Long-Term Care and the Housing Market

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Abstract: This paper examines the combined effects of population ageing and changes in long-term care policy on the housing market. Those needing care prefer to receive it at home rather than in institutional settings. Public authorities prefer to provide care in residential settings which are generally lower cost than institutional care. The trend away from institutional provision towards care at home is endorsed by national governments and by the OECD. Nevertheless, as the number requiring care increases, this policy shift will maintain the level of housing demand above what it would otherwise be. It will also have distributional consequences with individuals less likely to reduce their housing equity to pay for institutional care, which in turn will increase the value of their bequests. Empirical analysis using the UK Family Resources Survey and the British Household Panel Survey shows that household formation effects involving those requiring long-term care are relatively weak and unlikely to significantly offset the effects of this policy shift on the housing market and on the distribution of wealth.[1]

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JEL Codes: J12, J14, C21, C73

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I INTRODUCTION

Demographic change is affecting almost all developed countries and many developing countries. Its most evident characteristic is population ageing. Many countries, including the UK, are experiencing a particularly rapid growth in the numbers of "oldest old" – those aged 85 and above. Many of this group are likely to exhibit symptoms of frailty, a likely consequence of which will be increased demand for long-term care. In the UK, the population aged 80+ is expected to increase by 82 per cent between 2011 and 2031, from 2.97 million to 5.42 million (ONS, 2011). The number of disabled older people in households receiving informal care at home is projected to increase by 102%, from approximately 1.75 million in 2005, to over 3.5 million in 2041 (Wittenberg, Pickard *et al.*, 2008).

Long-term care is provided in a variety of accommodation settings. These include long-stay and geriatric hospitals, residential and nursing homes, various forms of sheltered accommodation, and private dwellings. This paper argues that the choice between institutional care and care provided in a private dwelling has a significant effect on the housing market. Increased care provision in private dwellings will, on balance, increase the demand for private housing. We argue that, due to market failure in the market for institutional care, the public sector plays an important role in determining how those requiring care are accommodated. For reasons of cost and welfare, care policy is increasingly promoting care provision at home. The change in emphasis from institutional care to care at home will have a substantial impact both on the housing market itself and on the distribution of personal wealth as the numbers requiring long-term care rises.

There are three possible housing outcomes following the recognition that an individual is in need of care. In some cases care provision at home will not cause any change in housing demand. If a house has at least one resident remaining and the resident requiring care enters institutional care, there will be no net effect on the demand for private housing. There may also be a reduction in demand: if an elderly parent becomes disabled, a child may decide to move in with the parent (or vice versa) to provide care at home. If either the parent or child's house is sold as a result of this interaction, the net effect on housing demand is negative. On the other hand, if a person living alone receives care at home instead of moving to an

institution, the effect is to hold housing demand higher than it would otherwise be. When those living alone enter institutional care, their accommodation becomes available for sale or rent. If the person receiving care (caree) is a home owner and has to pay for institutional care, sale of the house is often required, given that the home is frequently the largest component of wealth. Our argument is that this effect predominates over the tendency for households to amalgamate following the inception of care needs.

House sales precipitated by care needs influence the distribution of bequests. If the person is cared for at home and the house is not rented, the beneficiaries will inherit the full value of the home. If the person is cared for in a residential setting, the beneficiaries receive the value of the home *net* of the costs of care including the accommodation costs which, as we shall see, can be quite considerable. Care at home preserves the client's wealth. Given that care is largely provided during the latter stages of life, care at home is ultimately to the advantage of the beneficiaries of the caree's estate. The decision about where carees are accommodated therefore has distributional implications. If the person is cared for at home, the beneficiaries are likely to be the children of the caree. This benefit will be offset by marginally increased house prices faced by those purchasing houses. If care is provided in residential accommodation, the benefits will take the form of any excess rents earned by the owners of the accommodation. These owners tend to be a mixture of private, charitable and public sector organisations.

This market for care accommodation is characterised by uncertainty and information asymmetry since most potential consumers of care are likely only to be involved in this market during a relatively short period towards the end of their lives. Consistent with poor information flows, long-term care insurance markets have had limited success in providing wide coverage at affordable rates in most countries. Partly due to the failure of the insurance market, many users of long-term care are unable to meet the costs of residential care from their income and non-housing wealth. Governments have generally responded by subsidising long-term care. Sometimes support is provided on a universal basis – Scotland has a policy of "free personal care". The more common approach is to apply a means test to carees, making it free only to those who do not meet some wealth and/or income threshold. Whether universally available, or means tested, the public sector is heavily involved in purchasing long-term care provision on behalf of a significant share of the population with care needs in almost all OECD countries. Thus, the public sector, whether in the form of local, state or

central government, is a major purchaser of long-term care, giving it considerable market power.

Another channel of public sector influence comes through its role as regulator, where it can impose costs on institutional providers through the imposition of health and safety standards, staffing requirements etc. Because similar costs cannot generally be imposed in a domestic setting, increased regulation will tend to widen cost differences between institutional care and care provided in private homes. Netten et al. (2005) highlight the effects of the introduction of the National Minimum Wage and National Care Standards as contributory factors to a substantial increase in care home closures in England between 1998 and 2000.

This paper focuses on the accommodation market for those requiring long-term care. It argues that the implications for the private housing market of decisions concerning the accommodation in which care is delivered have not been recognised in the literature. It suggests that changes in the number of places available in institutional care are susceptible to exogenous government influence, which in turn derives from the power of the public sector both as a monopoly purchaser and as care regulator. This influences the supply of residential or care home places, which in turn affects the demand for private dwellings. If public sector actions restrict the supply of institutional care, the demand for private dwellings will increase. The importance of this issue will increase due to population ageing and the consequent increase in demand for long term care.

The paper is set out as follows: the next section reviews some relevant literature; the empirical section then presents some evidence on the care, household structure and the demand for housing. The final section brings out the implications of these arguments and concludes.

II LITERATURE REVIEW

The economics literature on long-term care has tended to focus on how care needs are met. Unlike health care needs, many long-term care needs can be provided by individuals that do not have professional training – such as family and friends. Attention has focussed on how household structure and family relationships affect care provision and, in turn, how care needs influence living arrangements. The supply of, and demand for, accommodation suitable for the provision of care and consequent effects on the housing market have received little attention.

