting non-linearity of its model, we cannot quantify the impact of the policy on hours of caregiving just by looking at the estimated coefficient of the policy variable. At the bottom of Table 5 we therefore report the estimation of average partial effects of the policy conditional and unconditional on the number of hours being larger than 0. We also compute them both on the full sample and on the subsample of Scottish individuals, in order to check to see if the differences in the covariates of the untreated and of the treated lead to a difference between the average treatment effect and the average treatment effect on the treated. We find that the estimation of the average partial effects is not affected by restricting the sample to the treated units. The 2002 Scottish reform of the personal care for the elderly reduced the average number of weekly caregiving hours by approximately 1 hour. If we condition of the number of hours being strictly larger than 0, the estimated reduction increases to 3 hours. Since approximately one third of the caregivers in our sample give care for 19 hours a week or less, reduction in the magnitude of 3 hours per week is relatively large.

The behavioural change in terms of informal caregiving generated by the policy might differ depending on whether individuals are taking care of a family member, a friend, or a distant relative. For example, although the free personal care is introduced in Scotland, individuals who have been taking care of a family member could be more likely to continue doing it because of the strict family relation involved, than what we could see for individuals taking care of friends or more distant relatives. Since our data allows us to

distinguish between the informal care individuals give to adults in the same benefit unit and to adults in different benefit units, we replicate the evaluation study in the benchmark models, by redefining the dependent variables on the basis on whether the care is given to individuals in the same benefit unit or in different benefit units.[5]

Table 6: The impact of the reform on informal caregiving to adults of the same benefit unit

	Linear probability model for informal care giving to adults of the same benefit unit			Interval regression for hours of informal care giving to adults of the same benefit unit		
	Coeff.		S.E.[§]	Coeff.		S.E.
After*Scotland (I_{rt})	-0.0030	***	0.0007	-8.2247	*	4.8636
Average partial effect of the policy						
$\Delta \mathrm{E}\,(y\vert z, y > 0)$	–		–	-1.1601		2.2655
$\Delta \mathrm{E}\,(y\vert z)$	–		–	-0.3966	*	0.2377
Average partial effect of the policy on the treated						
$\Delta \mathrm{E}\,(y\vert z, \mathrm{Scotland} = 1, y > 0)$	–		–	-1.1357		2.4626
$\Delta \mathrm{E}\,(y\vert z, \mathrm{Scotland} = 1)$	–		–	-0.4001		0.2560
Observations	399,098			399,098		
Log-likelihood	–			-45,715.16		
σ (standard error in parenthesis)	–			123.1718 (1.4144)		
R^2	0.1016			–		

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%. All the regressors included in the baseline models are also included in these models. The corresponding estimated coefficients are not reported for the sake of brevity and are available from the authors upon request.
[§] $\sqrt{R/(R-1)}$-clustered robust standard errors and t_{R-1} critical values as suggested in Brewer et al. (2013).

Tables 6 and 7 report the estimated parameters of the policy variable only when the dependent variables are defined on the basis of informal care given to individuals, respectively, in the same benefit unit and in different benefit units. The policy effect on the probability of giving care is slightly closer to zero for individuals taking care of family members: -0.3 percentage points against -0.34 percentage points. If we relate these parameters to the fraction of people who take care of individuals in the same benefit (2.41%) unit or in different benefit units (1.13%), we get quite different relative effects. Whilst the reduction in the probability of giving care to individuals in the same benefit unit amounts to about 12% of the sample average, the reduction in the probability of giving care to individuals in different benefit unit is around 30% of the sample average. By looking at the behavioural change in caregiving at the intensive margin, it seems that most of the effect found in the baseline model comes from individuals giving care to people in different benefit units.

_____

[5]The fraction of individuals in our sample who take care of individuals in the same benefit unit is 2.41%. The fraction of those who take care of individuals in different benefit units is 1.13%.

Table 7: The impact of the reform on informal caregiving to adults of different benefit units

	Linear probability model for informal care giving to adults of a different benefit unit			Interval regression for hours of informal care giving to adults of a different benefit unit		
	Coeff.		S.E.§	Coeff.		S.E.
After*Scotland (I_{rt})	-0.0034	***	0.0005	-18.7567	***	6.2585
Average partial effect of the policy						
$\Delta \mathrm{E}\,(y\vert z, y > 0)$	–		–	-3.6311	***	1.2203
$\Delta \mathrm{E}\,(y\vert z)$	–		–	-0.4390	***	0.1548
Average partial effect of the policy on the treated						
$\Delta \mathrm{E}\,(y\vert z, \mathrm{Scotland} = 1, y > 0)$	–		–	-3.7352	***	1.2987
$\Delta \mathrm{E}\,(y\vert z, \mathrm{Scotland} = 1)$	–		–	-0.4996	**	0.2050
Observations	399,098			399,098		
Log-likelihood	–			-32,061.37		
σ (standard error in parenthesis)	–			163.3710 (2.7615)		
R^2	0.0048			–		

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%. All the regressors included in the baseline models are also included in these models. The corresponding estimated coefficients are not reported for the sake of brevity and are available from the authors upon request.
§ $\sqrt{R/(R-1)}$-clustered robust standard errors and t_{R-1} critical values as suggested in Brewer et al. (2013).

