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Revisiting the Economic Case for Social Care Spending: Informal Care

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DISCLAIMER

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Abstract

There is a long-standing debate about the balance of long-term care delivered by family and friends as opposed to that provided formally by the state and private sector, which underpins the economic case for social care. We explore the implications of an exogenously driven change in the use of formal care on the utilisation of informal care. Applying an instrumental variable technique to the eight waves of the English Longitudinal Survey of Ageing (2002-2017), we find that formal care use leads to an approximately 20% decline in the probability of receiving informal care when not accounting for individual heterogeneity and to about 12% otherwise. The estimated effect is smaller for men than for women. Simple calculations, based on current estimates for people aged 75 and older, suggest that one extra hour of formal care leads to up to 40 fewer minutes of informal care, or, in monetary terms, one extra pound spent on formal care brings up to 67 pence savings in informal care costs, when the latter is valued at a replacement cost.

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1. Introduction

Long-term care (LTC) is a combination of services that support people who cannot perform (some) everyday activities independently. People may require LTC when they have a chronic health condition or a disability which can arise either unexpectedly (e.g. as a result of an accident or heart attack/stroke) or develop gradually with age or with the progression of an illness. LTC can potentially help people in several ways: by supporting everyday basic care

activities (e.g. feeding, dressing etc.); by helping people to have (more) control/independence and dignity in their lives; to feel more fulfilled and able to engage socially. There are, in other words, a range of care-related quality of life (CRQoL) or broader well-being benefits. LTC can help people achieve improved functioning in these domains (e.g. being fed, dressed, occupied) or offer people the capacity to accomplish these activities (Forder and Caiels, 2011; Makai et al., 2014) and fulfil its core aim of promoting quality of life (Fernandez et al. 2011). There exist different types of long-term care defined by the intersection of three dimensions: (i) the place where it is received (home-based vs. facility-based), (ii) the nature of the services (personal care vs. practical assistance), and (iii) the form of provision – formal (privately paid, provided by the government, or provided on an unpaid basis by voluntary organisations) vs. informal (unpaid, provided by the family, friends, or neighbours).

Survey estimates suggest that about 7% of the UK population (4.5 million) provided informal care (Foley *et al.*, 2021). Around a third of those carers reported providing 5-19 hours per week, with around 15% providing more than 50 hours per week (Foley *et al.*, 2021). The use of both formal and informal LTC is increasing with age. Our estimates for England using ELSA data show that LTC use is lowest for those younger than 65 years old (1-3% formal care and around 10-15% informal care). However, the age gradient significantly increases after 65, reaching about 10% in formal care use and 40% in informal care use by age 80. Informal care plays a significant role in supporting people with care needs. We expect there to be an impact of informal care on the cared-for person in terms of improving their care-related quality of life. There is also an expected impact on the carer's quality of life and wellbeing, both positively and negatively: the benefits of helping a loved one etc., but also the potential for carer stress and burden.

In England, formal LTC is often called social care. Publicly funded adult social care is essentially a local government responsibility and is means-tested. Unlike nursing, medical and broader health-related care provided by the NHS, social care is not free at the point of use and is separately funded and organised (King's Fund 2019). Local Authorities (LAs) primarily play a role in assessing people's needs for care and commissioning care from providers who are often private or voluntary organisations (NAO 2018). Over two-thirds of LA-provided care recipients are adults aged 65 and over (NAO 2014), with about a quarter of the adults in the same age group having unmet care needs for an activity of daily living (ADL) (NAO 2021). Central government grants, council tax including (from 2016) a social care precept, and income from charges fund adult social care. Total social care expenditure in 2020/21 was £26.0 billion (Bottery and Jefferies 2022), which represents the most significant expenditure by LAs.

This paper aims to understand how the provision of formal care (as exogenously determined) affects the decisions about informal care. As outlined below, the existing literature on the interplay between formal and informal care has produced mixed results. The current study makes three particular contributions. First, it considers the theoretical foundations of the relationship between formal and informal care. Second, we use a spatial instrumental variable strategy for the empirical analysis using a lower-level disaggregation – the local authority (LA) – which represents a more plausible level for the spatial instrument given that the decisions on the financing, allocation and amount of social care are made at this level. Finally, we use a rich, longitudinal survey - the English Longitudinal Study of Ageing – as our dataset, which allows controlling for a range of covariates and important group effects and sensitivity checks.

Intuitively, if people see formal and informal care as providing the same kind of support to a person with care needs, we might expect an increase in one to lead to a reduced need for the other. However, this view may be too simplistic for many reasons. For example, people may

face differential 'prices' for the two forms of care (e.g. through public subsidy). Alternatively, they may have differences in preferences (marginal utility) for various combinations of care types (e.g. when people do not see them as perfect substitutes). Theoretically, there are circumstances when utility maximisers might increase informal care following an increase in formal care provision (even where they are technical substitutes). We explore the likely conditions for when such choices lead to a complementary or substitutionary response and posit empirical tests to explore those differences.

The following section provides an overview of the earlier empirical literature, explores the theoretical concepts and formulates hypotheses. Section three describes the empirical specification and the estimation approach. Section four presents the results, including the sensitivity checks and estimation of the group effects, which are discussed in section five.

3. Literature and Concepts

Earlier findings

The potential equivalency of care tasks and activities provided formally and informally suggests a high degree of interdependency in families' decisions about these forms of care. Households make decisions about informal care, privately paid (formal) care, and publicly funded (formal) care subject to the 'offer' from the public system.

Regarding the impact on (potential) carers, a foundational question is whether (or not) families choose to provide informal care and under what conditions. Where choices are made to provide informal care, this has potential implications for the carer's quality of life, the cared-for person's quality of life, and the household's economic position, including opportunities for the carer to participate in the labour market.

Recognising the technical similarity of care provided either by a paid carer (as a formal care transaction) or by an unpaid carer (as an informal care transaction), we would expect decisions about formal and informal care to be interdependent. Theoretically, as we outline below, under different conditions – particularly in how far formal care prices are subsidised (with public funds) – exogenous increases in formal care may lead to reduced (substitution) or increased informal care (complements).

The empirical literature provides mixed results regarding the direction of the relationship between formal and informal care, which may depend on the context (van Houtven et al. 2019) and the chosen empirical strategy. One group of studies focuses on the effect of informal care on formal care use and often finds that they are substitutes. Those studies mainly rely on potential caregivers' demographic characteristics as instruments for informal care. Examples of such instruments include the number of siblings and whether the eldest child was a daughter (Van Houtven and Norton 2004), the proportion of children who are daughters and the distance to the nearest child (Bonsang 2009), the number of daughters (Urwin et al. 2019). One of the recent studies also used the employment status of the primary caregiver as their IV (Sun et al. 2019).

The second group of studies considers the effects of a change in formal care due to an exogenous difference in the availability of formal care. Given the public sector's significant role in providing formal care in most countries, differences in the generosity of the public system supported the instrumentation strategy. The studies outlined below use three approaches to measure changes in generosity: differences in eligibility for public care, differences in indicators

of public funding, and variations in market/supply conditions for formal care (differences in prices of formal care).

The analyses that use eligibility criteria as the IV(s) tend to show that informal care and formal care are complements – e.g. Carrino et al. (2018) and Lin (2019). Although conceptually using eligibility is a good IV strategy – since it can only affect informal care through choices about formal care – in practice, it is more challenging because eligibility criteria focus on the person's care needs, which can also affect informal care choices. It may be harder to distinguish an eligibility effect from a need effect. While eligibility criteria can differ, it is still the case that compared to people with no needs, those who are eligible are more likely to have greater needs. High-needs people are more likely to use formal and informal care than low/no-needs people.