Much of the economic analysis of provision of unpaid or informal care by family members to those with care needs derives from the economic theory of the family (Becker, 1981). His original focus was on a "unitary" or "common preference" view of care provision, where the members of the family share a common set of preferences. In these models, family assets are shared and the size of individual contributions to the common pool is irrelevant. More recent contributions such as Hiedemann and Stern (1999) and Engers and Stern (2002) have instead developed the analysis of the care decision in a game-theoretic framework. For example, Pezzin, Pollack and Schone (2007) focus on the alternative residential arrangements once a need for care has been determined. These include (1) residential care, (2) paid for care with no care provided by children, and (3) care provided by one, or more, children. The decision is set up as a two-stage game. In the first stage, children decide whether to meet with their siblings to determine care provision for the parent. Based on their evaluation of the potential outcomes including side-payments, children decide whether or not to attend the meeting. If they do attend, they bargain over possible care arrangements. Their bargaining strategy is partly affected by the extent to which their own utility is influenced by that of the parent.

A different literature focuses on parent-child location decisions. Konrad et al (2002), in describing the "geography of the family", argue that children may act strategically to change the costs of providing care to their parents as they grow older. Children may be concerned about whether their parents are receiving adequate care, but would prefer not to provide that care themselves. If there are two or more siblings, there is a public good issue, since each child would prefer to free ride while the other(s) provide the parental care. Rainer and Siedler (2009) confirm that siblings are more mobile than only children. Their empirical support comes from the German Socio-Economic Panel (GSOEP). In common with Konrad et al, they highlight the role of sibling rivalry as a determinant of caregiving.

Informal care from family and friends is a very significant source of care in old age. Such relationships can be one-to-one, many-to-one, one-to-many, and may even be reciprocal. Informal care improves the health and well-being of carees (Cutler, Gruber et al. 2002), and reduces healthcare use and costs (Van Houtven and Norton 2006b). Pickard (2012) shows evidence of substitution between nursing home or hospital care and very intense co-resident intergenerational care for older people. However, provision of informal care is not without cost: carers' health typically suffers as a result of care provision (Schulz, O'Brien *et al.*, 1995, Schulz, Mendelsohn *et al.*, 2003, Schulz, Mendelsohn *et al.*, 2003, Martire, Lustig *et al.*,

2010, Haley, Allen *et al.*, 2002, Haley, 2003, Baumgarten, Lebel *et al.*, 2002, Clyburn, Stones *et al.*, 2000, Pinquart and Sorensen, 2003).

There can be many motivations for providing informal care, from altruism towards family members through to expectations of future financial rewards. Informal care affects intergenerational bequests and inter-vivos transfers (Bernheim, Shleifer *et al.*, Norton and Van Houtven, 2006).

There is also an extensive literature on the funding of care, much of this relating to underlying care issues. Bell and Bowes (forthcoming) examine whether changes in the funding of care in Scotland resulted in changes in the provision of unpaid care. In England, there have been a number of reviews of long-term care funding with the aim of finding a more sustainable policy framework. The most recent major contribution was Fairer Care Funding: Report of the Commission on Funding of Care and Support (2011). One of the key political drivers of these reviews has been dissatisfaction with the effects of the costs of residential care on the housing wealth of carees.

Another strand of literature focuses on the living arrangements of those requiring care. This includes Börsch-Supan (1989); Börsch-Supan, Kotlikoff, and Morris (1991); Ellwood and Kane (1990); Kotlikoff and Morris (1990); Börsch-Supan et al. (1992); Börsch-Supan, McFadden, and Schnabel (1996). In the last of these, the authors investigate the factors that affect the living arrangements of the single elderly aged between 76 and 102 and argue that adverse health indicators for the elderly person is more likely to lead to joint living.

Care needs may directly affect not only the volume, but also the nature, of housing demand. Disabled people may require a different set of services from their accommodation. These are often described as "aids and adaptations" and include items such as stair lifts, handrails and specially adapted bathrooms. If these demands are unanticipated, those requiring care may choose to adapt their existing dwelling or to move to a more suitable dwelling. Heywood (2004) argues that housing adaptations have beneficial and/or preventative effects on both the physical and mental health of disabled people and their carers. However, Harrison (2004) challenges assumptions about the importance of physical housing quality, and suggests caution about the benefits of raising physical standards.

The literature that specifically addresses the interaction of care provision with the housing market is relatively sparse. Nevertheless, the literature on care interactions within the

household usefully exposes the issues relevant to the effects of care needs on household structure. Clearly, these are complex, dynamic and are most probably best addressed in a game theoretic framework. Given their complexity, and the structure of the datasets available to us, we can only take a reduced form approach to these issues.

III EMPIRICS

In this section, we consider some of the empirical aspects of the mobility and accommodation of older disabled people, focusing on the way in which this affects their housing circumstances. We use employ a simple theoretical model to encapsulate these ideas.

The demand for long-term care accommodation (D_{LTC}) is a function of the size of the population (P), its age-distribution (A), household living arrangements (L) and the health status of different age groups (S_A). Thus we have:

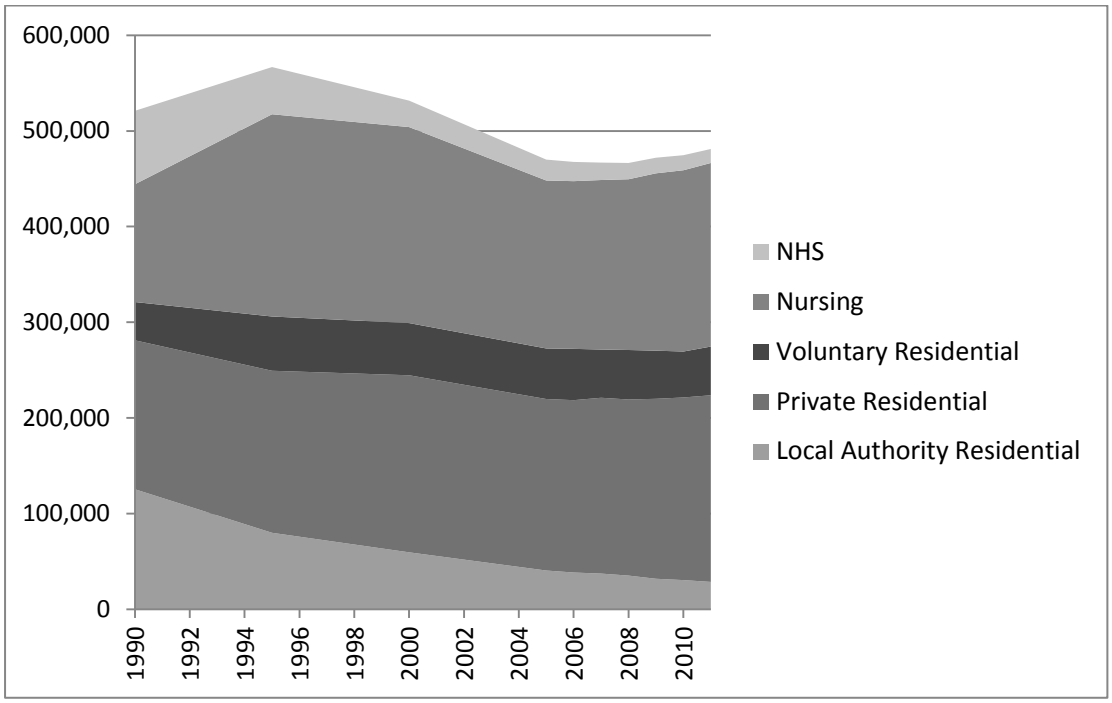
$$D_{LTC} = f(P, A, L, S_A) \tag{1}$$

The demand can be accommodated in private dwellings (PD) or in institutional accommodation (IA). We also assume that institutional care and private dwellings are perfect substitutes. In practice, for those with extremely high care needs, institutional care is generally the preferred option. A more complex model, allowing for imperfect substitutability would nevertheless yield similar results. We have:

$$D_{LTC} = PD + IA \tag{2}$$

We argue that the public sector has monopoly power over the price of residential care. Ceteris paribus, one might have expected that the increase in demand for long-term care associated with demographic change would have led to an expansion of institutional care. Yet in the UK, the volume of accommodation in institutional care fell between 1990 and 2011 (see Figure 1). The main decline occurred between 1995 and 2005, a period when public sector purchasers took greater control over the prices paid to residential and nursing homes, partly through the use of bulk purchases from private sector providers. In 2005, around 250,000 places were paid for by local authorities in England alone, a significant proportion of the total places available and thus an indicator of their market power.

Figure 1: Care Home Places in the UK 1990-2011



SOURCE Laing & Buisson Care of elderly people market survey (2011)

The decline in care home places coincided with a decline in provision by local authorities and increasing dependence on private and voluntary sector providers. This was motivated by a period of fiscal austerity during which local authorities substituted expensive in-house provision for more cost-effective private or voluntary sector care. In these circumstances a simple linear model of the supply of institutional (residential and nursing home) places is:

$$IA = a_1 + a_2 \bar{p}_{IA} \tag{3}$$

where a_1 and a_2 are parameters and $\bar{p}_{RC}$ is the exogenous price of residential care.

The demand for care accommodation in private dwellings is therefore given by:

$$PD = f\left(P, A, L, S_A\right) + a_1 - a_2 \bar{p}_{IA} \tag{4}$$

The aggregate demand for long-term care is highly inelastic, since has no obvious substitutes. In a simple linear formulation, this implies that the effect of care demand on the rental cost of care accommodation in private dwellings will be given by:

$$p_{PD} = b_1 - b_2\left(f\left(P, A, L, S_A\right) + a_1 - a_2 \bar{p}_{IA}\right) \tag{5}$$

where b_1 and b_2 are parameters. Thus, the principal influences on the rental price of care accommodation in private dwellings are:

- the size of the population (positively),
- the age structure of the population (increasing as the populations ages),
- living arrangements of those requiring care (decreasing in larger households)
- the health status of the population (decreasing in improving health status)
- exogenous changes in the supply of residential care home places and
- increasing in the exogenous price of residential care accommodation

The remainder of this section is taken up with an investigation of some of these effects. We particularly focus on the living arrangements of those in receipt of care. The present and future size and age-structure of the population are already well-known. Influences on its health status are outside the scope of this paper. For a review see Spiers et al (2005). And following the argument above, we treat the parameters influencing the supply of residential and nursing home places as fixed exogenously. We begin by reviewing some characteristics of older people in the UK using descriptive statistics from the British Household Panel Survey (BHPS)2.

Thus Table 1 shows statistics by age group for UK households with adults aged 55+ years. First, average household size decreases with age. This is consistent with children leaving home and with the differential life expectancy of men and women. Second, "formal care" – the type of care paid for by public authorities - is received by 4.2% of those aged 55 to 64 years and 26.5% of those aged over 85. Older people are much more likely to require care. Third, the proportion receiving informal or unpaid care increases from 3.5% for those aged 55 to 64 to 11.7% for those aged over 85. Informal care within households is primarily provided by spouses for those aged less than 85, although care from children is more likely for those aged 85+. In total, 34.4 per cent of this age group receive care from formal sources, informal sources, or both. In addition, some may have an unmet need for care: this is not captured in BHPS data. Fourth, the proportion with difficulties that require care grows with age. For households with individuals aged 85+, 31.1% have difficulty with housework, 30.9% with climbing stairs, 12.8% with dressing, and 31.9% with walking.

[2] See Appendix for a description of the datasets used in this paper.

