

The effect of house prices on the long-term care market: Evidence from England

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High house prices are often considered to be beneficial for the elderly due to the accumulation of wealth. However, as land is an input in the provision of public services, the elderly might be harmed by them, for example, due to a shortage of local care homes. Alternatively, care home providers might be attracted by asset-rich potential clients, which could lead to a positive effect of house prices on the provision of care. Applying an instrumental variables approach on English data, we show that higher house prices lead to fewer care homes, fewer entries into the market as well as fewer available beds.

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All analyses used Stata 14. Do-Files are available from the corresponding author on request. All analyses and opinions expressed in this paper as well as any possible errors are under the sole responsibility of the authors. The land registry data is released under Open Government Licence for public sector information (<http://www.nationalarchives.gov.uk/doc/open-government-licence/>). The land registry data covers the transactions received at the Land Registry in the period October 1st, 2014 to September 30th, 2016 and is covered by Crown copyright. If you have found an error with the data, please contact [Her Majesty's Land Registry \(HMLR\)](#).

1. Introduction

The English housing sector has experienced the fastest growth in real prices amongst all OECD countries over the last decades. Between 1997 and 2016 the median price paid for residential property increased by almost 260%, while median individual earnings increased by 68% (Henretty, 2017). A widely-discussed consequence of this process has been an affordability crisis that has particularly affected young and first-time buyers. These two groups have struggled to access mortgages and raise the necessary initial deposits to invest in housing (Hilber, 2017, Hilber and Vermeulen, 2016). At the same time, older home-owners are believed to benefit from this situation. They could buy properties cheaply and are currently benefiting from increases in housing wealth – even though realizing these gains obviously depend on the decision by the older homeowners to sell their properties and live in a cheaper area or smaller properties (Hilber and Schoni, 2016, Hiller and Lerbs, 2016). In this paper, however, we point out that the picture might be more complicated. Areas with high house prices, may inhibit the opening of new care homes, which in turn harms older home owners if these either cannot access sufficient care, have to delay their entry in a nearby care home or are forced to relocate in old age and consequently leave behind existing personal networks and connections.

The demand for long-term care services that involve health care and help with activities of daily living has increased substantially over the last decades. A main factor for this increase has been an ageing population. The proportion of people with at least one difficulty has increased from 16.4% at age 65 to almost 50% at age 85 (AgeUk, 2017). In addition, new family structures and living habits have shifted the provision towards paid nursing and residential care homes instead of more informal care within the (extended) family (Kaschowitz and Brandt, 2017; van Groenou and De Boer, 2016).

This paper investigates the relationship between housing and long-term care markets. Our analysis is motivated by the spatial disparities in the local availability of care homes and the wide variation in property prices across English districts (see figure 1). The direction of an eventual link between these two variables is a priori unclear. Higher house prices imply increases in wealth of existing homeowners. Since the majority of homeowners is old, they have greater sources for funding their long-term care needs. House assets are considered a core source for funding long-term care (Venti and Wise, 1990), Darton et al., 2010; Costa i Font et al., 2017). The opening of care homes also

requires space. Higher house prices may imply higher building costs for care home providers who could lower the supply of care homes for a given demand¹. Consequently, the available long-term care choices could be reduced for people living in these areas. The overall effect of higher house prices on the provision of social care then depends on the relative size of these two effects.

(Insert Figure 1 about here)

We combine data on care homes from the Care Quality Commission, the official regulator for care homes in England, and data on all housing transactions from the Land Registry, a government department that registers all land owners in England and Wales. Considering a context of health and healthcare, the former dataset has been used to analyse the effects of housing on individual health (Fichera and Gathergood, 2016). We construct a local authority-level dataset for England from January 2014 to December 2017. A potential problem of the analysis is that long-term care providers may choose local markets on the basis of unobservable variables that also affect house prices. If this occurs, the estimated effects of the house prices may be biased. To overcome this potential limitation, we use an identification strategy based on Hilber and Vermeulen (2016) that exploits differences in the tightness of planning regulations and in the share of available land across English local authorities. Our key findings suggest that higher house prices indeed lead to fewer and smaller care homes. Moreover, we also find some evidence of quality upgrading where areas with higher house prices have more care homes rated as “outstanding” and less care homes that require improvements or are inadequate.