5.2   The impact of the reform on working behaviour

If the policy had the effect on reducing the time people spend by informally taking care of other adults, one might wonder how individuals decide to allocate the extra available hours. They might use them for leisurely activities or they might increase their labour force participation. We now try to understand whether the 2002 Scottish reform had an indirect effect on the labour force participation both at the extensive and intensive margins. Table 8 displays the estimation results of the equations for the employment status and for the number of weekly working hours. Since there is a mass of individuals (14%) with zero weekly working hours, we estimate the equation for the weekly working hours using both a linear model and a tobit model which takes into account the corner solution at 0 hours. We find that the free personal care reform did not modify the average working behaviour of individuals between 25 and 64 years of age. The linear model and the tobit version for modeling the number of weekly working hours deliver similar estimation results and average partial effects.

Table 8: Estimation results of the employment and weekly working equations

	Linear probability model for being employed			Linear model for weekly working hours			Tobit model for weekly working hours		
	Coeff.		S.E.	Coeff.		S.E.	Coeff.		S.E.
After*Scotland (I_{rt})[§]	**0.0012**		**0.0027**	**0.0105**		**0.2091**	**0.0096**		**0.2106**
Female	0.0128		0.0179	-10.9855	***	1.9766	-10.5131	***	1.8847
Age	0.0243	***	0.0012	1.5075	***	0.0521	1.7561	***	0.0576
Age square	-0.0003	***	0.0000	-0.0182	***	0.0007	-0.0209	***	0.0008
Age of the spouse (if present)	0.0079	***	0.0004	0.3681	***	0.0256	0.4559	***	0.0297
Age of the spouse (if present) square	-0.0001	***	0.0000	-0.0058	***	0.0003	-0.0072	***	0.0004
White	0.0954	***	0.0126	3.7570	***	0.4517	4.7411	***	0.5739
Civil status - Reference: Married									
Couple	0.1218	***	0.0116	5.0667	***	0.7011	6.3762	***	0.8102
Single	0.0345	*	0.0174	0.6901		0.8991	1.1939		1.0446
Widowed	0.0320	*	0.0149	-0.0138		0.7246	0.3245		0.8408
Separated	0.0446	***	0.0130	1.5816	**	0.6070	2.0448	***	0.7189
Divorced	0.0678	***	0.0107	2.8289	***	0.5990	3.6410	***	0.6786
Region of residence - Reference: North-East									
North West and Merseyside	-0.0016		0.0044	0.1999		0.5794	0.1548		0.5521
Yorkshire and the Humber	-0.0173	***	0.0048	-0.2563		0.6579	-0.4620		0.6237
East Midlands	-0.0277	***	0.0069	-0.3937		1.0634	-0.6770		1.0207
West Midlands	-0.0163	**	0.0062	0.2267		0.6800	0.0027		0.6344
Eastern	-0.0537	***	0.0165	-1.1162		2.0027	-1.7116		1.9757
London	-0.0162		0.0177	1.3901	***	0.4024	1.0152	*	0.5569
South East	-0.0561	**	0.0200	-1.0607		2.2144	-1.7254		2.1735
South West	-0.0428	***	0.0117	-1.6176		1.6006	-2.0984		1.5568
Wales	0.0096	**	0.0033	0.0727		0.3054	0.2465		0.3050
Scotland	-0.0105		0.0066	0.4942		0.4819	0.3127		0.4493
Education (Age left) - Reference $0 - 12$									
$13 - 15$	0.1366	***	0.0158	4.6287	***	0.6998	7.1467	***	1.0067
$16 - 18$	0.1907	***	0.0173	6.7499	***	0.7165	9.8039	***	1.0895
$19 - 21$	0.2360	***	0.0192	9.7663	***	0.8130	13.2505	***	1.2315
$22 - 23$	0.2504	***	0.0230	11.0229	***	0.8922	14.6249	***	1.3957
$24 - 27$	0.2470	***	0.0205	10.8195	***	0.8435	14.4071	***	1.2819
28 or more	0.1149	***	0.0202	3.0495	***	0.7089	4.9997	***	0.9481
Education (age left) of the spouse (if present) - Reference $0 - 12$									
$13 - 15$	0.0500	***	0.0145	0.8380		0.5551	1.3770	**	0.6940
$16 - 18$	0.0424	**	0.0142	0.5156		0.5516	0.9697		0.7095
$19 - 21$	0.0150		0.0135	-0.5311		0.5545	-0.3226		0.6970
$22 - 23$	0.0000		0.0124	-1.3139	**	0.4670	-1.2321	**	0.5961
$24 - 27$	-0.0274		0.0168	-2.0723	***	0.5949	-2.1910	***	0.7633
28 or more	-0.0477	**	0.0200	-2.5477	**	0.8209	-3.0606	***	1.0551
Presence of dependent kids	-0.0747	***	0.0031	-4.0058	***	0.0618	-4.8158	***	0.1371
Long standing illness	-0.0415	***	0.0024	-2.2883	***	0.0962	-2.6721	***	0.1229
Long standing illness of the spouse (if present)	-0.0446	***	0.0065	-1.5088	***	0.2578	-1.9071	***	0.3301
Regional activity rate by gender	0.8843	***	0.1078	22.4015		14.3923	32.8023	**	13.4675
Regional unemployment rate by gender	-0.5302	***	0.1173	-42.4520	***	11.4725	-43.3316	***	11.3504
Per capita regional gross value added (£)	-0.0000		0.0000	-0.0002		0.0002	-0.0002		0.0002
Per capita regional gross disposable income (£)	-0.0000		0.0000	0.0002		0.0005	0.0002		0.0006
Variation in the regional activity rate by gender	-0.2115	***	0.0380	-5.3716		7.1650	-8.6304		6.8704
Variation in the regional unemployment rate by gender	-0.0272		0.0615	9.8531		7.5576	7.8272		7.7271
Variation of per capita reg. gross value added (£)	0.0000		0.0000	0.0002		0.0002	0.0002		0.0002
Variation of per capita reg. gross disposable income (£)	-0.0000		0.0000	0.0000		0.0006	-0.0000		0.0006