Table 1 : Descriptive Statistics for Households with Adults aged 55+

	Age of Oldest Householder (Years)			
	55 to 64	65 to 74	75 to 84	85 plus
Household Size (No. People)	2.204	1.795	1.491	1.32
	(1.045)	(0.811)	(0.607)	(0.588)
Receives any form of Care	0.074	0.108	0.189	0.344
	(0.263)	(0.311)	(0.392)	(0.475)
Receives Formal Care	0.042	0.045	0.113	0.265
	(0.201)	(0.208)	(0.317)	(0.441)
Receives Informal Care	0.037	0.074	0.095	0.117
	(0.19)	(0.262)	(0.294)	(0.322)
Cared for by Spouse	0.032	0.062	0.072	0.045
	(0.175)	(0.241)	(0.258)	(0.208)
Cared for by Children	0.004	0.013	0.02	0.07
	(0.065)	(0.111)	(0.142)	(0.255)
Provides Informal Care	0.212	0.194	0.139	0.067
	(0.409)	(0.396)	(0.346)	(0.25)
Difficulties with Housework	0.074	0.101	0.198	0.311
	(0.262)	(0.302)	(0.399)	(0.463)
Difficulties Climbing Stairs	0.091	0.131	0.227	0.309
	(0.287)	(0.338)	(0.419)	(0.462)
Difficulties with Dressing	0.033	0.038	0.066	0.128
	(0.18)	(0.191)	(0.249)	(0.335)
Difficulties with Walking	0.089	0.128	0.206	0.319
	(0.285)	(0.334)	(0.404)	(0.466)

SOURCE: BHPS (1992 to 2008) Standard deviations shown in brackets. Observations are weighted using the supplied longitudinal survey weights.

Next, we examine the household formation characteristics of those with care needs, one of the key elements of equation (5). We begin by examining the transitions between single and multi-adult households. Table 2 takes the adult population aged 50 years and over living with one or more others people in 2002, showing the proportion by gender who have moved to single person households three years later in 2005, and six years later in 2008. The proportion transitioning to living alone increases dramatically with age, and is significantly higher for females than males above the age of 60 years.

Table 2: Proportion Of Individuals Aged 50+ Years Transitioning Into Single Person Households

	2005 Percentage of Individuals				2008 Percentage of Individuals			
	Male		Female		Male		Female	
Age in 2002	Single	Multi-Adult	Single	Multi-Adult	Single	Multi-Adult	Single	Multi-Adult
50-59	13.9	86.1	11.8	88.2	14.0	86.0	11.2	88.8
60 - 69	11.5	88.5	23.5	76.6	12.5	87.5	20.3	79.7
70 - 79	22.5	77.5	46.2	53.8	18.7	81.3	40.9	59.1
80+	44.6	55.4	70.1	29.9	42.4	57.6	67.8	32.2

SOURCE: BHPS (2002, 2005 & 2008) All adults aged 50 years and over and not living alone in 2002. Observations are weighted using the supplied longitudinal survey weights.

Next, we evaluate the proportion of household containing older people that join, or are joined by, their children to form multi-adult households. Table 3 shows the proportion of children joining and leaving households between successive waves of the BHPS. This variable is cross tabulated with an indicator variable, which measures whether individuals aged 55+ moved house between waves.

Table 3: Proportion Of Individuals Aged 55+ Years Forming And Dissolving Households With Children

	Moved House between Waves	
	No (%)	Yes (%)
Child Leaves House Between Waves		
No (%)	95.32	3.58
Yes (%)	0.94	0.16
Child Joins House Between Waves		
No (%)	93.61	3.47
Yes (%)	2.64	0.27

SOURCE: BHPS (1992 to 2008) All adults aged 55 years and over in the year of observation. Observations are weighted using the supplied longitudinal survey weights.

From Table 3, it is clear that the proportion of older people moving house to be with their children (0.27%) is much less than the proportion of older people whose children joined their household (2.64%). There are flows of similar magnitude on household breakup, with moves from the parental home more common than parents leaving the children's home. This suggests a very small proportion of older people form new households with their children, where the children had previously left the family house.

Table 4 shows reasons for moving, again using BHPS data on those aged 55+. The most common motivation for moving in this age group is to be closer to the family. Again, a relatively small proportion moved in with their family. This suggests that families may come closer together as parents age. This may have to do with care, with proximity to grandchildren etc. But relatively few actually form new households with their children.

Table 4: Proportion Of House Movers Giving Reasons For Move

Reason for Moving	**Proportion of movers aged>55 years**
Moving closer to family	13.24%
Moving in with family	4.19%
Moving due to health	10.93%
Moving due to stairs	9.02%
Sample of movers in BHPS (n)	1,116

SOURCE: BHPS (1992 to 2008) All adults aged 55 years and over who have moved house since the previous wave. Observations are weighted using the supplied longitudinal survey weights.

We next consider the relationship between household size and the need for care. This follows a similar argument to that of Börsch-Supan, McFadden and Schnabel (1996). We consider the factors that are likely to influence the probability that an older person lives alone. For this analysis, we use the Family Resources Survey (FRS) and merge data from 2001 to 2006 to generate a large sample of older people and restrict the sample to those aged 70 and over. Table 5 shows how the need for care varies by age within our sample.

Table 5: Population (Thousands) by Age Group and Care Needs

	No care	Care Needs	Population share with care needs
70-74	1,707	226	11.7%
75-79	1,325	285	17.7%
80-84	888	366	29.2%
85+	398	367	48.0%

Source: FRS 2001-2006

Clearly care needs increase sharply by age. Among those aged 70-74, only 11.7 per cent are carees: among those aged 80+, 36 per cent receive some form of care. Again, this confirms the steep increase in the incidence of care needs with age. This is the age group whose

numbers in the UK, as mentioned above, will increase by 82 per cent between 2011 and 2031.

The impact of care decisions on the housing market is largely driven by older people requiring care who live alone. If one spouse moves into residential care, leaving their partner in the house, then there is no impact on housing demand. A transition from solo living to living with children reduces the net demand for housing. A switch from living with children to residential care has no effect on demand. The proportion of older people living alone is therefore a key determinant of potential effects on the housing market resulting from changes in care policy.

We now form a reduced-form model of the probability that an older person lives alone. As dependent variable we construct a binary variable taking the value one when a person lives alone and zero when he/she lives in a household of two or more persons. On the right-hand side, we include variables measuring whether anyone in the household requires care, real household income per capita, age, region and year. If someone requires care, other family or friends may co-reside to reduce the transactions costs of delivering care from a distance. Higher real household income provides people living alone with more purchasing power to buy services that might otherwise be provided by household members. However, higher income may also facilitate matching and be associated with longer life expectancy. Hence, a priori, the sign on this variable is ambiguous. Probabilities of living alone are likely to increase with age and at differential rates by gender due to differing life expectancies. Region dummies may capture differences in social mix and geography that influence the probabilities of living alone. Finally, a time trend is introduced to capture any general change in the preferences of older people over joint or single living.

