Did the Introduction of Free Personal Care in Scotland Result in a Reduction of Informal Care?

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Abstract

There are more than 5 million carers in the UK. These provide a vital low cost resource to support frail older people. Without their continued participation in caring activities, governments would face a steep increase in formal care costs. Therefore the issue of substitution between formal and informal care is a vital policy issue. This paper explores a recent "natural experiment" in care provision. In 2002, the Scottish Parliament agreed to provide personal care free of charge to all those in need of such care. This policy was not followed elsewhere in the UK. Social conditions and data resources are largely uniform throughout the UK; this permits a reasonably rigorous evaluation of the initial impact of the policy of free personal care on informal caring behaviour. Using a difference-in-difference methodology with the British Household Panel Survey, the authors show that informal caring in Scotland did not decrease relative to the rest of the UK after the substantial expansion in formal provision in Scotland. While the finding is in line with other international evidence, the paper argues that it may partly be explained by changes in the type of care that informal carers provide following the policy change.

Introduction

Informal caring provides a valuable source of support for frail older people. The size of the population of the "oldest old" will increase substantially in most developed countries during the next three decades and there will be increased demand for care, both formal and informal. Formal care is provided either by the private sector or a government agency, while informal care is provided by family and friends. There are no immediate financial transactions associated with informal care costs, while formal care costs may be met by the individual, by the family or friends, or by government. The relationship between the supply of formal and informal care is of considerable interest to governments since in many countries, individuals do not have adequate financial provision against the formal costs of the long-term care and the state may be expected to be the provider of last resort.

This paper analyses the relationship between the supply of formal and informal care in the context of a "natural experiment" in care provision in the UK that began in July 2002. This was the provision of "free personal care" to those aged 65 and over in Scotland, who were assessed by social services as being in need of such care. In England and Wales, countries where the social and economic characteristics of carers and carees are very similar to those in Scotland, disabled people were expected to continue to pay for any personal care they received either privately or from social services.

We use a well-known longitudinal dataset, the British Household Panel Survey (BHPS), which has a common structure throughout Great Britain and a boosted sample in Scotland, to analyse the effects of this policy. Specifically, we use a difference-in-difference analysis to test whether there was a change in informal caring behaviour following the introduction of the free personal care policy.

The paper proceeds as follows: in Section 1, we examine recent relevant literature on informal care. Section 2 further discusses the theoretical issues and suggests possible improvements. In Section 3 we describe the context for our empirical work Section 4 describes our model and results. Section 5 concludes.

Literature Review

There is an extensive social science literature covering the social, psychological and economic aspects of informal caring. In economics attention has been given to transfers of labour and income between disabled people and the family and/or friends who look after them informally. Further work has examined household restructuring as a response to disability, while another strand has considered how caring affects labour market activity and whether caring disadvantages those wishing to access the labour market.

The policy motivation for these analyses lies in the importance of informal carers providing a service to the disabled that would be extremely costly to replace with publicly funded formal care. In the future, population ageing will increase the overall demand for care. Shifts away from informal care could increase the demand for formal care and add to the fiscal stresses caused by population ageing. Yoo, Battycharya, McDonald and Garber (2004) estimate that the presence of a spouse caregiver is worth $28,840 per annum in reduced formal long-term care costs, while the presence of a child caregiver is worth between $310 and $3830. Other policy concerns involve the negative effect that informal caring may have on the income and employment prospects of carers. For all of these reasons, the factors that influence the provision of informal care are of considerable policy significance.

One key aspect of this debate is substitution between informal and formal care. If increased public provision of care simply results in reduced informal caring, then the public costs of care may rise substantially without discernible effect on older peoples' well-being. The net effect on public finances also depends on the additional tax revenues raised if informal carers decrease care provision while increasing their labour market participation.

This section first examines theoretical aspects of the literature on informal caring and then

goes on to discuss empirical findings in relation to the substitution between formal and informal care.

Recent contributions relating to the literature on substitution between formal and informal caring include Stern (1995), Pezzin, Kemper and Reschosky (1996), Hoerger, Picone and Sloane (1996), Pezzin and Schone (1999a), Pezzin and Schone (1999b), Engers and Stern (2002). Their empirical applications have been to US datasets. Empirical analysis of informal caring behaviour in Europe is much less advanced.

The context for the modelling of long-term care is the economics of the family. Families typically are assumed to comprise a disabled parent and one or more children. The case of a spouse caring for a disabled partner is not prominent in this literature, even though caring activities are usually more intense with this form of caring arrangement.

The standard approach is to assume that the family optimises with respect to living arrangements, private consumption, labour market participation, transfers between family members, payments to formal care providers and informal caring. Optimisation depends on the structure of the utility function(s) in the family. These have varied quite widely.

Hoerger, Picone and Sloane (1996) use a family utility function defined over three living arrangements: living independently, forming a joint household or for the disabled parent to enter a care home. In each setting, the amount of formal and informal care provided directly enters the utility function. Pezzin and Schone (1999a) argue that the family decision making framework is untenable, since adult children and their elderly parents do not behave consistently with the "common preference" model. They suggest that a bargaining approach would be more suitable and use a Nash bargaining rule to determine family living arrangements as well as care provision. In their model, the utility functions of the parent and child both include the public good, W, which represents the parent's state of health. This device allows the carer to behave altruistically. W is responsive to the amount of formal and

informal care received and is conditional on the exogenous level of parental disability. Further arguments in the utility functions may include tastes for independent living; these are likely to differ between parent and child. The threat point for the Nash bargain is the level of utility under the assumption of independent living. If utility gains to both parties exist relative to independent living, then it is argued that a joint household will be formed.