Continued on next page

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Table 8 – continued from previous page

	Linear probability model for being employed		Linear model for weekly working hours		Tobit model for weekly working hours	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Wave -Reference: 1998						
1999	-0.0037	0.0029	0.0870	0.1436	0.0708	0.1587
2000	0.0089 *	0.0048	0.4033	0.3271	0.5204	0.3416
2001	0.0138	0.0092	0.2900	0.5292	0.4743	0.5696
2002	0.0465 ***	0.0124	1.3913 *	0.7219	1.8362 **	0.7927
2003	0.0484 ***	0.0129	1.2045	0.7806	1.6589 *	0.8619
2004	0.0482 *	0.0152	1.1215	0.9023	1.5853	0.9907
2005	0.0568 ***	0.0165	1.4276	1.0320	1.9377 *	1.1283
2006	0.0524 **	0.0193	1.2266	1.1451	1.6807	1.2652
2007	0.0525 **	0.0204	1.2217	1.1692	1.6788	1.2900
Constant	0.0308	0.0403	-1.9707	2.0206	-12.9077 ***	2.5958
Average partial effect of the policy						
$\Delta \mathrm{E}\left(y|z, y>0\right)$	–	–	–	–	0.0160	0.3493
$\Delta \mathrm{E}\left(y|z\right)$	–	–	–	–	0.0182	0.3971
Average partial effect of the policy on the treated						
$\Delta \mathrm{E}\left(y|z, \text{Scotland}=1, y>0\right)$	–	–	–	–	0.0163	0.3551
$\Delta \mathrm{E}\left(y|z, \text{Scotland}=1\right)$	–	–	–	–	0.0184	0.4007
Observations	243,449		243,449		243,449	
Log-likelihood	–		–		-929,389.68	
σ (standard error in parenthesis)	–		–		16.8829 (0.3200)	
R^2 (Pseudo-R^2)	0.1245		0.2724		0.0381	

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%. $\sqrt{R/(R-1)}$-clustered robust standard errors and t_{R-1} critical values as suggested in Brewer et al. (2013).

§ After is equal to 1 if the observation is collected after 2002 and 0 otherwise.

5.3 Heterogeneity of the reform effect

In this subsection we try to understand whether the reform effect is heterogeneous across some individual characteristics. There are, at least, two good reasons to study the heterogeneity of the policy effect. First, there might be some individuals who react more because recouping the time used for informal caregiving might be more profitable for them. For example, the opportunity cost of informal caregiving might be higher among the more educated individuals than that of less educated individuals. Second, some categories of individuals may have no involvement in informal caregiving activities both with and without the policy. If so, the policy effect for these individuals would be zero and they would attenuate the overall average effect.

We study the heterogeneity of the policy effect across gender, education, and age. When doing so, we split the sample along the chosen dimension and replicate the DD analysis on each subsample. Table 9 reports the heterogeneous effects on caregiving behaviour. Table 10 focuses instead on the heterogeneous effects on labour force participation.