In contrast, Stabile et al. (2006) found that an increase in the generosity of public programs in Canada correlated with declining informal caregiving. They used public funding as an indicator of generosity. Likewise, Pickard (2012) relied on a 'natural experiment' in Britain, finding that an increase in the generosity of formal care services led to a decline in informal care and that this was subsequently reversed following a reversal in generosity. Another study exploited the cross-country variation in government spending on formal residential care in Europe and found a substitution effect for non-residential informal care (Viitanen 2007). Perdrix and Roquebert (2021) used indicators of formal care supply – specifically the (regulated) price of home care services – in a French context. They showed that an increase in formal care is associated with a slight decrease in the probability of using informal care. A recent study using the British Household Panel Survey BHPS (Saloniki et al. 2019) estimated a reduction in the cost of informal care by £0.07 per £1 of social care spending. It used a spatial lag instrument for formal care, although it was limited to a relatively high level of aggregation.

This literature supports the hypothesis that informal and formal care choices are interdependent. However, there is no consensus on the effect's direction and size.

Concepts and hypotheses

We can consider theoretically how utility-maximising individuals might respond to an exogenous change in the generosity of the (formal) publicly funded care system in any locality. We build upon the decision-making model in a household with both care recipients and caregivers, as developed by Stabile et al. (2006).

The household utility is:

$$U(X, L, H(F, I, \sigma)) \tag{1}$$

where X is private consumption of goods and services, L is leisure time, and H is the well-being of the care recipient. The latter, in turn, is a function of the needs' characteristics of the cared-for person, σ, and the hours of both formal, F, and informal, I, care.

The public care system offers an amount of care up to a limit $\bar{F}_s(\sigma, \mu)$, which varies with the needs of the care recipient and the generosity of the system (measured by μ). Families choose an amount of care up to the limit: $0 \leq F_s \leq \bar{F}_s(\sigma, \mu)$. They can also supplement this care with privately paid-for care, F_r, giving total formal care use of $F = F_s + F_r$, where subscripts s and r refer to publicly- and privately-funded care, respectively. Time is allocated to informal caregiving (I), leisure (L) and work, with T being total time (which is always used). The budget constraint is:

$$p_r F_r + p_s F_s + p_x X + wI = B + w(T - L) \quad (2)$$

where p_r is the private market price of formal care, p_s is the subsidised charge for the public system, such that $p_s < p_r$. Non-wage income is denoted by B, and wage income is the hours spent on work, $T - L - I$, at the unit wage w. The 'price' or per unit cost to the household of informal caregiving can be understood as the forgone wage of time lost to the labour market (at a unit wage w). Families are assumed to maximise utility U, subject to this constraint.

We are interested in the effect on both informal care choice I and formal care $F = F_s + F_r$ of changes in two exogenous variables: the generosity of the public system, $\bar{F}_s(\mu)$; and the prices of formal care, p_r and p_s (relative to the 'price' of labour inputs w). These impacts can be determined by comparative statics analysis of the system (1) and (2).

The main points can be illustrated in Figure 1 and Figure 2, which plot indifference curves and budget constraints for the choice between formal and informal care, assuming the same opportunity cost of informal care w. We plot choices for households that are eligible for some publicly funded care. The budget constraint line is kinked at the limit of the amount of subsidised (formal) care offered by the public system, the effective price for care facing the household being lower up to this point. In this example, we consider formal and informal care as technical substitutes. People's preferences reflect a willingness to trade off between the two forms of care, i.e. indifference curves are less curved. If these forms of care are technical complements – so that people have highly curved or rectilinear indifference curves, then exogenous price changes will likely lead to positively correlated responses (although such preferences are unlikely, as discussed below). In what follows, we show that a complementary/positive response is possible even if the forms of care are seen as substitutes.

Figure 1 considers the effect of a change in the public offer. It shows sets of preferences for two household types, A and B. Households of type A have preferences such that they are more indifferent between formal and informal care than household B. As such, A will take publicly funded formal care, paying charges that are subsidised below the private market rate but will not buy further privately funded care while using more informal care. Household A is at the corner solution where the price they face for marginal increases in formal care is the private pay price which is higher than the publicly-subsidised price. By contrast, households of type B will be willing to pay for some privately funded care.

Differences in preferences lead to different responses to an increase in the public offer, which is shown as an outward shift of the budget line from c_1 to c_2. For household A this increase leads to an increase in formal care and a reduction in informal care use – a substitution effect overall (ΔA). As formal care becomes cheaper at the margin – when the (subsidised) public sector provides more – Household A switches more towards formal care. The amount of publicly funded care available increases, so the price for marginal increases in formal care is the (lower) subsidised price which is attractive relative to the price of informal care (where the latter is w – the opportunity cost of less time spent working).

For household B we see a complementary effect overall in this example (ΔB). With greater levels of subsidised care, the average price of formal care reduces, freeing up a budget that can be used to 'buy' more informal care (i.e. forgo more working time and wage income) – an income effect. Because these people are already buying private formal care, the *marginal* price they face for formal care relative to informal care remains the same even though the average expenditure on formal care is reduced. Therefore, there is no price substitution effect.

This example demonstrates that a qualitative difference in response to an increase in the public offer depends on the degree of substitutability/complementarity between the formal and informal care embodied in preferences. Suppose formal and informal care for a particular household is closer to being complements than substitutes, i.e. the indifference curves having greater curvature. In that case, the increase in the system's generosity leads to a greater positive response – due to a greater income effect and a smaller price substitution effect.

Figure 2 is an example of the second type of exogenous impact – a change in the price of formal care. In this example, comparing the starting point, the budget line c_1, a reduction in the price of formal care gives a new budget constraint of c_2 (these prices relative to a given 'price' of labour, w)[1]. The price change induces both a negative price substitution effect and a positive income effect, where the former is stronger. Even in the case of household B above, this exogenous change in price leads to a negative relationship between formal and informal care (ΔB). We use the example of household B which regards formal and informal care as being complements. Nonetheless, where preferences are for even greater complementarity between care forms, income effects could dominate price substitution effects to lead to an overall positive relationship. We discuss the plausibility of such preferences below.

Net effects

The above analysis gives us insight into the various circumstances in which an exogenous change in formal LTC results in either an overall negative or positive effect on informal LTC. First, whether these forms of care are technical complements or substitutes. Second, if care is seen as a substitute, whether people are eligible for any public support. Finally, contingent on the first two conditions, whether the (eligible) person is topping up the public offer of care with any other self-paid care. Table 1 summarises these conditions and the corresponding hypothesised effects.

On the first condition, we suggest that formal and informal care are unlikely to be technical complements. In particular, formal services in most LTC systems are designed to help relieve the burden of informal care or provide care to people without access to potential informal caregivers. However, as noted earlier, in the case of a very substantial physical and emotional need (e.g. with particularly frail individuals), the specific tasks which would constitute the two forms of care – formal and informal – may lead to a situation when they are more likely to be complements (Lambotte et al. 2018; Litwin and Attias-Donfut 2009). In this case, the different forms of care bifurcate into focusing on different tasks, such as between more practical and more personal care. As such, we hypothesise that substitution preferences are more likely to be in the complementary direction for frail people. It is, nonetheless, difficult to see how the benefits of one form of care depend on the use of the other. Even where they do focus on different tasks. For example, it is difficult to argue that the value of *personal* care is strongly dependent on the use of *practical* care and vice versa.