Extending this model to include more than one child, Engers and Stern (2002) also use a bargaining framework to determine which child(ren) will care for the disabled parent. In the *voluntary* model, each child can decide whether to participate in the care decision. In the *collective* model all children participate. Side payments may form part of the optimal strategy. Each may contribute towards the care of the older person by direct care provision or in kind. Choice of caring arrangements may reflect relative efficiencies in the production of care and of goods as well as preferences for living independently.

Pezzin, Pollack and Schone (2005) construct a theoretical model of a two-stage bargaining process where at the first stage the living arrangements of parent and children are determined, while at the second stage the amounts of assistance given by each child are allocated. They argue that children will be unwilling to commit to live jointly with the parent at the first stage of the game because this decision weakens their bargaining power at the second stage. This weighs the balance against joint residence arrangements even though they may be Pareto efficient. Intervention in the form of subsidising the co-residing child or taxing the non co-resident children may improve efficiency.

It is also important to identify who controls the resources available to family members. Pezzin and Schone (1997) show that household expenditure patterns vary with such control. This clearly has implications for government decisions whether to allocate cash transfers to carer or caree. Bargaining outcomes within households may take the allocation of transfers as a determinant of threat points and reservation utilities.

Having determined the structure and solution method for the inter-family caring arrangement, different forms of budget constraint are added to the models. These usually involve the allocation of the child(ren)'s time between work, leisure and informal caring. The income generation potential of child(ren) may be affected by living arrangements. The parent may also have sources of income, either from pensions or state transfers. Hoerger, Picone and Sloane (1996) introduce income contingent state subsidised care payments into the parent's budget constraint.

In both the case of a family budget constraint and individual budget constraints, some income is allocated to each family member's private consumption. The remainder can be used to meet the costs of formal care and of housing. With individual budget constraints, transfers between carer and caree can be used to meet the costs of formal care.

Solving the constrained optimisation problem leads to a set of reduced form relationships that can be estimated, given appropriate data. We now focus on how far these estimates are able to shed light on the extent of substitution between formal and informal care. This evidence extends beyond the literature just described. That is, some of the empirical estimates do not derive their empirical strategy from a theoretical analysis of family behaviour. Most findings are based on relatively small scale surveys specifically designed to analyse informal caring behaviour within a particular policy and institutional framework.

The US National Long Term Care Demonstration (Carcagno and Kemper 1988) examined how the structure of elderly care changed when services provided to the disabled living at home were reorganised, extended and made more affordable. One of the key concerns in this exercise was that increased home provision of formal care would reduce informal caring. An experimental design was used with control and treatment groups.

Carcagano and Kemper suggested that improved information flows on the availability of services had no effect on informal care provision. Increased funding for formal home care

services (reductions in their relative price) reduced the proportion receiving informal care by 6.5 per cent. This was mainly concentrated on care provided by neighbours and friends rather than by relatives. Primary caregivers did not reduce their care even when the price of formal provision was significantly reduced. In another study of the Long-Term Care Demonstration, (Christianson 1988) concluded that: "a 5 per cent increase in percent receiving in-home formal care services was associated with a 1 per cent decrease in the percent receiving informal care".

Pezzin, Kemper and Reschovsky (1996) used the same dataset, but their analysis permitted the endogenous determination of living arrangements. Indirect effects on informal caring caused by changes in living arrangements result in relatively small substitution effects. Only unmarried individuals were significantly more likely to live independently as a result of additional financial support for formal care provision.

Substitution effects, conditional on living arrangements, were small. In particular, there was no evidence of a significant change on the hours of informal care provided, either for married or unmarried carees. The correction term for living arrangements used in the hours equation indicated that endogenous living arrangements lead to more informal care hours being supplied than would be the case if reallocation was not permitted.

Pezzin and Schone (1999a) used the Hebrew Rehabilitation Centre for the Aged (HRCA) Survey of the Elderly and the subsequent HRCA-NBER Child Survey to examine the labour force participation and informal caring decisions of children, as well as decisions about co-residence when a parent requires care. Their results were based on a set of 424 parent-child pairs. They found that provision of formal care reduces the likelihood of joint living and thus the provision of informal care. They used the results to simulate a stylised version of non means-tested home care policy with features similar to policies adopted in states such as Oregon, Washington and Massachusetts. Their results suggested that such a program would

reduce the probability of co-residence by 58 per cent and the provision of informal care by 46 per cent. This signifies a major reduction in informal caring behaviour as a result of the policy change. They argue that their findings suggest that the negative impact of changes in living arrangements and informal caring could *reduce* the total (formal plus informal) care received by frail elderly persons.

Tennstedt, Crawford and McKinlay (1993) use longitudinal data from a seven-year study in Massachusetts. They investigate the impact on informal caring of variations in the availability of community services at little or no cost to older people. In particular, they focus on whether informal hours decrease as formal hours increase. These transitions formed the focus of their results. They subdivided care into six types, such as personal care, housekeeping etc. They conclude that although some substitution was detected in the sample, there was no evidence of strong substitution effects. There was some indication that substitution was more likely for certain types of care than others. For example, informal carers were more likely to opt out of arranging services for the disabled person.