Men and women seem to have reduced their involvement in caregiving with the same

Table 9: Heterogeneity of the reform effect on caregiving

	Linear probability model for informal care giving		Interval regression for hours of informal care giving		
	Coeff.	S.E.†	Coeff.		S.E.	Observ.
By gender						
Men	-0.0076 ***	0.0019	-15.8986 ***	5.3389	186,941
Women	-0.0067 ***	0.0019	-13.9982 **	5.7682	212,157
Wald test for heterogeneous effect by gender (p-val.)	$\chi^2(1) = 0.16\ (0.6860)$		$\chi^2(1) = 0.06\ (0.8089)$			
By education						
Less than 13 years old when left education	-0.0139 ***	0.0027	-21.7489 ***	5.4131	138,936
13 years old or older when left education	-0.0019	0.0020	-5.0687	5.4249	260,162
Wald test for heterogeneous effect by educ. (p-val.)	$\chi^2(1) = 11.55\ (0.0007)$		$\chi^2(1) = 4.74\ (0.0295)$			
By age						
[25, 40)	-0.0018	0.0013	-3.0728	8.0795	117,813
[40, 55)	-0.0030	0.0027	-5.1163	6.9449	117,363
55 or older	-0.0120 ***	0.0025	-20.0873 ***	5.3734	163,922
Wald test for heterogeneous effect by age (p-val.)	$\chi^2(2) = 18.16\ (0.0001)$		$\chi^2(2) = 4.47\ (0.1071)$			
By education and age						
[25, 40) of age & less than 13 years old when left educ.	-0.0072	0.0077	10.4728	30.3196	7,221
[40, 55) of age & less than 13 years old when left educ.	-0.0040	0.0068	-9.5875	11.5897	28,221
55 or older & less than 13 years old when left educ.	-0.0173 ***	0.0029	-26.1185 ***	6.23737	103,494
[25, 40) of age & 13 years old or older when left educ.	-0.0016	0.0014	-3.3661	8.2456	110,592
[40, 55) of age & 13 years old or older when left educ.	-0.0037	0.0033	-5.4631	8.7717	89,142
55 or older & 13 years old or older when left educ.	-0.0009	0.0057	-6.8677	10.7356	60,428
Wald test for heter. effect by educ. and age (p-val.)	$\chi^2(5) = 29.23\ (0.0000)$		$\chi^2(5) = 7.54\ (0.1836)$			
Average partial effect of the policy for individuals 55 years old or older & less than 13 years old when left education						
$\Delta\mathrm{E}\,(y\vert z, y > 0)$	–	–	-7.0563 ***	1.6967	103,494
$\Delta\mathrm{E}\,(y\vert z)$	–	–	-3.3144 ***	0.8325	103,494
Average partial effect of the policy on the treated who are 55 years old or older & less than 13 years old when left education						
$\Delta\mathrm{E}\,(y\vert z, \mathrm{Scotland} = 1, y > 0)$	–	–	-7.1928 ***	1.8367	16,224
$\Delta\mathrm{E}\,(y\vert z, \mathrm{Scotland} = 1)$	–	–	-3.5044 ***	1.0355	16,224

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%. All the regressors included in the baseline models are also included in these models. The corresponding estimated coefficients are not reported for the sake of brevity and are available from the authors upon request.

† $\sqrt{R/(R-1)}$-clustered robust standard errors and t_{R-1} critical values as suggested in Brewer et al. (2013).

§ The estimation of the policy effect is carried out as we did in the baseline model, apart from the fact that the sample is split by the dimension of heterogeneity under analysis.

Table 10: Heterogeneity of the reform effect on labour force participation

	Linear probability model for being employed		Linear model for weekly working hours		
	Coeff.	S.E.	Coeff.	S.E.	Observ.
By gender					
Men	0.0127 ***	0.0047	0.6000 ***	0.2018	114,911
Women	-0.0016	0.0064	0.1832	0.2071	128,538
Wald test for heterogeneous effect by gender (*p*-val.)	$\chi^2(1) = 4.61\ (0.0318)$		$\chi^2(1) = 2.01\ (0.1563)$		
By education					
Less than 13 years old when left education	0.0111	0.0092	0.5344	0.3646	47,683
13 years old or older when left education	-0.0014	0.0040	-0.2067	0.1885	195,766
Wald test for heterogeneous effect by educ. (*p*-val.)	$\chi^2(1) = 1.56\ (0.2112)$		$\chi^2(1) = 3.81\ (0.0509)$		
By age					
[25, 40)	0.0015	0.0049	-0.0266	0.2952	104,539
[40, 55)	-0.0074 *	0.0038	-0.3598 *	0.1869	99,157
55 or older	0.0238	0.0162	0.7692 *	0.3946	39,753
Wald test for heterogeneous effect by age (*p*-val.)	$\chi^2(2) = 10.69\ (0.0048)$		$\chi^2(2) = 7.07\ (0.0292)$		

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%. $\sqrt{R/(R-1)}$-clustered robust standard errors and t_{R-1} critical values as suggested in Brewer et al. (2013). All the regressors included in the baseline models are also included in these models. The corresponding estimated coefficients are not reported for the sake of brevity and are available from the authors upon request.