Table 6 shows our results. They are derived from repeated cross-sections using the FRS over the period 1998-99 to 2009-10. Males and females are estimated separately because differences in life expectancy by gender cause a significant gender imbalance at older ages, which in turn increases the probability that females live alone.

For the FRS model, the columns headed dF/dx shows the marginal effects on the probability of living alone of each of the explanatory variables. Stars indicate levels of significance. Columns to the right show the relevant standard errors. The equations are estimated for those aged 50 and above. There are 117 thousand males and 133 thousand females in our samples.

Table 6: Determinants of Living Alone at Older Ages

	Males		Females	
	Marginal Effects	St. Error	Marginal Effects	St. Error
Requires care	-0.0291***	(0.003)	-0.0471***	(0.003)
Income per adult	0.0196***	(0.003)	-0.0042	(0.006)
NW and Merseyside	-0.0093	(0.005)	-0.0112*	(0.005)
Yorks & Humberside	-0.0285***	(0.005)	-0.0178**	(0.006)
East Midlands	-0.0374***	(0.006)	-0.0384***	(0.006)
West Midlands	-0.0326***	(0.005)	-0.0426***	(0.006)
Eastern	-0.0546***	(0.005)	-0.0538***	(0.006)
London	0.0174**	(0.005)	0.0041	(0.006)
South East	-0.0539***	(0.005)	-0.0517***	(0.005)
South West	-0.0517***	(0.005)	-0.0425***	(0.006)
Wales	-0.0302***	(0.006)	-0.0313***	(0.007)
Scotland	-0.0117*	(0.005)	0.0103*	(0.005)
Age 55-59	0.0141***	(0.004)	0.0543***	(0.004)
Age 60-64	0.0251***	(0.004)	0.1151***	(0.004)
Age 65-69	0.0504***	(0.004)	0.1748***	(0.004)
Age 70-74	0.0748***	(0.004)	0.2667***	(0.004)
Age 75-79	0.1366***	(0.004)	0.3758***	(0.004)
Age 80-84	0.1887***	(0.005)	0.4609***	(0.005)
Age 85+	0.2828***	(0.007)	0.5310***	(0.007)
Trend	0.0031***	(0.00)	-0.0005	(0.00)
Bic	111044.3		147911.4	
N	116976		133250	
Pseudo R^2	0.0332		0.1089	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: FRS 1998-99 to 2009-10, marginal effects shown with standard errors, omitted categories: region – North, age group – 50-54.

Both for males and females, having someone in the household receiving care reduces the probability of living alone. The reduction is quite small - 3% for males and 5% for females. It may reflect increased co-habitation in response to care needs, reducing transactions costs associated with care provision as well as possibly reducing housing costs. Greater household

income increases the probability that men live alone, but has no significant effect on females. Men may be prepared to make greater use of the independence that follows from higher income than do women.

The sharp contrast between the probabilities of living alone for men and women is shown in Table 1 Table 7 which gives the predicted probabilities of living alone from the estimates set out in Table 6 at different ages. With other variables set at their sample means, the substantial difference in the predicted probabilities of living alone between the group aged 55-59 and the group aged 85+ are evident. For men, they increase from 0.147 to 0.487, while for women they increase even more dramatically – from 0.172 to 0.718. Age effects dwarf the impacts of other exogenous variables on the probability of living alone.

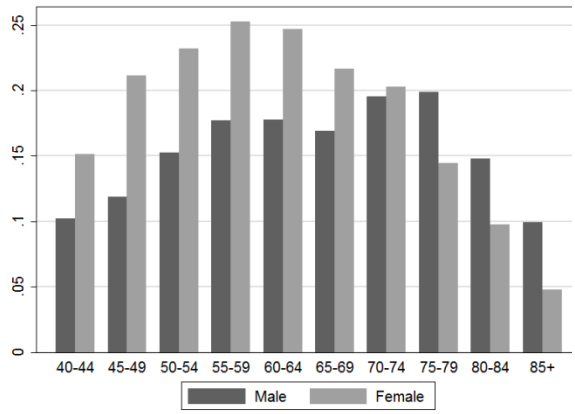
Table 7: Predicted Probabilities of Living Alone by Age Group

	Male	Female
Age 55-59	0.147	0.172
Age 70-74	0.206	0.395
Age 85+	0.487	0.718

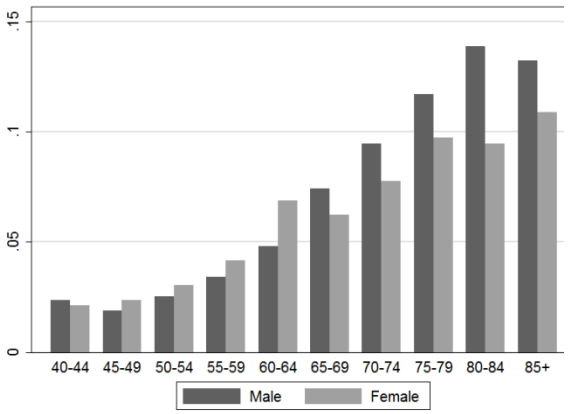
Source: Own calculations from regression estimates

If individuals live alone, they may receive informal care from inside or outside the home, which may help them continue to live independently rather than being admitted to institutional care. Within multi-adult households, informal care is generally available. Spouses provide the bulk of informal care within households. Figure 2 shows the proportion providing and receiving informal care within their household by age and gender. Women are more likely to provide informal care than men. They also provide care at a younger age. Men (if they are alive) are more likely to continue providing care into older age. Men are more likely to receive care, and later in life than women.