The second and third conditions relate to the institutional settings of LTC systems. In the English LTC system, as with other means-tested systems, people only qualify for publicly-funded support if they pass financial means and needs-severity tests. If they pass this financial test, they can rely only on publicly funded care or public support topped up with self-paid care. Self-paid care is the only option for those who do not pass the test. There are no definitive sources, but the authors' (unpublished) simulations suggest that around a third of community-

[1] Areas with lower prices may also have lower wages in which case the price of informal care is also lower

based social care in England is self-funded (with a higher proportion in the care home/nursing home setting). For those who use publicly provided and self-funded (top-up) care, a positive effect of an increase in formal care on the use of informal care is possible. But we would hypothesise a negative response when people rely exclusively on publicly provided or self-funded care.

Overall, in theory, we cannot rule out a positive response. However, given the likely combinations of conditions, a negative response is more plausible following an increase in the generosity of publicly provided formal care or a reduction in formal care prices. Given the considerations above, we also expect to find an indication of a negative effect for self-payers. However, we are less clear about the direction of the effect for people with very high needs. In the latter case, a negative response is again expected if we focus only on formal personal care. Likewise, we cannot, *a priori*, predict the relative size of the effect across population groups (e.g. between self-payers and publicly-supported people). Mainly because their different circumstances might mean they differ in the size of the marginal rate of substitution in their preferences and also their opportunity cost (w) of informal care.

Empirical methodology

Aims and approach

We aim to estimate the impact of (exogenous) changes in formal LTC use on informal LTC use and determine whether this relationship is mediated/differentiated between population groups. We are particularly interested in groups that vary according to the likelihood of being financially eligible for support from the public system and between groups differentiated by their level of frailty.

In the empirical analysis, we estimate the impact of exogenous changes in formal care using spatial lags of formal care use, that is, the mean uptake of formal care of geographically proximate individuals. Specifically, we calculate the proportion of respondents living in the local (administrative) area, other than the index individual, using formal care and employ that as an instrument. Spatially common factors in this geography include the generosity of the public system and local market characteristics (e.g. local care prices) but not the need-related characteristics of individuals. Instrumenting an individual use of formal care in this way helps mitigate any issues of unobserved needs or simultaneity effects. Since both informal and formal care positively correlate with needs, a positive endogeneity bias can arise if the needs are unobserved. People with unobserved high needs are more likely to use both forms of care than those with unobserved low needs. A simultaneity bias can arise if formal care use partly depends on people's choice about informal care. People that are (randomly) high users of informal care may have a lower propensity of using (public) formal care (because the public care assessment system assumes these forms of care to be substitutes). This would bias formal care's apparent (causal) effect in the negative (substitutes) direction.

Specification

The empirical model we use to estimate the effect of formal care on informal care takes the following form:

$$IC_i = \begin{cases} 1 \; if \; IC_i^* > 0, \\ 0 \; otherwise \end{cases} \quad (1)$$

$$IC_i^* = \beta X_i + \gamma FC_i + \varepsilon_i \quad (2)$$

where IC_{it} is the probability of getting informal care - IC_i^* , FC_{it} is the use of formal care, and X_{it} is a vector of controls.

Data

The sample is drawn from the first eight waves of the English Longitudinal Study of Aging (ELSA), which interviews individuals aged 50 and over every two years. Initially sampled from the pool of respondents to the Health Survey of England (1998, 1999, 2001), it covers the period from 2002 to 2017. It collects a vast amount of information on individual and family circumstances and the quality of life of older people. It explores the dynamic relationships between health and functioning, social networks and participation, and the economic position of people starting from the pre-retirement period onward.

Variables

The dependent variable for the basic model is constructed based on the responses to the questions on whether the person receives help from different sources due to difficulties with activities of daily living. The relevant questions differ between waves 1-2, 3-5, 6, and onwards. We have followed the categorisation used in the last waves of the ELSA questionnaire to ensure consistency.

The *dependent variable* is an indicator variable for the use of informal care provided by either of the following people: husband/wife/partner; parent; son (-in-law); daughter (-in-law); sister; brother; grandchild/ grandson/granddaughter; other relative; friend; neighbour.

The *variable of interest* is the indicator variable for the use of formal care provided by one or more of the following forms of carers:

- [Wave 6 onwards] home care worker; member of staff at care/nursing home; member of reablement team; other formal help; cleaner; council's handyman; warden/sheltered housing; voluntary helper;
- [Wave 3-5] local authority/ social services helper, e.g. home care worker; nurse, e.g. health visitor or district nurse; member of staff at the care/nursing home;
- [Wave 1-2] social services arranged care; nurse; other health or social services.

Control factors include variables describing an individual's functional limitations, health conditions, and socioeconomic situation. We define functional limitations as a set of three variables operationalised as a number of limitations with (i) activities of daily living (ADLs), e.g. dressing, washing, transfer; (ii) instrumental activities of daily living (iADLs), e.g. shopping, meal preparation; and (iii) mobility, e.g. walking 100 yards. These variables enter the specification as quadratic functions. Health is measured as a self-assessed health status and variables describing serious health conditions. The latter is operationalised in two ways. The first (used for a more parsimonious specification) is a count of specific health conditions, such as high blood pressure, diabetes, cancer, lung disease, heart-related problems, stroke, psychiatric disorders, and arthritis, that an individual has. And a more extended specification contains indicator variables for each mentioned health condition. A set of socioeconomic controls includes a quadratic function of age, dummy variables for being female (for specifications on the whole sample only), being married, non-white, having no qualifications or college or above qualification, and being a homeowner, household size, logarithm of the real per capita

household income, number of children and an indicator on whether the first child is female, regional and time dummies.

Estimation approach

We start with the basic estimation of the probit model by maximum likelihood. However, this approach is prone to generate a biased estimate of the effect of formal care on informal care for several reasons. First, both formal and informal care represent a solution to an individual or household utility maximisation problem, where the decision to use a particular form of care is taken either simultaneously or sequentially, depending on the institutional context. Second, despite relying on an extensive set of controls, there may remain an omitted variable reflecting unobserved care needs, affecting both formal and informal care. While the direction of the bias would not be clear in the first case, in the second case, it is quite obvious that we are facing an upward bias in the estimate of interest. E.g. when the memory-related disease is developing but not yet diagnosed, the survey would not have any information about this. Still, such a person may require more formal and informal care.

We rely on an instrumental variable approach (*IV*) with pooled data controlling for the time effects and then extend it to account for individual unobserved heterogeneity (*XT-IV*). As the instrument has to be correlated with formal care but to have no direct impact on informal care, we explore two candidates. One is the 'spatial lag' instrument ($\overline{FC}_{j\neq i\in L_j}$) for formal care (Forder et al., 2018): for each person $_i$ in the dataset, it represents the average formal care used by the respondents in the local authority where the person lives (L_i), excluding person $_i$'s use of formal care (i.e. $\overline{FC}_{j\neq i\in L_j} = \sum_{j\neq i} FC_{j\in L_i}/(n_{L_i} - 1)$. Theoretically, this instrument may be valid for two reasons. The use of formal care by other people in the same region shall be correlated with a person $_i$'s use of these services due to common local authority policy factors in that market. Yet, there seems to be no reason to believe that this variable can affect the receipt of informal care other than through own formal care use. The second candidate is the concentration index for the care markets (Forder and Allan 2014). The rationale behind this instrument is that more concentrated care markets will have higher prices of formal care packages, leading to the supply effect on the use of formal care while having no direct effect on informal care. The IV estimations are performed via ***eprobit*** and ***xteprobit*** functions in Stata 16 (StataCorp 2019). The standard errors are clustered at an individual level for the pooled probit regressions.