§ The estimation of the policy effect is carried out as we did in the baseline model, apart from the fact that the sample is split by the dimension of heterogeneity under analysis.

order of magnitude, both at the intensive and extensive margins. A test of equality of the coefficients for men and women, performed after seemingly unrelated regression, cannot reject the null hypothesis. The reform effect seems instead to vary with education. While the policy effect is close to zero and not significant for people who left education when 13 or older, it is larger, in absolute value, and significantly different from zero for those who left education before turning 13. If we split the sample in three age groups (25–39, 40–54, and 55 or older), we realize that the reform effect in the benchmark model seems to be driven by older people. Only for them the policy significantly reduced the involvement in informal caregiving both at the extensive and at the intensive margins.

Since most of the people who left education before turning 13 are older, it is not clear whether the detected heterogeneity is related to low education or to the older age. Henceforth, we split the samples along the six cells identified by the interactions of low/high education and the three age groups and rerun the DD analysis in each of the six subsamples. We find that the effect identified in the benchmark model is driven by people older than 55 and with low education. All the other types of individuals are not affected by the policy. The 2002 Scottish reform of personal care for the elderly reduced by 1.7 percentage points the probability of low educated and older people to take care of an adult. The bottom panel of Table 9 reports the estimated average partial effects on weekly hours of

caregiving for low educated and older individuals. They reduce the number of weekly hours of caregiving by 3.3 hours and by 7 hours if conditional on giving care.

Turning to the heterogeneous policy effect on working behaviour, we find some differences between men and women. The policy seems to have boosted the employment rate of men by 1.3 percentage points and the male number of working hours by 0.6 hours per week. No significant effect is detected for women. This asymmetry by gender might be explained by the fact that men are more attached to the labour market than women: when the free personal care for the elderly allows the caregivers to have more time, while men invest this time in the labour market, women are more likely to invest it in other activities. We do not detect substantial heterogeneity by education and age groups. From the quantitative point of view, individuals aged 55 or older are more likely to participate in the labour market (2.4 percentage points) and work more hours (0.8 hours per week), but these estimates are not significantly different from zero.

6   Sensitivity analysis

We conduct various sensitivity analyses in order to test the robustness of our baseline findings. First, we run two sets of placebo tests. In the first placebo test we include among the regressors the lag of order one, two, and three of the policy indicator I_{rt} and test the significance of the associated coefficients.[6]. By doing so, it is as if we are pretending that the 2002 Scottish policy was implemented one, two, or three years in advance. The test of significance of the coefficients of these lags should not therefore reject the null hypothesis. In the second placebo test, we include among the regressors the interactions between a dummy equal to one if the individuals are observed after the reform and some regional indicators. Doing this implies as if the 2002 policy was implemented also in other regions. Similarly to the first placebo test, the coefficients of these interactions are expected to not be significantly different from zero. Table 11 reports these two placebo tests and it shows that we cannot reject the null hypothesis of joint equality to zero of the coefficients of the lags of the policy indicator and of the regional interactions, in all the models for caregiving behaviour and labour force participation.[7] The evidence arising from the placebo tests therefore supports the validity of the parallel trend and no

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[6]Since we have four periods before the reform, we cannot include further lags.

[7]Only one coefficient is positive and significantly different from zero in the model for weekly hours of caregiving when we run the placebo test by pretending that the policy was implemented in 2002 also in other regions. Given that in this regression the joint test of significance cannot reject the null and that there is not a similar problem in the regression for caregiving behaviour at the extensive margin, we interpret it as statistically significant by random chance.

anticipation assumptions.

In a second sensitivity analysis, we exclude years 2001 and 2002 from our sample. This is partially due to eliminating any policy anticipation effects. From the time the Sutherland Commission was set up, the entire process until the enactment of the Scottish CCHA was highly publicized by the media. Moreover, the Scottish government's decision to take up the recommendation received wide media coverage as early as January 2002. For example, the BBC announced that the free personal care for Scotland would be introduced in July of the same year on 15 January 2002. Similarly, the Guardian also published an article after one of the Bills passed in the Scottish Parliament (Inman, 2002). As a result of this wide media coverage, individuals may have anticipated the introduction of the policy. Panel a) of Table 12 clearly indicates that excluding those two years from our sample does not affect the estimated policy effects.