Li (2005) used Michigan's Home- and Community-Based Medicaid Waiver Program over a 3 year period. She found an initial decline in informal caring just after the provision of publicly paid home care. This decline, however, ended quite quickly. She argued that publicly provided long-term care helps formal and informal carers to work together to support disabled older people.

Thus, aside from Pezzin and Schone (1999a), the burden of evidence suggests that the extent of substitution from informal to formal care when the price of formal care is reduced is small. Existing theoretical models are certainly consistent with substitution between formal and informal care. However the mechanisms are predicated on the assumption that formal and informal carers supply the same services to the disabled person. In the next section we suggest possible extensions to these models which provide

a richer explanation of why one might observe low rates of substitution.

Theoretical Developments

In this section we discuss some of the assumptions implicit in existing models of informal care. Following from this analysis, we propose a different formulation for the production of informal care which has application to the empirical analysis that follows.

The implicit assumptions in the family utility and Nash-bargaining models of informal care include:

1. *Well-functioning markets exist both for care homes and for care at home.*

   These markets are often characterised by uncertainty due to the role of public providers. In many countries, it is the public sector that is the dominant provider of formal care. Such public provision may be subject to substantial fluctuations due to changes in budget allocations. The uncertainty caused by such fluctuations may deter private providers from market entry.

2. *These markets clear, implying no unmet demand for care.*

   There is an extensive literature in social policy on unmet need that is summarised, for example, in Cordingley, Hughes and Challis (2001). One of the key issues in determining the existence of unmet demand is the perspective from which need is assessed. The economics literature tends to ignore this issue whereas the social policy literature acknowledges that carees, carers and professionals may take different views on an individual's level of unmet demand. If public funds are to support care provision, then it is likely that professional assessments will play a major role in determining the allocation of formal care to the disabled person. Additional private purchases of care will therefore be contingent on the difference between the professional assessment and the individual or carer's assessment of care needs.

Hoerger, Picone and Sloane (1996) is an exception. Their model allows for rationing of care home places. Such rationing is dependent on state level variables such as the relative supply of nursing home provision in the state, and the difference between Medicaid and private care payments.

3. *Identification of personal care needs is costless*

    Health economists approach to ill health involves uncertainty on the part of the patient due to lack of understanding of the causes and remedies for his/her condition. In contrast, the literature on care does not focus on uncertainty and assessment by a medical practitioner and/or others. But care needs have both medical and social aspects and are normally assessed by professionals in these disciplines. In practice assessments play a key role in diagnosing chronic conditions associated with ageing as well as defining the role of the informal carers.

4. *All parties are capable of making rational decisions.*

    This is a difficult issue since the standard economic orthodoxy of rational decision making is difficult to reconcile with the evidence of the large numbers of older people with severe cognitive impairment. The evidence suggests that in 2002, 3.1 per cent of English residents aged 75-84 suffered from severe cognitive impairment. This share rose exponentially to 40.2 per cent of those aged 95+ (Wanless and Forder 2006).

5. *Care is an undifferentiated service.*

    In practice, care is a spectrum of services which stretch from regular medical interventions required by those with chronic conditions to domestic tasks such as shopping and gardening. Formal care providers can specialise in certain aspects of care. Disabled individuals consume the benefits provided by these services rather than directly consuming formal care or informal care per se.

While existing models have concentrated on the determinants of living arrangements and on

the structure of family decision making, the implications of these other assumptions have not been fully explored. Here we focus on the last of these issues, leaving the others for future work. Thus we consider how to extend models of caring behaviour to include different forms of care.

First, we would suggest that it is not formal or informal care that directly enters the disabled person's utility function, but rather the amounts of the care services produced through the use of formal or informal care. Using a production function in implicit form and assuming n forms of care output, we may write

$$g(c_1,..c_n,IC_1...IC_n,FC_1...FC_n) = 0 \qquad (1)$$

where c_1, c_2,.. c_n are the types of care produced, IC_1 , IC_2 …. IC_n are informal care inputs to the care types and FC_1, FC_2 …. FC_n are the equivalent formal care inputs. Using the subscripts P (D) to indicate the client (carer), their utility functions are, respectively

$$
\begin{aligned}
&U_P(X_P,W(c_1,..c_n;D),\phi_P) \\
&U_D(X_D,W(c_1,..c_n;D),IC_1,IC_2..IC_n,L,\phi_D)
\end{aligned}
\qquad (2)
$$

where X is private consumption and W is a public good that measures the disabled person's well-being or health. , IC_1, IC_2 …. IC_n represent the (dis)utility that the carer incurs, which varies over the type of care provided. We also introduce ϕ , which is a parameter reflecting the client's (carer's) preferences over *who* provides care. This is a form of process utility and reflects the observation that older people are more comfortable with carers whom they know, particularly family members, while children *may* prefer to provide care directly rather than pay for the equivalent quantity of formal care.