Results

Descriptive statistics

The sample of age-eligible ELSA respondents for which the information on all necessary variables is available includes 68,311 person-years across all the survey waves. Table 2 presents summary statistics for the entire sample and by the formal care status. Among the whole sample (Column (3)), about 5% of the respondents are users of formal care, while 20% use informal care. The average age of the respondents is 67 years; 60% are married; live in households of 1.9 individuals on average. 15% of the sample have college qualifications or above, and 31% have no formal qualifications. Only 3% of the sample is non-white. Respondents who self-report poor or worse health constitute 27%, with the average number of serious health conditions at 1.4. On average, there are 0.39 ADLs, 0.43 iADLs, and about two mobility limitations. 93% of the respondents are homeowners with a per capita household income of £15.5K annually. The average number of children is 3.5, with 41% of the sample having a first child being a female.

A comparison between the respondents with (Column (2)) and without (Column (1)) use of formal care shows significant differences along several dimensions. Informal care use is almost four times more prevalent among formal care users. Formal care users are, on average older by 12 years than non-users, less likely to be married, less likely to have a college education and more likely to have no formal qualifications. They live in smaller households, have fewer children, have a lower likelihood of having a daughter as the eldest child, and have lower household income per capita. In general, they have poorer health outcomes – twice more likely to report poor subjective health and have one more serious health condition, more than one additional ADL, two additional iADLs, and four additional mobility limitations. Interestingly, the likelihood of home ownership is the same regardless of the use of formal care.

Probit results

Table 3 presents the estimated coefficients and standard errors from the Probit regression for age-eligible ELSA respondents. The results are for the whole sample, controlling for gender and separately for men and women. Odd columns have a more parsimonious specification where the health status is described by two variables – self-reported subjective health and the number of serious health conditions reported to be diagnosed by a doctor. Even columns correspond to the specification where the health conditions enter the model as a set of indicator variables for each condition. Summary statistics for these variables are reported in Appendix Table A2).

As expected, the results show that married individuals, those with no formal educational qualification, living in larger households, having more children and the first child being female are more likely to use informal care, controlling for their health and functional limitations. Poor health and a greater number of serious health conditions increase the use of informal care. Likewise, a greater number of ADLs, iADLs, and mobility limitation increases informal care use, but at a decreasing rate. There is no statistically significant effect of being non-white or a homeowner on using informal care. The effect of household income is also insignificant.

Most effects are not different when estimated separately for men and women, apart from the effect of having one additional ADL – it is three times larger for men compared to women. Other than that, the effects of the variables describing care needs are similar across men and women. Similarly, the effect of interest – an indicator variable for the receipt of formal care – is not statistically significant but differs in the sign for men compared to women. This highlights the importance of the analysis separately by gender. However, as discussed earlier, we expect an upward bias in the estimated coefficients for formal care. Hence, the positive coefficient for males and the insignificant coefficient for females may be a sign of such bias rather than a genuine lack of effect or complementarity between the two forms of care.

IV results

Table 4 provides key results from the instrumental variable estimation for all age-eligible (50+) respondents of ELSA and samples restricted by age or gender. Column (1) shows that the onset of formal care leads to a 20% drop in the likelihood of receiving informal care (marginal effect of -0.2). The effect is statistically significant at a 1% level of significance. First-stage results suggest that the spatial lag of formal care receipt is a relatively strong instrument for this model and this sample. Although Stata ***eprobit*** command does not report the necessary first-stage statistics for the case of one instrument, the squared Z-score corresponding to the estimated coefficient of the effect of the spatial lag of formal care on the respondent's receipt of formal care can be compared to the Stock and Yogo's critical values, because with one instrument, i.e. one degree of freedom, the Chi-2 distribution is equivalent to the F-

distribution[2]. In this case, it is greater than that corresponding to the 15% maximal IV size. The instrument's strength is preserved for the sample restricted to those 65 years old and older, and it deteriorates as we impose further restrictions on age. For those 75 years old and older, the 1st stage statistics is between the 20% and 15% maximal IV size critical value. When comparing the estimates between men and women, one of the conclusions is that the effects are smaller for men in absolute value. As before, the instrument's strength deteriorated as the analysis moved to smaller samples. However, what is interesting is that regardless of the specification, the effect size is not reduced to less than 13% and is not larger than 21%.

As discussed in the methodology, we also explored care home market concentration indices as potential instruments (Forder and Allan 2014). However, in this case, the first-stage results showed them to be weak instruments, perhaps reflecting the limited effects of this measure of competition on prices that individuals face where our definition of formal LTC includes care in people's homes and institutions.

Sub-group effects and sensitivity checks

Table 5 presents five variations on the preferred specification for the three samples based on age groups, without being split by gender to ensure sufficient sample sizes. Column (1) repeats the preferred specification for the corresponding age group from Table 4.

In column (2), we restricted the sample only to those financially eligible for publicly-funded social care, where we expect also to observe a negative response. The results are consistent with this hypothesis. Column (3) provides the results for the sample restricted only to those who can be considered non-frail – based on the most commonly used threshold of 0.25 (Gordon et al. 2021) of the Rockwood frailty index (Searler et al. 2008) constructed following most recent applications to the ELSA data (Rogers et al. 2017, Nikolova et al. 2022). In the theoretical considerations above, we could not clearly hypothesise a direction of effect for the highest need group, i.e. the frailest. The table shows very little difference from the baseline results (column 1), concluding that there is little difference between groups depending on the frailty index.

To test the nature of the substitution effect based on the nature of the performed tasks, in columns (4) and (5), we narrowed down the definition of formal care to only home care, which was only feasible for later waves of the survey and led to a smaller sample size. In this case, we find a negative response which is larger in magnitude than the base case. This result is consistent with greater technical substitutability between informal and formal care when used for the same or similar tasks. However, we must be cautious with this finding since the instrument is weaker in this sub-sample.

Finally, we allowed for individual heterogeneity in column (6). This leads to smaller estimated effect sizes (in magnitude, i.e. closer to zero), suggesting that individual time-invariant characteristics, such as preferences, may lead to a greater preference for one form of care but not the other.

Discussion

Overall, the results are consistent with the main hypothesis of a negative effect of formal LTC use on informal LTC use. We also find that the marginal effect estimates are larger for women

[2] https://www.stata.com/support/faqs/statistics/chi-squared-and-f-distributions/

than men. Regarding the distinction between frail and non-frail people, we found no meaningful difference in the marginal effect estimates. Yet, when we restricted the measure of care to home care only, we obtained larger negative estimates of the effects. Hence, this is consistent with the size of the negative effect being dependent on how we specify formal care in terms of included tasks. So, we can infer that the economic case for formal care would differ depending on what kind of tasks would be eligible for provision via formal care.

This analysis can help inform policy decisions about the funding of formal LTC. The results suggest that additional use of formal care will reduce informal care use and, therefore, societal expenditure on informal care, and so (partly) offset the societal cost of the additional formal care.