Third, we remove from our sample households living in London. We do it because London is likely to differ substantially from the rest of UK in terms of its economic activities and demographic characteristics such as migration movements (Duranton and Monastiriotis, 2002; Hatton and Tani, 2005). This suggests that people residing in London might not be a valid control for those in Scotland. From panel b) of Table 12, we observe that the policy effects are only marginally different from those of the benchmark estimates.

Fourth, we modified the baseline model by allowing the coefficients of $\mathbf{x}$, $\boldsymbol{\beta}$, to vary over time. therefore, the covariates capture heterogeneity in the dynamics of the outcome variables over time (Abadie, 2005). Operationally, we interact all the observables $\mathbf{x}$ with the indicator for the period after the policy and include this new set of regressors in the model specification. Panel c) of Table 12 reports the estimated policy effects: they are very much in line with those of the baseline models.

Finally, we run a robustness check to test a potential misspecification in the interval regression model for the number of hours of caregiving. Given the interval-coded and censored nature of this outcome variable, we modelled it using a generalization of the type-I Tobit model. This model can be viewed as coming from a usual linear model with a latent variable which is fully observed (not interval-coded or censored) and an error term characterized by a normal distribution with variance equal to σ^2. In other words, we have estimated an interval regression model which imposed a homoskedasticity assumption on the error term of the underlying latent variable model. Since we build the log-likelihood function on the basis of the homoskedasticity assumption, its violation could generate a bias in the estimated parameters and average partial effects. In this robustness check we relax the homoskedasticity assumption by allowing the standard deviation of the error term in the latent variable model to depend on individual characteristics. More in detail,

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Table 11: Placebo tests

	Linear probability model for informal care giving		Interval regression for hours of informal care giving		Linear probability model for being employed		Linear model for weekly working hours	
	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.	Coeff.	S.E.
Place test pretending that the 2002 policy reform was implemented one, two, or three years earlier								
After$_{t-1}$*Scotland	-0.0014	0.0046	-4.9900	8.5559	0.0098	0.0114	-0.0055	0.5110
After$_{t-2}$*Scotland	0.0028	0.0048	3.8095	8.6744	0.0082	0.0124	0.0372	0.5428
After$_{t-3}$*Scotland	-0.0045	0.0049	0.7688	9.0113	-0.0121	0.0123	0.2030	0.5423
Wald test of joint significance	*p*-value= 0.8168		*p*-value= 0.9351		*p*-value= 0.5048		*p*-value= 0.9643	
Place test pretending that the 2002 policy reform was implemented also in other regions								
After*North†	0.0033	0.0030	14.0431 **	6.6999	-0.0097	0.0079	-0.4990	0.3500
After*Center‡	-0.0008	0.0035	9.1717	8.0027	-0.0020	0.0092	-0.3102	0.4139
After*South§	0.0016	0.0028	9.0179	6.6456	-0.0058	0.0075	-0.1795	0.3378
Wald test of joint significance	*p*-value= 0.1935		*p*-value= 0.1324		*p*-value= 0.2784		*p*-value= 0.4358	
Observations	399,098		399,098		243,449		243,449	

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%. All the regressors included in the baseline models are also included in these models. The corresponding estimated coefficients are not reported for the sake of brevity and are available from the authors upon request. Standard errors are robust to heteroskedasticity.

† In the North, we include North-West, North-East, and Yorkshire and the Humber.

‡ In the Centre, we include Wales, West Midlands, and East Midlands.

§ In the South, we include South-West, South-East, and Eastern.

Table 12: Robustness checks of the reform effect on caregiving and labour force participation

	Linear probability model for informal care giving		Interval regression for hours of informal care giving			Linear probability model for being employed		Linear model for weekly working hours	
	Coeff.	S.E.$	Coeff.		S.E.	Coeff.	S.E.$	Coeff.	S.E.$
a) Removing 2001 and 2002 from the sample									
After*Scotland (I_{rt})	-0.0060 ***	0.0009	-12.3425	***	4.4044	0.0066	0.0039	0.1346	0.2336
Average partial effect of the policy									
ΔE$(y|z, y > 0)$	—	—	-2.8133	***	1.0102	—	—	—	—
ΔE$(y|z)$	—	—	-0.8756	***	0.3210	—	—	—	—
Observations	315,559		315,559			191,761		191,761	
Log-likelihood	—		-59,118.29			—		—	
R^2	0.0725		—			0.1255		0.2714	
b) Removing London from the sample									
After*Scotland (I_{rt})	-0.0063 ***	0.0011	-12.1806	***	4.1617	0.0052 *	0.0023	0.0836	0.1629
Average partial effect of the policy									
ΔE$(y|z, y > 0)$	—	—	-2.7913	***	0.9598	—	—	—	—
ΔE$(y|z)$	—	—	-0.8854	***	0.3106	—	—	—	—
Observations	359,271		359,271			216,992		216,992	
Log-likelihood	—		-68,633.15			—		—	
R^2	0.0735		—			0.1160		0.2752	
c) Including interactions between Xs and after dummy									
After*Scotland (I_{rt})	-0.0064 ***	0.0008	-13.3061	***	3.9185	-0.0058	0.0033	-0.1083	0.1989
Average partial effect of the policy									
ΔE$(y|z, y > 0)$	—	—	-3.0351	***	0.8996	—	—	—	—
ΔE$(y|z)$	—	—	-0.9416	***	0.2853	—	—	—	—
Observations	399,098		399,098			243,449		243,449	
Log-likelihood	—		-74,618.39			—		—	
R^2	0.0721		—			0.1258		0.2734	