This way of describing care allows us to analyse substitution between formal and informal care more extensively. We assume that formal care and informal care are only used in the

production of the corresponding care types. That is:

$$\frac{dc_j}{dFC_i} = \frac{dc_j}{dIC_i} = 0 \ \forall i \neq j \tag{3}$$

and the marginal rate of technical substitution between informal care and formal care of type *i* *is* given by

$$\frac{dIC_i}{dFC_i} = \frac{g_{FC_i}}{g_{IC_i}} = -MRTS_{IC_i,FC_i} \tag{4}$$

Clearly, these may differ across care types where there are significant differences between the skill sets of formal and informal carers We can also evaluate the marginal product of informal care in the production of care type *i* and compare that with the marginal product of formal care in its production. Thus

$$\frac{dc_i}{dIC_i} = \frac{g_{IC_i}}{g_{c_i}} = -MP_{IC_i} \ \text{and} \ \frac{dc_i}{dFC_i} = \frac{g_{FC_i}}{g_{c_i}} = -MP_{FC_i} \tag{5}$$

are, respectively, (negative) the marginal products of informal care and formal care of type *i* in producing care of type *i*. This structure is still compatible with the approaches to optimisation, particularly Nash bargaining outcomes, which have been discussed. Rather than focus on solutions, we develop arguments to show that this structure permits more flexible responses to changes in the relative prices of different types of care.

Suppose that we have only two care types (n=2). The price of both types of formal care is determined competitively. There is a reduction in the price of Type 1 care. Adjustment by the informal carer may now take two forms: (1) substitution toward greater participation in the labour market and/or (2) substitution toward additional provision of Type 2 care. If the latter effect offsets the reduction of informal care of Type 1, then there will be no effect on total

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informal care provided.

An additional pressure to continue to provide informal care will arise if

$$\frac{dU_P}{d\phi_P} > 0, \frac{d^2U_P}{d\phi_P^2} < 0, \frac{dU_D}{d\phi_D} > 0, \frac{d^2U_D}{d\phi_D^2} < 0, \tag{6}$$

which implies that the process utility associated with provision of care by the child increases at a diminishing rate. Thus, even if there is some reduction in informal care, the utility cost of each hour's reduction to the child will increase. This effect might occur for a number of reasons. For example, she might wish:

1. to maintain contact to gather information on the parent's state of health;

2. to check on the adequacy of the formal care provision;

3. to perceive herself as remaining a carer, albeit at reduced intensity.

Thus, reductions in the price of one type of formal care provision will not necessarily lead to reduction in levels of informal caring since provision of other types of care may increase. The carer may reduce hours of care, but at a decreasing rate.

We now investigate these issues using a natural experiment in care provision that has recently taken place in the UK.

Context

The Scottish Parliament passed the Community Care and Health (Scotland) Act in March 2002. Its objective was to provide free personal care (FPC) for frail older people in Scotland. The policy was introduced in July 2002 and was financed by a £250 million package over the next two years. The policy involved:

- All personal care charges for people cared for in their own home were abolished

- Everyone needing nursing care received it free of charge
- For those cared for in a care home and who were funding the cost of their care, a "free personal care" payment of £145 per week was provided

We wish to focus on the first of these provisions: the removal of all charges for personal care to those being cared for in their own homes.

Personal care was defined to include:

- Personal hygiene such as bathing and showering;
- Continence management – help with toilet and skin care;
- Food and diet including assistance with eating;
- Help with mobility;
- Counselling and support services;
- Assistance with medication and simple treatments; and
- Personal assistance such as help getting up and into bed.

Personal care did *not* include help with domestic tasks such as shopping and gardening. Hence it only covered part of the spectrum of care services that a disabled person might wish to consume.

In passing this legislation, Scotland was the only part of the UK to put into practice the recommendation of the Royal Commission on Long Term Care (1998) that personal care should be free in all settings and should be paid through general taxation. The potential financial impacts of the policy were evaluated in 2001 by the Scottish Executive. In assessing its costs, one of the key issues was whether the provision of free personal care would result in a reduction in the provision of informal care by friends and family and consequent increases in the costs of providing formal care. Based on the evidence from the Channelling Experiment, it was recommended that £10m be set aside to provide for substitution between informal and formal care.

Throughout the UK, it is the responsibility of local authorities to deliver social care to disabled individuals. Table 1 shows the number of clients receiving home care services

from local authorities in Scotland between 2000 and 2005 – before and after the introduction of the policy. It indicates that the total number of home care clients receiving some service has varied between 54 thousand and 59 thousand over this period. However the share of this group receiving free personal care has increased rapidly from 45 per cent of the total when the policy was first introduced, to 68 per cent in 2005. The average number of hours of care received by clients has also increased significantly over the period, from 5.6 to 8.2 hours. And expenditure on free personal care for home care clients rose from £116 million in 2003-04 to £136 million in 2004-05 (Scottish Executive, 2006).

Table 2 shows broadly equivalent home care statistics for England. (England comprises around 82 per cent of the population of the UK and therefore dominates the "Rest of the UK" in comparisons between Scotland and the Rest of the UK). Administrative data on social care are not collected on the same basis in Scotland and England. Personal care is not separately identified in England though more intensive home care packages, which involve longer hours and multiple visits, are shown. In England the data relate to all adults, while in Scotland those aged 65 and over, to whom the free personal care policy applies, are identified. Care clients aged 65 and over outnumber those aged less than 65 by around 5 to 1.

The data in Table 2 show that there was a substantial decline in the number of local authority clients in England between 2000 and 2005[1]. This may be due to a withdrawal by some local authorities from some domestic home care activities such as help with shopping. However the number receiving intensive care packages rose from 151 thousand to 178 thousand. Between 2000 and 2005, average hours per client rose more quickly in England (from 7.0 to 10.1 hours per week) than in Scotland (from 5.6 to 8.2 hours per week).