There will also be implications for the (quality-of-life) outcome consequences of these decisions. In particular, an increase in formal care use will have (a) a direct effect on the cared-for person's CRQoL (Forder et al., 2018) and (b) an indirect effect by impacting choices about informal care, which in turn, affects both the cared-for person and the carer's CRQoL.[3] In exploring this relationship, we need to know how (exogenous) changes in formal care use will change informal care use; and how changes in informal care impact CRQoL. This paper has provided estimates for the first element.

We can use the (point) estimates to gain insight into the size of the offsetting effects both in terms of time and money. In terms of time, extending to someone an average formal care package of 7 hours per week would offset 2 hours of informal care per week (based on the preferred estimate of the substitution effect of -0.2 above and the average weekly hours of informal care provision of 10 (Kelly and Kenny, 2018; Department for Work and Pensions, 2018; Office for National Statistics, 2016)). Hence, one extra hour of formal care would offset 17 minutes of informal care (-0.2*10/7). With the largest estimated effect of -0.472, the offsetting effect is 40 minutes; with the smallest estimate of -0.124, it is 10 minutes.

Table 6 offers the range of offsetting effects depending on the estimate (from the preferred specification, the largest and the smallest) for the sample of 75+ year-old respondents and various combinations of the unit costs of formal care and opportunity cost of informal care. We follow a similar methodology as in Saloniki et al. (2019), assuming 10 hours of informal care provision per week and an average of 7 hours per week of home care provision (Curtis and Burns 2018). So, the cells in the table represent the ratio of the total opportunity cost of informal care, which is being offset by providing formal LTC to someone who did not receive it before (the estimate times 10 hours times the opportunity cost of one hour of informal care) to the total cost of the provision of an average LTC package by the formal organisation. So, considering the case for the first cell, when the unit cost of formal care is £15 (the lowest estimate for the total cost of hiring a personal assistant) and the opportunity cost of informal care is measured at the minimum wage. In that case, the formal LTC spending will increase by £105 (7*£15). So, spending £105 extra on formal care leads to a £19 savings in terms of informal long-term care (£9.5*10*0.2), which corresponds to an 18 pence savings in terms of informal care for each pound of spending on formal care (£19/£105). This is considerably larger than a 3 pence savings estimated by Saloniki et al. (2019) for a comparable group of individuals aged 75 and older from the British Household Panel Survey (BHPS). The last column in the table corresponds to the situations when informal care is valued at the same level as formal care,

[3] There are likely further impacts, such as a potential reduction in acute health care needs (Forder, 2009) or primary care needs (Forder et al, 2019).

with the offsetting effects being essentially driven by the size of the estimate (larger estimate leading to larger offsetting effects) and the relative intensity of the weekly care provided formally (7 hours per week) versus informally (10 hours per week). Otherwise, for each specific estimated effect, the offsetting effects vary from the lowest (6 to 9 pence per £1 spent) when formal care is valued at £30 per hour and informal care at the minimum wage to the highest (18 to 67 pence per £1) when informal care is valued at a replacement cost level.

There are some limitations to our analysis. First, while the instrumental variable approach helps obtain estimates of causal effects, in the case of one instrument, there is no way of testing the exogeneity of the instrument, and we have to rely solely on theoretical considerations. Second, in using a spatial lag IV, there may be underlying drivers of (unobserved) need that are common for individuals in a locality (similar to Stabile et al. 2006). We maintain that variation in need between individuals is much greater than any variation in common unobserved needs between areas, mitigating this concern. We also control for a range of observed need factors, and it seems unlikely that any local common effect in unobserved needs would differ from any common effect in observed needs. Nonetheless, we are mindful of this potential bias noting that it would be in the positive direction (i.e. more likely to suggest the relationship is positive – that formal and informal care are complements – than is the case).

Conclusion

This paper contributes to building the economic case for formal LTC by producing additional evidence of a substitution effect between formal and informal care (Saloniki et al. 2019; Pickard 2012; Viitanen 2007; Stabile et al. 2006; Ettner 1994). Based on the preferred estimate of -0.2, we find that one hour of additional formal care saves 17 minutes in terms of informal care. Or, in monetary terms, one extra pound spent on formal care leads to a saving of 29 pence in terms of informal care when it is valued at a replacement cost (i.e. at the unit cost of formal care). With a larger estimate of -0.472, the offsetting effects reach up to 40 minutes per hour of additional formal care or up to 67 pence per extra pound spent on it. A fuller economic evaluation would require us also to consider the health and well-being consequences for care recipients and caregivers and other beneficial effects of long-term care (such as impacting/reducing health care spend). As estimates of the size of the substitution are required for such an analysis, the results in this paper also underpin the need for further research on the consequences.

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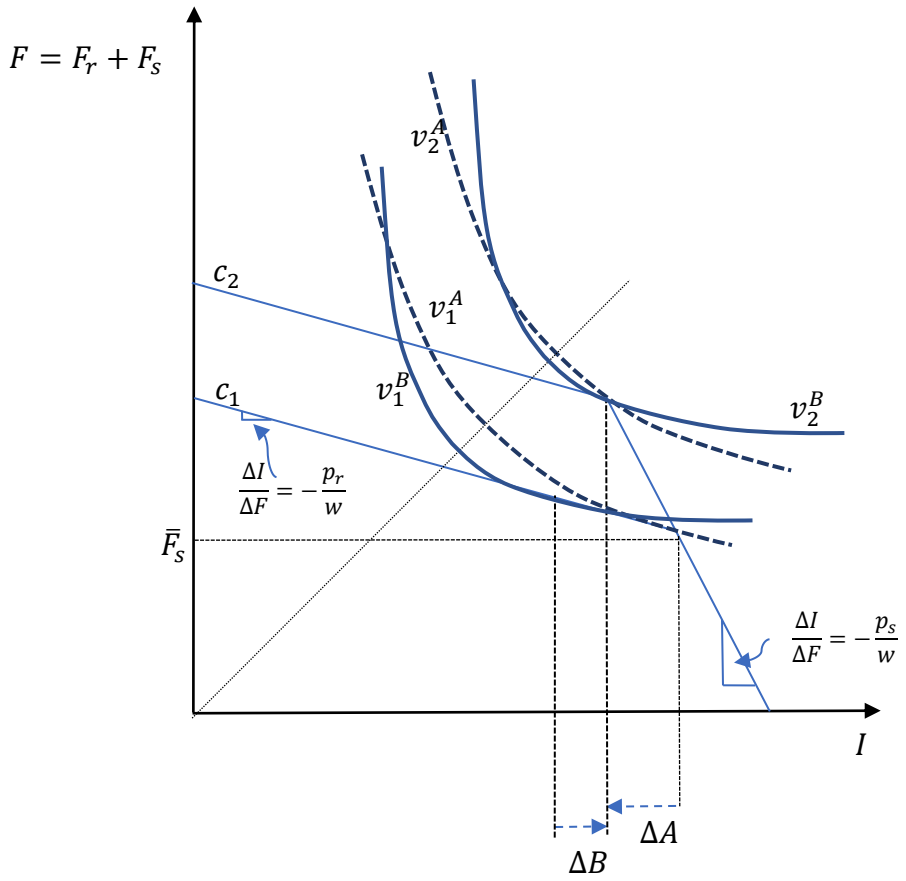

Figure 1. The effects of a change in the (public) care system offer depending on the degree of substitutability between the two forms of care.