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%. All the regressors included in the baseline models are also included in these models. The corresponding estimated coefficients are not reported for the sake of brevity and are available from the authors upon request.
$ $\sqrt{R/(R-1)}$-clustered robust standard errors and t_{R-1} critical values as suggested in Brewer et al. (2013).

we specify the standard deviation of the error term as $\sigma(\mathbf{z}_{irt}) = \sigma \exp(\mathbf{z}'_{irt}\boldsymbol{\alpha})$, where $\mathbf{z}_{irt}$ is made up of all the individual characteristics in $\mathbf{x}_{irt}$ (but the constant), time dummies, and regional dummies. The log-likelihood contribution in Equation (2) is modified by replacing σ with $\sigma(\mathbf{z}_{irt})$. Table 13 reports the estimation results of the heteroskedastic interval regression model for the number of weekly hours of caregiving. Although the Wald test for the joint significance of $\widehat{\boldsymbol{\alpha}}$ rejects the null hypothesis, pointing to the failure of the homoskedasticity assumption in the baseline model, the coefficient of the policy indicator and the average partial effects are so close to those of the baseline model that we decided to stick to the homoskedastic model as a benchmark.

Table 13: Heteroskedastic interval regression estimation of the policy effect on the number of weekly hours of informal caregiving

	Coeff.		S.E.
After*Scotland (I_{rt})	-13.4889	***	3.8837
Average partial effect of the policy			
$\Delta \mathrm{E}\,(y|z, y > 0)$	-3.0787	***	0.8916
$\Delta \mathrm{E}\,(y|z)$	-0.9598	***	0.2840
Average partial effect of the policy on the treated			
$\Delta \mathrm{E}\,(y|z, \mathrm{Scotland} = 1, y > 0)$	-3.1631	***	0.9431
$\Delta \mathrm{E}\,(y|z, \mathrm{Scotland} = 1)$	-1.0230	***	0.3348
Wald test for heteroskedasticity	$\chi^2(39) = 2{,}328.20$, p-value $= 0.0000$		
Log-likelihood	-73,836.42		

Notes: *** Significant at 1%; ** significant at 5%; * significant at 10%. All the regressors included in the baseline models are also included in this model. The corresponding estimated coefficients are not reported for the sake of brevity and are available from the authors upon request. The standard deviation of the error term is specified as $\sigma(\mathbf{z}_{irt}) = \sigma \exp(\mathbf{z}'_{irt}\boldsymbol{\alpha})$, where $\mathbf{z}_{irt}$ is made up of all the individual characteristics in $\mathbf{x}_{irt}$ (but the constant), time dummies, and regional dummies.

7   Conclusions

This paper studies the impact of the Scottish Care and Health Act 2002, which introduced subsidies for the elderly residing in Scotland to pay for their formal personal care cost, on the informal caregiving behaviour and working behaviour of Scottish people. We used difference-in-differences estimators, since this reform was implemented only in Scotland, whilst the rest of the UK kept the old system. We find that the Scottish policy reduced the probability of an individual of taking care of another adult by 0.65 percentage points, which amounts to a decrease of about 19%. In terms of number of hours per week of informal caregiving, the reduction is of about 3 hours, conditional on giving care, and of about 0.9 hours, unconditional on giving care. The effect is particularly strong among older and low educated caregivers. Despite the reduction in informal caregiving activities, we

observe only marginal changes in working behaviours, with men increasing slightly their labour force participation both at the extensive (1 percentage point) and at the intensive margins (0.6 hours per week).

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Appendix

A   Other policy reforms

In addition to the 2002 Scottish CCHA, there were other reforms that influenced the elderly care cost, which contributed to the changes in the amount of allowances individuals received. As stated below, however, these policies were implemented throughout the UK and it is the free personal care element of the 2002 CCHA reform that contributed to the substantially larger increase in the amount of allowances Scottish individuals received compared to those living elsewhere in UK.

A.1   Nursing care cost

Nursing care is the type of care that involves medical care provided by registered nurses. Prior to 2001, nursing care provided in UK care homes was maintained by social services administered by each local authority. Financial support for nursing care was only offered on stringent means-tested basis. In contrast, nursing care offered at home or in hospitals was organized by the National Health Service (NHS) and, therefore, was free of charge at the point of delivery.