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[1] Around 11% of home care hours in England are supplied by private providers to private clients (Mathew 2004 and Department of Health 2006)

In both areas the average hours per client data suggest that formal care provision has increasingly focussed on intensive care packages. In Scotland these tend to involve personal care, while in England, though data on personal care is not available, they involve frequent visits and long weekly hours, which suggests that they are similar to the intensive care packages being supplied in Scotland. The main difference between Scotland and England is the decline in the total number of local authority clients in England compared with the broad stability in client numbers in Scotland. The decline in England may have occurred for budgetary reasons. This is quite possible because the method for allocating resources to local authorities is quite different in Scotland and England.

There is no evidence of a sudden decline in demand in either jurisdiction. Indeed some evidence (Wanless and Forder 2006) suggests that demand is rising and will continue to do so. This is partly due to increases in unhealthy life expectancy and rising awareness and expectations of public provision. Thus, the decline in local authority supply in England suggests that demand has had to be met from other providers or there has been an increase in unmet need.

The other important difference relates to charging. In England, individuals with assets in excess of £12,500 (excluding housing assets) are expected to contribute towards their personal care costs, while in Scotland since July 2002 these costs have been fully met by the local authority. Thus, in Scotland, with the introduction of free personal care, there was a fall in the price of formal care relative to England.

If there is a significant fall in the relative price of personal care in Scotland and a decline in supply in England, what will happen to relative levels of informal caring? The most obvious prediction would be that there would be a reduction in informal caring in Scotland relative to England.

Table 3 presents data from the Family Resources Survey on informal caring in Scotland,

England and Wales during the period 1996 to 2003. The Family Resources Survey is an annual cross-sectional survey of the income and circumstances of households in the UK, covering around 29,000 households. This sample period covers two years after the introduction of free personal care and does not show any significant relative change in the number of informal carers in Scotland compared with England and Wales in 2002 and 2003.

Thus, there is no suggestion from these aggregate data of a change in informal caring behaviour in Scotland following the introduction of free personal care. However, these comparisons are based on unconditional means which do not allow for unobserved heterogeneity. In the next section we test for relative changes in informal caring using the British Household Panel Survey (BHPS) which allows us both to control for exogenous influences on caring behaviour and for unobserved heterogeneity.

Model and Results

To capture any change in informal care behaviour following the introduction of free personal care in Scotland, we employ a simple difference-in-difference approach to model whether an adult provides care to a disabled person or not. In particular we estimate the following equation:

$$y_{it}^* = \beta x_{it} + \delta time + \varphi s \cot land + \gamma time * s \cot land + \varepsilon_{it} \qquad (7)$$

where the latent dependent variable is the probability that an individual provides informal care to an elderly (aged 65 and over) disabled person, conditional on a set of explanatory variables. These left-hand-side variables include a set of explanatory variables x, a time dummy which is zero before the policy change and unity after, a location dummy for Scotland and an interaction term of time and location. Hence, the main parameter of interest is γ; a significantly negative sign would indicate that informal care provision has declined in the

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aftermath of the introduction of free personal care while a significantly positive sign would suggest the opposite.

Though the left-hand-side variable is latent, we nevertheless estimate the models using a linear formulation, adjusting for heteroscedasticty and correcting for unobserved heterogeneity by using a fixed effects estimator. We also estimated probit models to check for the robustness of the results and find very little difference.[2]

We include a series of exogenous variables to control for socio-economic status including age, marital status, education, number of children in household, household size, ownership of accommodation, number of disabled in household and own disability status. Estimations are done separately for co-residential and extra-residential carers.

The implementation of (7) is based on data from BHPS from 1999 to 2003. Each year over 5,000 households consisting of roughly 10,000 individuals have been interviewed. Most of these are re-interviewed in subsequent years, allowing us to follow their behaviour over time for a maximum of 13 years. The BHPS offers a wide range of variables for our variables and is nationally representative. Individuals are classified as carers if they provide an affirmative answer to at least one of the following questions:

> Co-residential carer: "*Is there anyone living with you who is sick, disabled or elderly whom you look after or give special help to? "*
>
> Extra-Residential carer: *"Do you provide some regular service or help for any sick, disabled or elderly person not living with you?"*

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[2]   A problem with estimating difference-in-difference models using non-linear estimators is that standard errors from these estimations are invalid and need to be adjusted (see Ai and Norton 2003). However, this is rather estimation-time consuming and results were very similar for the models in which we used both linear and non-linear estimators.

To account for the fact that free personal care is only available to those aged 65 and over resident in Scotland, we restricted the care definition further. We distinguish between the co-residential (within the home) and extra-residential (outside the home) carers. Information on the age of the caree is available for co-residential carers in the BHPS but not for extra-residential ones. For extra-residential care we used the age of the carer to infer the age of the caree, given that we knew the relationship between carer and caree. Thus we included only middle-aged individuals who care for a parent or parent in law or grandparent.

Our model abstracts from the endogeneity of living arrangements. This may be acceptable for the short-run analysis that we are able to conduct at present, given that our data only cover two years following the introduction of the policy. In the longer run, given that understanding of the policy was initially limited and that new sets of decisions on living arrangements are now being made as successive cohorts of older people require care, this may be a difficult argument to maintain.