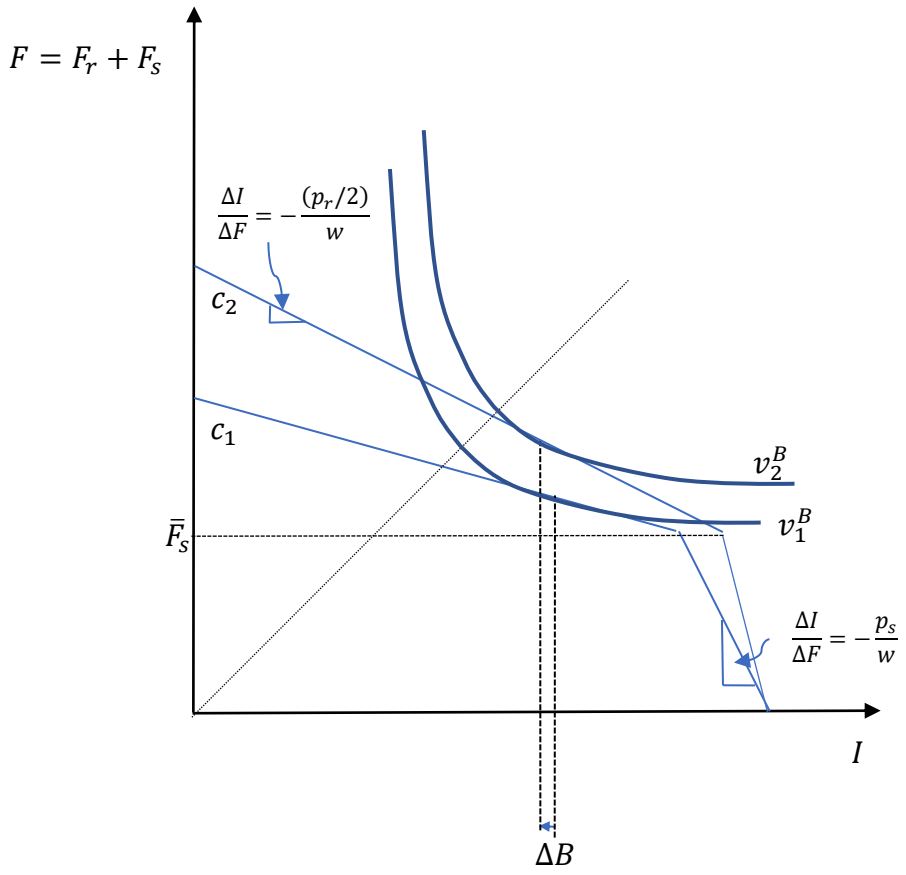

Figure 2. Effects of a change in local prices

Table 1: Theoretical effects of formal care on informal care based on underlying conditions

Type of preference: Substitutes	Public support	Top-up self-pay	Hypothesis: change in generosity	Hypothesis: change in formal care prices
No			Positive response likely	Either possible
Yes	Yes i.e. $\bar{F}_s > 0$	Yes, i.e. $F_s > 0$ and $F_r > 0$	Possible positive response	Negative response
Yes	No i.e. $\bar{F}_s = 0$	(Yes)	NA	Negative response
No	Yes i.e. $\bar{F}_s > 0$	No, i.e. $F_s > 0$ but $F_r = 0$	Negative response	Negative, but small positive response possible

Table 2: Summary statistics for the sample of ELSA-eligible respondents by formal care (FC) receipt

	50+		
	FC=0 (1)	FC=1 (2)	Whole sample (3)
N of observations	65,194 95.44%	3,117 4.56%	68,311
IC = 1	0.17**	0.64**	0.20
Spatial FC lag	0.04** [0.03]	0.05** [0.03]	0.04 [0.03]
Age	66.81** [9.66]	78.68** [11.46]	67.35 [10.06]
If married	0.61**	0.26**	0.59
If non-white	0.03	0.03	0.03
If college or above	0.15**	0.11**	0.15
If no qualification	0.31**	0.41**	0.31
Household size	1.94** [0.64]	1.42** [0.58]	1.91 [0.64]
Poor health	0.26**	0.58**	0.27
N of serious health conditions	1.35** [1.19]	2.44** [1.35]	1.40 [1.22]
N ADLs	0.32** [0.88]	1.84** [1.89]	0.39 [1.00]
N iADLs	0.34** [0.91]	2.37** [1.94]	0.43 [1.07]
N mobility limitations	1.83** [2.45]	5.84** [2.57]	2.02 [2.60]
If homeowner	0.93	0.93	0.93
Real per Capita HH Income ('000 £)	15.59** [14.57]	14.01** [11.20]	15.52 [14.44]
The first child is female	0.41**	0.39**	0.41
N of children	3.48** [1.72]	3.30** [1.90]	3.47 [1.73]

Notes: ** p<0.01, * p<0.05, $^{+}$ p<0.1. Statistical significance refers to the difference between the mean characteristics of sub-samples of respondents with and without diabetes.

Table 3: Probit model estimates for informal care receipt (Sample 50+)

	Whole sample		Males		Females	
	(1)	(2)	(3)	(4)	(5)	(6)
Detailed health controls	No	Yes	No	Yes	No	Yes
R received formal care	-0.012	-0.013	0.105	0.102	-0.042	-0.042
	(0.038)	(0.038)	(0.067)	(0.068)	(0.046)	(0.046)
If female	0.212**	0.216**				
	(0.020)	(0.021)				
If married	0.136**	0.133**	0.120**	0.116**	0.136**	0.133**
	(0.023)	(0.023)	(0.038)	(0.039)	(0.029)	(0.029)
If non-white	-0.028	-0.043	0.013	-0.014	-0.041	-0.050
	(0.061)	(0.061)	(0.110)	(0.108)	(0.072)	(0.073)
If college or above	-0.096**	-0.099**	-0.121*	-0.128**	-0.095*	-0.092*
	(0.033)	(0.033)	(0.049)	(0.049)	(0.044)	(0.044)
If no qualification	0.075**	0.075**	0.021	0.019	0.105**	0.105**
	(0.021)	(0.021)	(0.035)	(0.035)	(0.027)	(0.027)
Household size	0.283**	0.283**	0.287**	0.288**	0.280**	0.279**
	(0.019)	(0.019)	(0.030)	(0.030)	(0.024)	(0.024)
If poor health	0.213**	0.216**	0.214**	0.220**	0.218**	0.219**
	(0.020)	(0.020)	(0.032)	(0.032)	(0.025)	(0.025)
Number of Serious Health	0.056**		0.053**		0.062**	
Conditions	(0.008)		(0.014)		(0.011)	
ADL count	0.242**	0.240**	0.414**	0.410**	0.136**	0.136**
	(0.022)	(0.022)	(0.036)	(0.035)	(0.027)	(0.027)
ADL count squared	-0.039**	-0.037**	-0.067**	-0.064**	-0.022**	-0.022**
	(0.005)	(0.005)	(0.008)	(0.008)	(0.006)	(0.006)
iADL count	0.817**	0.821**	0.817**	0.816**	0.825**	0.832**
	(0.019)	(0.019)	(0.032)	(0.032)	(0.024)	(0.024)
iADL count squared	-0.089**	-0.094**	-0.088**	-0.093**	-0.091**	-0.096**
	(0.003)	(0.004)	(0.005)	(0.005)	(0.005)	(0.005)
Count of mobility	0.496**	0.499**	0.445**	0.445**	0.519**	0.524**
limitations	(0.010)	(0.010)	(0.017)	(0.017)	(0.013)	(0.013)
Count of mobility	-0.038**	-0.038**	-0.034**	-0.034**	-0.039**	-0.039**
limitations squared	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)
If homeowner	0.004	0.005	0.027	0.032	-0.006	-0.007
	(0.035)	(0.035)	(0.066)	(0.065)	(0.042)	(0.042)
Log of household	-0.014	-0.014	0.017	0.018	-0.033+	-0.033+
income per capita	(0.015)	(0.015)	(0.026)	(0.026)	(0.018)	(0.018)
The first child is female	0.074**	0.075**	0.092**	0.094**	0.063**	0.066**
	(0.019)	(0.019)	(0.031)	(0.031)	(0.024)	(0.024)
N of children	0.046**	0.046**	0.029**	0.029**	0.054**	0.054**
	(0.006)	(0.006)	(0.009)	(0.009)	(0.007)	(0.007)
Observations	68,311	68,311	30,059	30,059	38,252	38,252
Pseudo R2	0.488	0.489	0.514	0.515	0.468	0.469