Figure 2: Proportions giving and receiving unpaid care by age



Proportion of Adults Providing Unpaid Care

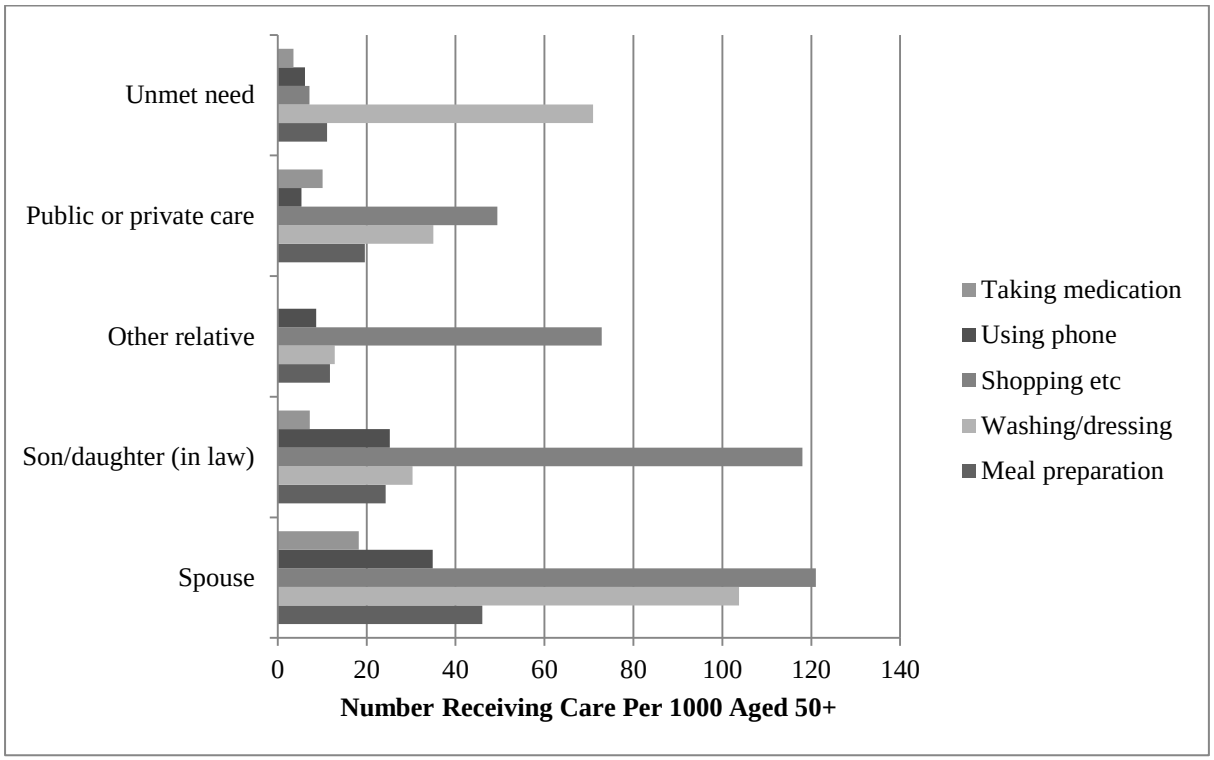


Proportion of Adults Receiving Unpaid Care

Source: BHPS (2002 – 2008) All adults aged 40 years and over. Observations are weighted using the supplied longitudinal survey weights.

A further explanation lies in a more detailed analysis of care provision. Caring is a complex activity, and individuals' care needs may involve a mixture of forms of care, with individuals receiving different types of support from different sources. The English Longitudinal Study of Ageing has a detailed breakdown of forms of care. Figure 3 shows a breakdown of caring activities by source. Non-spousal family members are most likely to be involved with activities such as shopping. More intimate caring, such as washing/dressing is most likely to be provided by spouses or through formal/private care. There is also significant unmet need for these forms of care. A need for intimate care may reduce the willingness of children to form households with parents.

Figure 3: Carers and Caring Roles



Source: English Longitudinal Study of Ageing Waves 2-4 (2004 to 200)
Adults aged 50 years and over in receipt of some form of care. Population estimates produced using the supplied survey weights.

Children's role in providing care for parents is restricted mainly to assistance with shopping and domestic tasks. It is clear that more personal tasks such as washing and meal preparation are largely carried out by spouses. These are the kinds of care in which residential care homes specialise. Hence, these data suggest that spousal care is more substitutable for residential home care than is the care provided by children.

Returning to Table 6, regional effects are calibrated relative to the North of England. Most regions have significantly lower probabilities of living alone than the North. As mentioned earlier, this is likely to reflect differences both in social mix and geography. The only area with a significantly higher probability of older males living alone, though not older females, is London.

With the FRS dataset, age is measured using five-year bands. Age effects are calibrated in our regression using a set of dummy variables, each corresponding to one of these bands. The marginal effects shows that age has a more dramatic effect on the probability of living alone than any of the included variables. Thus, for men, the probability of living alone increases by

28% between ages 50-54 and 85+, while for women the increase is a massive 53 per cent over the same age range. The increased probability of living alone with increasing age reflects both the increased likelihood that a spouse is not present and the relatively low proportion of older people in the UK who cohabit with their children, as shown in Table 2.

Our time trend shows an increasing probability of living alone among older males, but no significant trend among females. However the effect is small and therefore not likely to have a substantive effect on the housing market even if continued into the longer term. It may reflect changes in the process of household formation and dissolution, including the increased prevalence of divorce, though it is not clear why only males should be affected.

Another factor which may increase the proportion of those with care need staying at home rather than entering an institution is the possibility that houses may be modified to provide for particular care needs. Household adaptations can be an important factor in determining whether it is feasible to stay and receive care in one's own home. This increases the potential supply of care in the home, and reduces the incentive to move to residential care in order to access appropriate living environments to address care needs.