There is no evidence of actions taken in anticipation of the policy, such as movements of older people requiring care from England to Scotland. This may be partly because the policy was introduced quickly and its details were initially not well understood (Bell and Bowes 2006).

Table 4 summarises the care characteristics of the BHPS sample. It shows that around 11.3 per cent of all adults in GB provide extra residential care, while about 7.8 per cent provide care at home. Subsumed within these groups is 1 percent of adults who provide care both within and outside the home. In general females provide more care than males. The gender imbalance is greatest for extra-residential caring.

Table 5 shows further characteristics of carers in Great Britain drawn from our BHPS sample. Around 11 per cent of the adult population provides extra-residential care. This group accounts for a slightly smaller share of full-time workers (9.9 per cent) and a larger share

(13.6 per cent) of part-time workers. These outcomes are consistent with the findings of Heitmueller and Inglis (2004) who argue that informal carers face significant disadvantages in the labour market, both in terms of labour market participation and wages. The causal links between employment and care are also explored in Heitmueller and Michaud (2006).

There is a distinctive age pattern in both co-residential and extra-residential caring. Table 5 shows that extra-residential caring peaks in the age group 50-60, while for co-residential caring there is a steady increase through retirement age. This reflects the higher prevalence of caring for a spouse among co-resident carers. Finally, the shares by qualification of extra-residential carers broadly mirror their population share, albeit with a slightly lower proportion holding first degrees. In contrast, co-residential carers are much less well-qualified than the population as a whole. Co-residential carers are, as we have already seen, likely to be older, and therefore less likely to be well-qualified. However, the low level of educational qualifications among co-resident carers may also stem from selection of cost-minimising housing arrangements when opportunity costs in the labour market are relatively low.

We now turn to our estimates of the effects of the introduction of free personal care on co-residential and extra-residential caring. Tables 6 to 9 report our results for various versions of equation (7). There are six dependent variables - each and both genders, and co-residential or extra-residential carers. Each of these six cases is estimated with controls for additional characteristics present or absent. Estimates are constructed for all adult respondents and then the dataset is restricted to adults of working age to determine whether significantly different behaviour is observed among carers that might be active in the labour market[3].

As mentioned previously, our main concern is the sign and significance of the difference-in-difference coefficient. For all models involving co-residential carers, none of the interaction

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[3] Cross-section weights are applied to rescale the booster sample for Scotland.

(diffindiff) terms is significant regardless of the model specification. In other words, the introduction of free personal care does not seem to have changed the provision of informal care in Scotland for those caring for an elderly person within the same household.

The picture is slightly different for extra-residential carers. Irrespective of whether additional controls are added, there appears to be a significant reduction in the probability of informal caring by females of around 1 per cent. This effect is only significant at the 10 per cent level and its magnitude is very small.

We have argued that a change in the relative costs of some categories of formal care might lead to changes in the types of care being provided informally. We know that the publicly supplied care type is personal care. This will normally imply high-intensity care. Thus, if there is substitution between personal care and other forms of care by informal carers we may observe a shift in the hours of care supplied. Thus far we have neglected the intensive margin of care provision. Unfortunately, the information on hours of care provided is patchy and banded. Hence, we simply compare changes in the distribution of hours of informal care before and after the introduction of the policy in Scotland and England rather then replicate our difference-in-difference estimation. Figures 1 and 2 summarise our results.

There was virtually no change in the distribution hours of care in England following the introduction of free personal care in Scotland. One would certainly not expect the Scottish policy to affect the English distribution. But this finding also implies that there were no other major changes happening in England that might have altered the distribution. In contrast, there is a dramatic change in the Scottish distribution. Most noticeably, there has been a sharp decline for people caring for more than 100 hours per week in their own home (from 85 to 50 individuals or 46% to 27%). There was a corresponding increase in lower intensity co-residential care (between 0 and 19 hours per week). There was also a significant increase in the 0-9 hour band among extra-residential carers.

Thus, although we have found no difference in the probability that co-resident adults will describe themselves as carers, there does appear to be some reduction in the intensity of support that they provide. This is probably because co-resident carers provide the most intensive support, which is more likely to involve personal care. Extra-residential carers are more likely to provide general domestic support and it is therefore not surprising that changes in the distribution of hours are less significant for this group when the price of personal care is reduced to zero.

These changes in the distribution of the hours of care in Scotland compared with England are most likely associated with the policy. While our difference-in-difference models did not indicate any substantial reduction in informal caring in Scotland on the extensive margin, the data on hours of care do suggest that informal carers may have reduced the intensity of the care they provide and/or are providing different types of care.

Conclusions

The existing literature on substitution between formal and informal care provision tends to imply that any reductions in informal care brought about by reductions in the price of formal care tend to be small. Most of this literature has used US data and tends to operate within a theoretical framework that does not distinguish between different types of care and the varying efficiency of informal carers in providing these forms of care.

Our paper examines one of the largest natural experiments in care provision to frail older people. This was the provision of free personal care in Scotland from July 2002. In the rest of Great Britain, notably England, those frail older people who required personal care and had non-housing assets of more than £12,500, had to continue contributing towards the cost of that care. The impacts of the policy change can be assessed using a GB-wide longitudinal dataset that was established before the introduction of the policy.