In response to the 1999 Sutherland report, which recommended that both personal and nursing care be offered free of charge regardless of care settings, England and Wales each implemented their free nursing care policy in October and December 2001. Scotland and Northern Ireland introduced their policy in June and October 2002, respectively. They paid allowances directly to care homes where the individual is receiving nursing care. The policy change, therefore, was aimed at correcting the unequal cost treatment for patients receiving nursing care in care homes compared to those receiving free nursing care either at home or in hospitals.

A.2 Attendance Allowances

The Attendance Allowance (AA) is a non-means tested weekly benefit for severely disabled people aged 65 or over who need help with personal care. It is paid out to all UK individuals in need. The amount of AA depends on the severity of the elderly's disability. After local authorities assess the elderly's condition, allowances are paid out in two levels depending on the elderly's condition.

After the 2002 CCHA reform, Scottish individuals receiving free personal care in care homes no longer qualified to receive AA. In contrast, those Scottish individuals receiving care in their own homes continued to receive AA.

A.3 Summary of all policies

Table A.1 summarises which allowances were given out to the elderly before and after the policy changes in 2001 and 2002. Since the amounts of allowances differed depending on the care settings, the table separately list the available allowances by where the elderly received care. There are two groups of individuals who benefited from the reforms: i) those receiving nursing care in care homes in all the regions of the UK; ii) the Scottish individuals receiving formal personal care.

In Table A.2, we illustrate how the maximum amounts of weekly allowances changed before and after the reforms depending on where the elderly reside and where they receive care. The pre-reform amounts are calculated using the 2000 rates whereas the 2003 rates are employed for the calculations of the post-reform amounts. The table highlights that the changes in the nursing care allowances only applied to those who receive care in residential care homes and the increase experienced by these individuals are comparable across regions. Scottish individuals receiving care at home however saw a large increase in their care allowances due to the 2002 policy reform. This implies two things. Firstly, it is the 2002 Scottish policy to offer free personal care that induced the major care price variation. Secondly, since the majority of individuals receive care in their own homes, the price variation is likely to induce behavioural responses among all Scottish individuals.

Table A.1: Availability of allowances before and after the 2001–2002 reforms

	Scotland		England, Wales, and Northern Ireland	
	At home	Care home	At home	Care home
Before the 2001–2002 reforms				
Nursing care cost covered	Yes	No	Yes	No
Personal care allowance	No	No	No	No
Attendance allowance	Yes	Yes	Yes	Yes
After the 2001–2002 reforms				
Nursing care allowance	Yes	Yes	Yes	Yes
Personal care allowance	Yes	Yes	No	No
Attendance allowance	Yes	No	Yes	Yes

Notes: This table summarises the availability of various allowances in Scotland, England, Wales, and Northern Ireland before and after the 2001-2002 reforms. Regardless of the regions, the amount of nursing care allowance is fixed only for those receiving nursing care in care homes. In contrast, those receiving nursing care at home or in NHS hospitals receive the care free of charge.

Table A.2: Maximum weekly allowance calculations (£ per week)

Care received in care homes	Before the reforms (2000 rate) £ per week	After the reforms (2003 rate) £ per week
England	53.55 (AA)	57.20 (AA) + 142.80 (NC) = 200.00
Wales	53.55 (AA)	57.20 (AA) + 119.66 (NC) = 176.86
Northern Ireland	53.55 (AA)	57.20 (AA) + 100.00 (NC) = 157.20
Scotland	53.55 (AA)	145.00 (FPC) + 65.00 (NC) = 210.00
Care received at home	Before the reforms (2000 rate) £ per week	After the reforms (2003 rate) £ per week
England	53.55 (AA)	57.20 (AA)
Wales	53.55 (AA)	57.20 (AA)
Northern Ireland	53.55 (AA)	57.20 (AA)
Scotland	53.55 (AA)	57.20 (AA) + 145 (FPC) =202.20

Notes: This table illustrates how the maximum amounts of weekly allowances changed before and after the reforms depending on where the elderly reside and where they receive care. The pre-reform amounts are calculated using the 2000 rates whereas the 2003 rates are employed for the calculations of the post-reform amounts. AA stands for Attendance Allowance; FPC means Formal Personal Care allowance; NC is the Nursing Care allowance. Since in Scotland the formal personal care allowance for those receiving care at home is not fixed, we use the maximum amount provided to the elderly in residential care homes, i.e. £145. Note that the nursing care provided in the elderly's home is offered for free at the point of delivery. As a result, nursing care allowance is only given to the elderly receiving care in care homes. In addition, it is worth noting that the attendance allowance is not provided to the Scottish elderly receiving care in care homes after the 2002 reform.