Notes: ** p<0.01, * p<0.05, + p<0.1. Robust clustered standard errors are in parentheses. Additional controls include age, age squared, regional and time dummies for all of the models, and the vector of detailed serious health conditions instead of the total count in even columns (see Appendix Table A2 for summary statistics).

Table 4: Extended probit model estimates for informal care receipt based on the preferred specification.

	Whole sample			Males			Females		
	50+	65+	75+	50+	65+	75+	50+	65+	75+
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
N of observations	68311	38091	15392	30059	16956	6539	38252	21135	8853
Formal care:	-0.200**	-0.187**	-0.200**	-0.129**	-0.142**	-0.166**	-0.206**	-0.175**	-0.172**
marginal effect	(0.014)	(0.016)	(0.025)	(0.023)	(0.028)	(0.045)	(0.018)	(0.021)	(0.033)
Formal care:	-0.785**	-0.729**	-0.718**	-0.588**	-0.609**	-0.633**	-0.789**	-0.678**	-0.628**
probit coefficient	(0.063)	(0.071)	(0.096)	(0.122)	(0.142)	(0.195)	(0.076)	(0.088)	(0.126)
Chi2	17025.3	9890	5009.58	7047.79	4610.03	2140.85	10233.91	6205.61	2858.14
p-value	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
IV: Spatial lag formal care	1.859**	1.387**	1.501**	1.767*	1.438*	1.087	1.950**	1.417**	1.743*
	(0.511)	(0.348)	(0.557)	(0.856)	(0.605)	(0.945)	(0.639)	(0.431)	(0.692)
1st Stage Z-sq	13.25	15.84	7.24	4.28	5.66	1.32	9.30	10.82	6.35
Test for endogeneity	0.438**	0.399**	0.395**	0.376**	0.369**	0.366**	0.430**	0.364**	0.344**
Corr(e.rcarefrm,e.rcareinf)	(0.029)	(0.034)	(0.049)	(0.052)	(0.061)	(0.090)	(0.036)	(0.044)	(0.068)

Note: ** p<0.01, * p<0.05, $^{+}$ p<0.1. Robust clustered standard errors are in parentheses. Stock-Yogo weak ID test critical values: 10% maximal IV size (16.38), 15% maximal IV size (8.96), 20% maximal IV size (6.66), 25% maximal IV size (5.53). The preferred specification is as in Table 3, odd columns. The substitution of the count of serious health conditions with a detailed vector of indicators for these conditions has not had any discernible effect on the estimates of interest.

Table 5: Various sensitivity checks for preferred specification (whole sample) for different age groups.

	Preferred specification (1)	If eligible for social care (2)	If non-frail (NF) (3)	FC= only home care (HC) (4)	NF & HC (5)	XT-IV (6)
Panel A (50+): N obs.	68311	38327	55194	40281	32534	68311
Formal care: marginal effect	-0.200**	-0.203**	-0.217**	-0.407**	-0.469**	-0.086**
	(0.014)	(0.016)	(0.042)	(0.056)	(0.099)	(0.006)
Formal care: probit coefficient	-0.785**	-0.803**	-0.747**	-1.365**	-1.345**	-0.778**
	(0.063)	(0.080)	(0.102)	(0.126)	(0 .316)	(0.064)
IV: Spatial lag care	1.859**	2.006**	2.256**	1.981	0.603	1.924**
	(0.511)	(0.641)	(0.772)	(1.352)	(2.917)	(0.511)
1st Stage Z-sq	13.25	9.80	8.53	2.16	0.04	14.14
Test for endogeneity	0.438**	0.400**	0.511**	0.549**	0.642**	0.432**
	(0.029)	(0.036)	(0.044)	(0.052)	(0.118)	(0.029)
Panel B (65+): N obs.	38091	21704	28799	24187	18497	38091
Formal care: marginal effect	-0.187**	-0.183**	-0.154**	-0.448**	-0.573**	-0.100**
	(0.016)	(0.030)	(0.040)	(0.059)	(0.088)	(0.008)
Formal care: probit coefficient	-0.729**	-0.719**	-0.588**	-1.435**	-2.147**	-0.726**
	(0.071)	(0.080)	(0.116)	(0.138)	(0.093)	(0.072)
IV: Spatial lag	1.387**	1.239**	1.954**	2.082*	-0.672	1.419**
	(0.348)	(0.429)	(0.547)	(0.877)	(1.784)	(0.348)
1st Stage Z-sq	15.84	8.35	12.74	5.62	0.14	16.65
Test for endogeneity	0.399**	0.342**	0.413**	0.592**	--	0.395**
	(0.034)	(0.043)	(0.051)	(0.059)		(0.034)
Panel C (75+): N obs.	15392	9627	10148	9785	6562	15392
Formal care: marginal effect	-0.200**	-0.187**	-0.148**	-0.472**	-0.423**	-0.124**
	(0.025)	(0.039)	(0.050)	(0.060)	(0.139)	(0.016)
Formal care: probit coefficient	-0.718**	-0.689**	-0.534**	-1.494**	-1.254**	-0.675**
	(0.096)	(0.122)	(0.150)	(0.138)	(0.374)	(0.099)
IV: Spatial lag	1.501**	1.593**	1.654^{+}	1.403**	0.455	1.653**
	(0.557)	(0.702)	(0.931)	(0.551)	(1.419)	(0.561)
1st Stage Z-sq	7.24	5.15	12.74	6.50	0.10	8.64
Test for endogeneity	0.395**	0.337**	0.376**	0.661**	0.567**	0.370**
	(0.049)	(0.061)	(0.067)	(0.084)	(0.157)	(0.051)

Note: ** p<0.01, * p<0.05, $^{+}$ p<0.1. Robust clustered standard errors are in parentheses. Stock-Yogo weak ID test critical values: 10% maximal IV size (16.38), 15% maximal IV size (8.96), 20% maximal IV size (6.66), 25% maximal IV size (5.53). All of the regressions Chi-square is more than several thousand with the p-value less than 1%.

Table 6: Savings estimates in terms of informal care costs per £1 extra spending on formal care for various levels of estimated effect based on the 75+ sample.