Our difference-in-difference approach examines the impact of the policy. Its effect on the probability of informal care provision on almost all categories of carer is insignificantly different from zero. The only exception is female extra-residential carers. However, the negative effect is mildly significant and its magnitude is small. These results are consistent with much of the earlier literature from other countries on the effects of subsidised public care provision on willingness to supply informal care.

The data do imply that the introduction of the policy may have affected the balance of informal care provision towards less intensive support. This is consistent with a model in which the effect of a policy change is to encourage substitution both between types of care and between informal caring and the labour market.

There are a number of caveats we should add. First, this assessment of its impact is being made only two years after the policy has been introduced; further adjustments to informal caring behaviour may evolve as the policy matures. Second, more information is needed on the types of task that informal carers undertake and how they select these tasks. Only with such direct information will we be able to determine how informal care adapts and evolves when the price of formal care drops. Finally, any longer term study should address the endogeneity of living arrangements to determine how they are affected by additional public support for care at home. These effects will include impacts on both the housing and labour markets.

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APPENDIX A

TABLE 1: HOME CARE CLIENTS 2000-05 IN SCOTLAND

	At 31st March					
	2000	2001	2002	2003	2004	2005
Home Care clients aged 65+	59,217	55,381	53,636	55,746	57,762	57,883
Home Care clients aged 65+ receiving personal care services *	-	-	24,161	31,103	36,145	39,105
Clients receiving personal care as proportion of all clients.	-	-	45%	56%	63%	68%
Average hours per week (all clients)	5.6	6.0	7.0	7.4	7.8	8.2

Source: Scottish Executive (2006)

TABLE 2: HOME CARE CLIENTS 2001-2005 IN ENGLAND

Year	Clients	Total Hours	Hours per Client	More than 5 contact hours and 6 or more visits
2000	414,700	2,791,300	7.0	151,700
2001	395,500	2,881,700	7.5	156,800
2002	382,000	2,983,200	8.1	160,800
2003	373,700	3,174,800	8.7	165,200
2004	368,600	3,359,000	9.1	172,200
2005	367,700	3,567,500	10.1	178,800

Source: Department of Health (2006)

TABLE 3: INFORMAL CARERS 1996-2003 (THOUSANDS)

	England		Wales		Scotland	
Year	total	% female	total	% female	total	% female
1996	3465	61%	266	66%	352	65%
1997	3584	62%	261	63%	344	70%
1998	3818	63%	287	60%	342	62%
1999	3842	62%	301	62%	365	68%
2000	3676	63%	298	62%	388	61%
2001	4101	60%	295	59%	380	66%
2002	3976	62%	282	63%	387	62%
2003	3902	61%	276	62%	384	64%

Source: Family Resources Survey

TABLE 4: PERCENTAGE OF ADULTS PROVIDING CARE BY CARE TYPE

From Home		Not Providing Care	Providing Care
Overall	RUK	88.8	11.2
	Scotland	88.4	11.6
Females	RUK	87.1	12.9
	Scotland	86.8	13.2
Males	RUK	90.9	9.1
	Scotland	90.4	9.6
At Home		Not Providing Care	Providing Care
Overall	RUK	92.1	7.9
	Scotland	92.9	7.1
Females	RUK	91.9	8.1
	Scotland	92.0	8.0
Males	RUK	92.3	7.7
	Scotland	93.5	6.5

Source: BHPS 1999-2004

TABLE 5: CHARACTERISTICS OF CO-RESIDENTIAL AND EXTRA-RESIDENTIAL CARERS

	Co-Residential	Extra-Residential	
Total (Share of Adult Population)	**7.7%**	**11.2%**	
Economic Activity			
Full-time work	4.1%	9.9%	
Part-time work	4.9%	13.6%	
Retired	15.7%	11.6%	
Other	11.0%	10.9%	
Deviation from Average Labour Income			Average Labour Income
Full-time work	-6.9%	-1.7%	£1,669.7
Part-time work	-10.4%	-7.6%	£913.2
Retired	19.7%	54.2%	£6.3
Other	-64.8%	-35.5%	£84.5
Age			
21-25	3.8%	5.5%	
26-30	3.1%	5.6%	
31-35	3.8%	7.3%	
36-40	4.4%	8.3%	
41-45	6.1%	10.3%	
46-50	6.5%	14.6%	
51-55	8.5%	18.6%	
56-60	10.1%	18.8%	
60-64	12.4%	17.6%	
65+	15.4%	10.6%	
Qualification			
higher degree	4.3%	11.0%	
1st degree	3.4%	9.3%	
hnd, hnc, teaching	5.1%	12.5%	
a level	4.9%	10.6%	
o level	5.9%	11.6%	
cse	6.9%	11.5%	
none of these	13.6%	11.5%	

TABLE 6: OVERALL – CO-RESIDENTIAL

Variable	Model I Both Genders		Model II Both Genders		Model III Males		Model IV Males		Model IV Females		Model VI Females	
	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error
Time	0.0015	0.0600	-0.0019	0.0030	0.0022	0.2700	0.0043	0.0500	-0.0003	0.0020	-0.0035	0.0040
Scotland	0.0555	0.0506	0.0381	0.0640	-0.0018	0.0019	-0.0078	0.0063	0.1344	0.1142	0.0896	0.1343
Time*Scotland	0.0056	0.0035	0.0039	0.0038	0.0076	0.0052	0.0052	0.0056	0.0039	0.0048	0.0029	0.0051
Characteristics	No		Yes		No		Yes		No		Yes	
R-sq	0.53		0.56		0.52		0.56		0.53		0.56	
N	46515		36884		20908		16576		25607		20308	