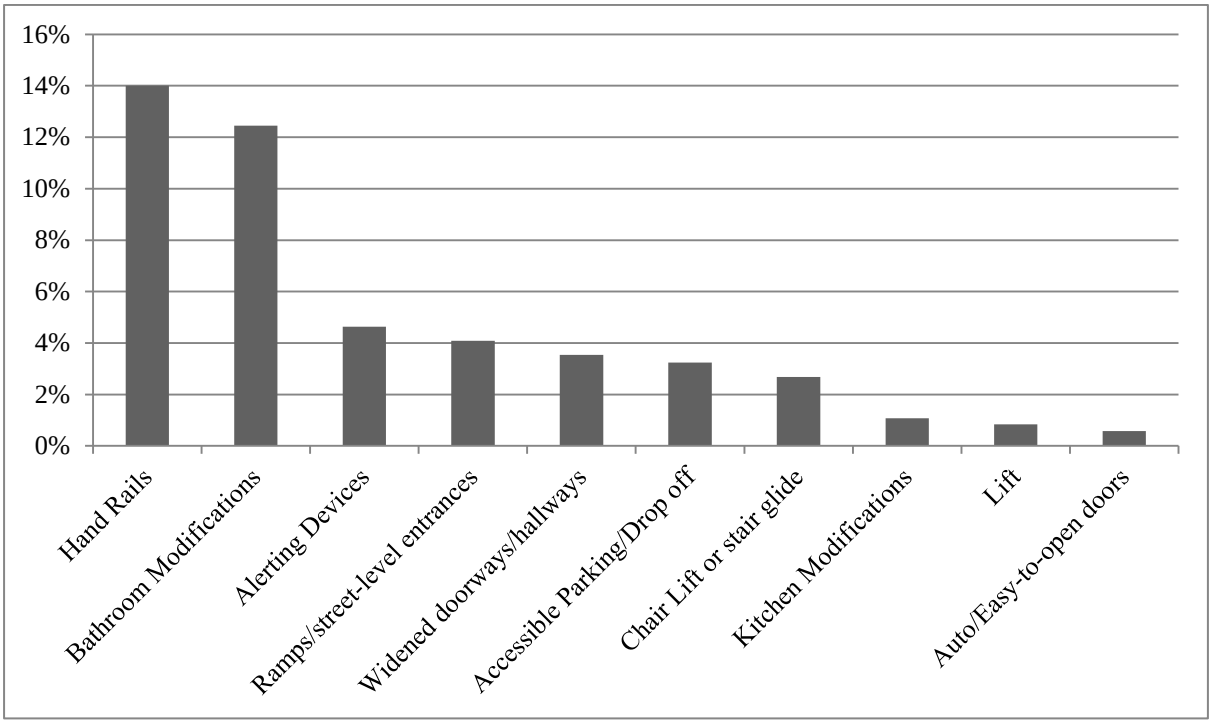
Error! Reference source not found. shows the proportion of older people who have made adaptations to their home. The most common are hand rails (14%), bathroom modifications (12%) and alerting devices (5%). These adaptations are concentrated amongst lower income households and those living in social housing. More expensive homes may be better designed to accommodate the disabled or more affluent carees may choose to move to more suitable accommodation. Social housing may also require that adaptations remain after a change of tenant, while owner-occupiers may remove such devices when a house is sold.

The characteristics of the house in which those receiving care reside may differ from private houses in general. Household adaptations can be an important factor in determining whether it is feasible to stay and receive care at home. Housing improvements and adaptations make housing more suitable locations in which to receive care. This increases the supply of private home care, and reduces the incentive to move to residential care in order to access appropriate living environments to address care needs.

Error! Reference source not found. shows the proportion of older people (those aged 50+) who have disability-related adaptations to their home. The most common are hand rails (14%), bathroom modifications (12%) and alerting devices (5%). These adaptations are

concentrated amongst lower income households and those living in social housing. Higher income households may be better designed for disabled people, reducing the need for adaptation. Social landlords may also be more reluctant than owner occupiers to remove adaptations, once the immediate need for them has passed.

Figure 4: Proportion of Households with Adaptations



Source: English Longitudinal Study of Ageing

Finally, we consider how the private housing in which care clients reside compares with the housing stock in general. One key indicator of housing quality is number of bedrooms. We therefore construct a model of the number of bedrooms to see how this relates to care provision and to get some idea of the quality of housing that may not be available to the market if the supply of institutional care was restricted by market failure.

Table 8 shows regression models of the number of bedrooms in homes where care is being supplied, and in houses where no care is being supplied. The mean number of bedrooms in these categories is 1.5 and 2.1 respectively. Care is typically supplied in houses with fewer bedrooms. Disability may have restricted past income, reducing the opportunity to acquire housing wealth. Care needs may also be associated with occupational hazards and therefore

more likely to be associated with lower income individuals with less access to housing wealth.

Our approach is to model the number of bedrooms in a house to determine whether this variable is related to receipt of care. The number of bedrooms is distributed over the set of positive integers, and conventionally begins at 1. We therefore model the number of bedrooms less one, which we characterise as a Poisson distribution. We use the negative-binomial distribution for estimation because it does not suffer from the constraint imposed on the Poisson distribution of equality between its mean and variance. We separately model households in which at least one person has care needs and households where no-one has care needs. We use owner-occupation, living alone, real household income per adult and age as explanatory variables.

Table 8: Determinants of the No. Bedrooms In House

			No Caree in Household	
	Marginal Effects	St. Error	Marginal Effects	St. Error
Owner-occupier	0.681***	0.014	0.816***	0.010
Lives alone	-0.559***	0.015	-0.523***	0.008
Real income	1.106***	0.063	0.089***	0.004
Age 55 to 59	-0.077***	0.024	-0.074***	0.010
Age 60 to 64	-0.142***	0.023	-0.141***	0.010
Age 65 to 69	-0.197***	0.023	-0.218***	0.010
Age 70 to 74	-0.219***	0.023	-0.247***	0.011
Age 75 to 79	-0.211***	0.023	-0.297***	0.012
Age 80 to 84	-0.279***	0.023	-0.372***	0.015
Age 85+	-0.235***	0.024	-0.419***	0.021
N			154553	
LR $chi^2(10)$			18692	
Pseudo R^2			0.0412	
Mean Bedrooms			2.080	

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Source: FRS 1998-99 to 2009-10, Excluded category: Age 50-54

Table 8 shows the results. All variables are significant at a 1 per cent level of significance. For non-caree households, the number of bedrooms declines with age. Conditional on other variables, those aged 85+ live in houses with 0.42 less bedrooms than those aged 50-54. Amongst those receiving care the decline is smaller, at 0.23 bedrooms on average, though still significant. These reductions may reflect cohort effects. The relatively old were probably

in the labour market at a time when real incomes were lower than the period during which those aged 50-54 were working. Owner-occupation may also be correlated with higher incomes and consequently with housing wealth. For caree households, owner occupiers live in dwellings with 0.68 more bedrooms, while there are 0.82 more bedrooms in non-caree houses. Similarly, increased real incomes are associated with more bedrooms. Not surprisingly, single-adult households occupy around one-half bedroom less than multi-adult households.

These results suggest that dwellings in which at least one resident has care needs typically have fewer bedrooms than those where no care needs are present. Not surprisingly, living alone also has a negative effect on numbers of bedrooms. However, the number of bedrooms decline less rapidly with age for dwellings with care needs. Nevertheless, the implication of these results is that the houses most likely to be unavailable to the market due to limitations in the supply in institutional care have relatively few bedrooms and are therefore more likely to be at the lower end of the housing market.