		Opportunity cost of IC (per hour, 2022)		
		Min Wage	Median Wage	Replacement
Unit cost of FC (per hour, 2021/22)		£9.50[b]	£14.77[b]	=Unit cost of FC
$\gamma = -0.200$				
	£15[c]	0.18	0.28	0.29
	£23[a]	0.12	0.18	0.29
	£30[c]	0.09	0.14	0.29
$\gamma = -0.472$				
	£15[c]	0.43	0.66	0.67
	£23[a]	0.28	0.66	0.67
	£30[c]	0.21	0.33	0.67
$\gamma = -0.124$				
	£15[c]	0.11	0.17	0.18
	£23[a]	0.07	0.11	0.18
	£30[c]	0.06	0.09	0.18

Note: [a] Unit Costs of Health and Social Care 2022 Manual (https://kar.kent.ac.uk/100519/1/Unit_Costs_of_Health_and_Social_Care_2022%20%287%29.pdf);
[b]https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/bulletins/lowandhighpayuk/2022#:~:text=Low%20pay%20and%20high%20pay&text=For%20example%2C%20median%20hourly%20earnings;
[c]https://ukcareguide.co.uk/home-care-costs/#:~:text=The%20answer%20is%20that%20you,funded%20by%20your%20local%20council

Annex/supplementary material

Table A1: Summary statistics for the sample of ELSA-eligible respondents by FC receipt for 65+ and 75+ samples

	65+			75+		
	FC=0	FC=1	Whole	FC=0	FC=1	Whole
	(1)	(2)	(3)	(4)	(5)	(6)
N of observations	35,399	2,692	38091	13,426	1,966	15392
	92.93%	7.07%		87.23%	12.77%	
IC = 1	0.21**	0.63**	0.24	0.29**	0.64**	0.33
Spatial FC lag	0.07**	0.08**	0.07	0.06**	0.06**	0.06
	[0.04]	[0.04]	[0.04]	[0.03]	[0.03]	[0.03]
Age	73.89**	81.64**	74.44	80.66**	84.99**	81.22
	[6.89]	[9.07]	[7.34]	[5.22]	[7.36]	[5.73]
If married	0.57**	0.25**	0.55	0.48**	0.22**	0.45
If non-white	0.02	0.02	0.02	0.01	0.02	0.01
If college or above	0.12**	0.11**	0.12	0.10	0.10	0.10
If no qualification	0.38**	0.44**	0.38	0.45	0.47	0.45
Household size	1.76**	1.37**	1.74	1.64**	1.32**	1.60
	[0.58]	[0.54]	[0.58]	[0.58]	[0.52]	[0.59]
Poor health	0.29**	0.56**	0.31	0.34**	0.54**	0.37
N of serious health	1.61**	2.47**	1.67	1.81**	2.49**	1.89
conditions	[1.21]	[1.34]	[1.24]	[1.22]	[1.34]	[1.26]
N ADLs	0.38**	1.81**	0.49	0.49**	1.79**	0.66
	[0.92]	[1.85]	[1.08]	[1.02]	[1.82]	[1.24]
N iADLs	0.43**	2.38**	0.56	0.62**	2.48**	0.86
	[1.03]	[1.97]	[1.23]	[1.25]	[2.02]	[1.50]
N functional	2.19**	5.81**	2.45	2.67**	5.81**	3.07
limitations	[2.54]	[2.53]	[2.71]	[2.64]	[2.53]	[2.83]
If homeowner	0.93	0.94	0.93	0.93	0.93	0.93
Real per Capita HH	14.37^{+}	13.92^{+}	14.34	12.56**	13.53**	12.68
Income ('000 £)	[13.60]	[11.11]	[13.43]	[10.33]	[11.26]	[10.46]
The first child is female	0.44**	0.39**	0.44	0.44**	0.39**	0.43
N of children	3.73**	3.37**	3.70	3.66**	3.36**	3.62
	[1.76]	[1.92]	[1.78]	[1.77]	[1.89]	[1.79]

Notes: ** p<0.01, * p<0.05, $^{+}$ p<0.1. Statistical significance refers to the difference between the mean characteristics of sub-samples of respondents with and without diabetes.

Table A2: Summary statistics for the sample of ELSA-eligible respondents by FC receipt

	FC=0 (1)	FC=1 (2)	Whole sample (3)
Sample 50+			
IC = 1	0.41***	0.59***	0.42
If high blood pressure	0.10***	0.19***	0.10
If diabetes	0.08***	0.13***	0.09
If cancer	0.06***	0.13***	0.06
If lung disease	0.18***	0.38***	0.19
If heart condition	0.04***	0.16***	0.05
If stroke	0.09***	0.13***	0.10
If psychiatric problems	0.37***	0.65***	0.38
If arthritis	0.01***	0.07***	0.01
If memory-related disease	0.41***	0.59***	0.42
Sample 65+			
IC = 1	0.48***	0.60***	0.49
If high blood pressure	0.12***	0.19***	0.13
If diabetes	0.11***	0.14***	0.11
If cancer	0.08***	0.13***	0.08
If lung disease	0.24***	0.40***	0.25
If heart condition	0.06***	0.17***	0.07
If stroke	0.07***	0.10***	0.08
If psychiatric problems	0.43***	0.67***	0.45
If arthritis	0.01***	0.08***	0.02
If memory-related disease	0.48***	0.60***	0.49
Sample 75+			
IC = 1	0.53***	0.59***	0.54
If high blood pressure	0.13***	0.19***	0.14
If diabetes	0.12*	0.14*	0.12
If cancer	0.08***	0.12***	0.09
If lung disease	0.30***	0.43***	0.32
If heart condition	0.09***	0.18***	0.10
If stroke	0.05***	0.08***	0.06
If psychiatric problems	0.47***	0.67***	0.50
If arthritis	0.02***	0.09***	0.03
If memory-related disease	0.53***	0.59***	0.54

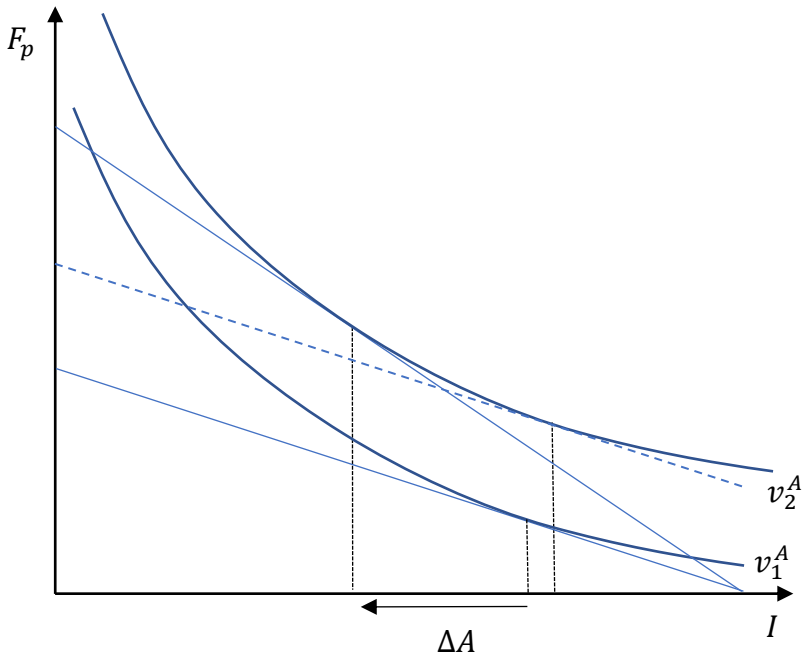

Figure A1. Change in relative prices p and w

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