TABLE 7: WORKING AGE – CO-RESIDENTIAL

Variable	Model I Both Genders		Model II Both Genders		Model III Males		Model IV Males		Model IV Females		Model VI Females	
	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error
Time	0.0001	0.0014	-0.0032	0.0027	0.0000	0.0019	-0.0038	0.0034	0.0004	0.0020	-0.0024	0.0040
Scotland	0.0785	0.0535	0.0633	0.0668	-0.0001	0.0015	-0.0028	0.0036	0.2002	0.1250	0.1511	0.1474
Time*Scotland	-0.0018	0.0031	-0.0016	0.0032	0.0003	0.0039	-0.0015	0.0039	-0.0035	0.0048	-0.0016	0.0050
Characteristics	No		Yes		No		Yes		No		Yes	
R-sq	0.52		0.55		0.48		0.52		0.55		0.58	
N	35558		28047		16894		13332		18664		14715	

TABLE 8: OVERALL – EXTRA-RESIDENTIAL

Variable	Model I Both Genders		Model II Both Genders		Model III Males		Model IV Males		Model IV Females		Model VI Females	
	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error
Time	0.0021	0.0031	0.0093	0.0062	0.0076	0.0045	0.0088	1.8900	-0.0025	0.0044	0.0086	0.3900
Scotland	0.0071	0.0640	-0.0044	0.0835	-0.0268	0.0339	-0.0004	0.0455	0.0544	0.1443	-0.0037	0.1769
Time*Scotland	-0.0050	0.0072	-0.0132	0.0078	-0.0069	0.0101	-0.0085	0.0108	-0.0034	0.0102	-0.0183	0.0110
Characteristics	No		Yes		No		Yes		No		Yes	
R-sq	0.53		0.56		0.51		0.55		0.53		0.56	
N	46512		36883		20908		16576		25604		20307	

TABLE 9: WORKING AGE – EXTRA-RESIDENTIAL

Variable	Model I Both Genders		Model II Both Genders		Model III Males		Model IV Males		Model IV Females		Model VI Females	
	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error	Coeff	Std Error
Time	0.0096	0.0034	0.0104	0.0067	0.0127	0.0047	0.0133	0.0091	0.0067	0.0050	0.0079	0.0096
Scotland	0.0411	0.0680	0.0121	0.0896	-0.0045	0.0292	-0.0015	0.0481	0.1117	0.1660	0.0376	0.2021
Time*Scotland	-0.0105	0.0082	-0.0177	0.0087	-0.0101	0.0106	-0.0123	0.0113	-0.0107	0.0122	-0.0247	0.0132
Characteristics	No		Yes		No		Yes		No		Yes	
R-sq	0.53		0.57		0.51		0.55		0.54		0.58	
N	35556		28046		16894		13332		18662		14714	

Figure 1: Change in the distribution of hours of informal care in Scotland
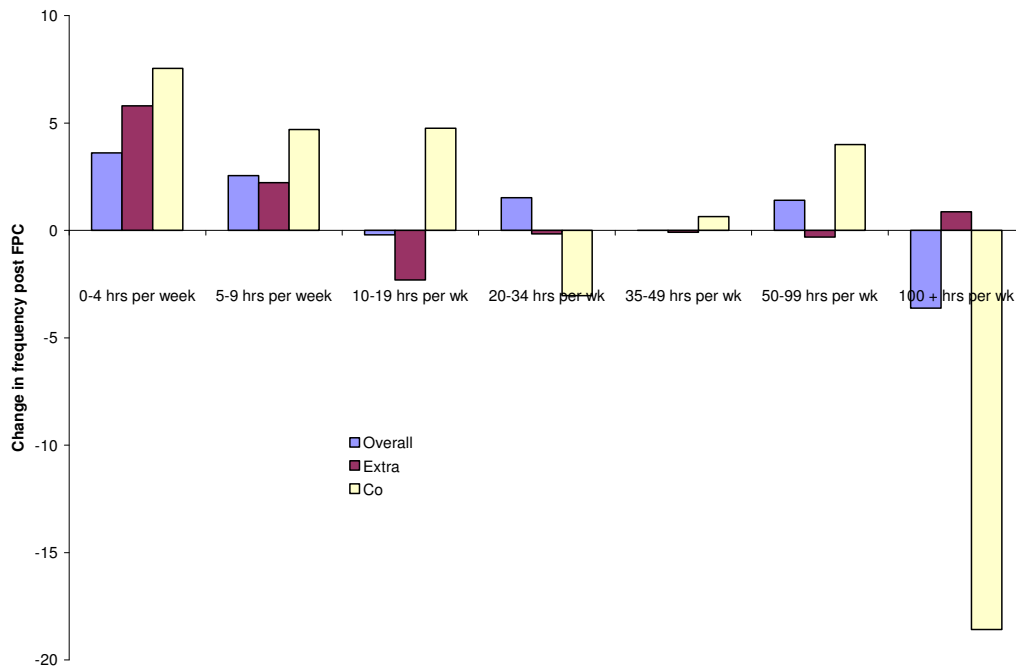

Figure 2: Change in the distribution of hours of informal care in England