IV DISCUSSION

Over time, policy in the UK towards the accommodation of long-term care clients has changed substantially. There was a significant change from care provision in hospital geriatric wards to residential or nursing homes between 1983 and 1993, when care home fees were "uncapped". During this period, the government met *any* care home charges levied on carees with insufficient income to meet their care home costs. This caused a sharp expansion in the supply of institutional care. Since then there has been a shift in the "balance of care" away from such care homes towards care provision at home. Capping of the fees payable by local authorities and increased regulation had a dramatic effect on care home provision in the UK. Between 1994 and 2007, the number of care home places in the UK fell from 570,000 to 409,000. This development occurred even though care home provision is overwhelmingly focussed on older people and the impact of demographic change was also well understood.

One of the key arguments in favour of care provision at home is that it enhances welfare for most carees, other than those with high levels of need. Thus, the Wanless Review (2006) of long-term care provision in England argued that the first of its six priorities for long-term care should be "to promote the development of domiciliary, day and respite services to enable people to live in their own homes wherever feasible and sensible." In Scotland, there is a National Indicator "to increase the percentage of people aged 65 and over with high levels of

care needs who are cared for at home." The drive for care provision in the private residence of the care client is not limited to the UK. OECD policy supports care provision at home: "Encouraging home and community care is desirable for users and spending is lower" (Colombo, Ana *et al.*, 2011). This trend towards care at home has also been justified on the grounds of cost – most care packages provided at home cost significantly less than care in nursing or residential care home. The average cost of home care in England in 2005 was estimated by the Public Social Service Research Unit at £91.78 for an average of 6.5 hours per week. Even a more intensive home care provision of 20 hours per week would cost only £284 per week. This compares to average weekly fees in 2005 for residential care (£397) and nursing care (£570) (Laing & Buisson, 2011).

Nevertheless, the policy debate has ignored the housing market effects of this policy shift. These effects are conditional on the household arrangements of carees, particularly whether they live alone or with their spouse and/or children. A decision to provide care in a private dwelling rather than in an institution has no immediate housing market implications if the individual is part of a multi-adult household. If the care client is the sole member of the household and has insufficient income to meet the residential home fees, the dwelling may be sold to meet these fees. The residue from the client's estate will ultimately be paid to the beneficiaries. This sets up a complex set of incentives, both for carees and their potential carers which involves the costs associated with care provision and the uncertain benefits of subsequent inheritance.

We found that the amount of household formation involving parents going to live with children, or children forming a household with their older parents, is relatively small. In addition, children's care tends to involve a more restricted set of care tasks compared with that provided by spouses or formal care provision. This implies that a household involving parents needing care and adult children is a less obvious substitute for institutional care than is a household where a spouse is present or where formal care is being provided by the public or private sector. For a caree living alone, friends and family outside the household are less likely than spouses to provide forms of care such as washing and meal preparation. Population ageing will mean that the market in care provision for such tasks may have to expand substantially.

We found that carees are slightly less likely to live alone, but this effect is relatively small compared with the sharp age gradient in solo living, particularly among women. We know

that age and care needs are positively correlated. The increased numbers of the "oldest old" associated with demographic change will tend to increase housing demand, particularly if the number of places in institutional care fails to increase due to the effects of regulation and the exercise of monopoly power by the public sector.

The housing market effects of increased demand for care also depend on characteristics of the housing occupied by carees. We have found that care and living alone are associated with relatively small houses (using the metric of the number of bedrooms). Hence the house typically affected by the switch from institutional care to care at home will be somewhat smaller than average. One might speculate that this may be a segment of the market that first-time buyers also seek to occupy. Substitutability between private accommodation for those requiring care and the general housing market may be partly limited by the extent of aids and adaptations necessary to support care provision.

Nevertheless, the overall conclusion is that a policy focussing on care at home relative to institutional care may enhance the welfare of carees, but it will also have some unintended consequences on the housing market. It will allow carees and their beneficiaries to retain their housing wealth, while potential investors in institutional care may be deterred due to the absence of assured rental streams.

Finally, consider some of the magnitudes which underlie the arguments put forward in this paper. The current projection is that there will be an additional 2.45 million people in the UK aged 80+ by 2030. Our estimates suggest that on current patterns of behaviour the majority of the women and around 40 per cent of the men will be living alone. Based on the gender composition of the projected increase in population, there are likely to be around 1.1 million additional singleton households by 2031. We also know that, based on current patterns of health, at least 25 per cent of this age group will have a demand for care. In 2010, the UK housing stock comprised 27.3 million dwellings. If neither the current stock of dwellings, nor the number of places in institutional care increases significantly, around 1 per cent of dwellings will be occupied by this particular group of older people, and they will comprise only part of the additional stock of individuals requiring care. While care provision at home may be beneficial both for the individuals concerned and for those paying such care, there may be negative effects due to excess demand in the housing market, particularly at the lower end, which will be exacerbated if the price response to the excess demand is non-linear.

Appendix – Datasets used in the study

British Household Panel Survey

The BHPS provides information on household organisation, employment, accommodation, tenancy, income and wealth, housing, health, socio-economic values, residential mobility, marital and relationship history, social support, and individual and household demographics. It was originally designed as a sample of more than 5000 households, making a total of 10,000 individual interviews. In this paper we use the longitudinal nature of the BHPS to describe changes in household structure and individual characteristics.

Family Resources Survey

The Family Resources Survey an annual cross-sectional survey of living conditions and resources of people across the UK. Currently based on a representative sample of around 25,000 UK households, it collects extensive information on care, benefits, household living arrangements and sources of income. In this paper we use the large cross-sectional sample of the Family Resources Survey to estimate regressions household size, both number of persons and rooms.

English Longitudinal Study of Ageing

The English Longitudinal Study of Ageing is a panel dataset which incorporates information on the economic, social, psychological and health elements of the ageing process. The sample size is around 10,000 individuals in England aged 50 and over. Begun in 2002-03, respondents are interviewed once every two years. In this paper we use the detailed data on informal care in the English Longitudinal Study of Ageing to describe types and sources of support provided to older people within their own homes.

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