This paper widens the growing literature on the study of the residential long-term care market in England. It is the first to provide evidence for a causal link between house prices and long-term care provision and to consider a time period with the new quality framework operating. The house values are key determinant for the definition of mean tests and local funding. The study of the relationship between housing and long-term care markets offers significant insights for the organization of formal social care services. The provision of long-term care in England has been analysed by a number of authors. Forder and Allan (2014), using cross-sectional data, provide a

¹ The cost of a new 60 bed care home is around £8 according to the Competition and Markets Authority. These costs would include building and operating costs.

detailed analysis of elements that determine competition amongst care homes and assess the consequences of this competition for both prices and quality. Using the house prices as an indicator of the payer composition, their results show a negative correlation between the prices paid for care home services and the prices of nearby houses. Likewise, they find a positive correlation between the house prices and probability of a care home obtaining a higher quality rating. Other authors, have explored the dynamics of the care home market by analysing elements that lead to care homes closures. Netten et al. (2003, 2005), find that closures may be associated with the prices set in the care homes. Hence, lower prices would lead to higher closer rates. Allan and Forder (2015) explore other element such as the quality and show that poorer quality and more competitive markets are elements that increase the probability of market exits. In contrast to this research, our paper joins Machin et al. (2002) on providing evidence on factors related to entries into the care home market. Their results suggest that the introduction of the UK national minimum wage had a negative, but statistically insignificant effect on care home entries. Our paper is also related to Mc Millen and Powers (2017) who analyse the factors that determine location decisions of care homes. Considering the market of nursing care homes in California and using a spatial econometrics approach, they conclude that nursing care homes tend to locate in densely inhabited areas with older and wealthier populations.

This paper is organised as follows. The next section outlines the main institutional characteristics characterising the market for long-term care and housing. Section 3 describes the data and the empirical strategy Section 4 discusses the results and section 5 concludes.

2. Institutional background

In England, urban planning and long-term care are organised on the level of local government, specifically in local authorities. These are roughly comparable to US counties and usually encompass one city or some larger rural area. Some areas have a two-tier structure with some decisions taken at the (lower) district council level and others at the (higher) county council level, while others are unitary authorities that combine both tiers.

Urban planning is managed at the district level. Local planning decisions are based on a National Planning Framework that guides policies and development decisions to meet local socio-economic, cultural, security and health needs. Local planning policies have long been regarded as

one of the main constraints on the housing supply and a main reason for the increase in house prices (Kok et al., 2014; Jackson 2016; Davis et al. 2017) ². English planning regulations are more restrictive than other countries (Cheshire, 2009; Hilber, 2015). In addition, they can lead to incentives for existing home owners to promote “not in my backyard” policies that restrict local development and consequently the supply of local housing. These tighter regulations lead to increases in the land value of those areas already developed. Conversely, for owners in less developed areas these policies imply a cost (Hilber and Robert-Nicoud, 2013).

Long-term care is managed by 152 local authorities that operate at the council level.³ The main responsibility entails the commissioning (i.e., the purchase) of care services for those clients eligible for public support. Since the mid-eighties, the provision of long-term care operates according to market mechanisms. As a result, the *for profit* private sector has emerged as the main provider. In 2014, 74% of the total places belonged to a private provider compared with 8% of places provided by the public sector. The remaining 18% of the places were provided by the voluntary sector (Jarret, 2017)

There are 19 private and 6 voluntary providers that have a combined market share of about a 30% of the beds available. Within these, 4 providers are big chains with a combined market share of 15%. The remaining 70% of the market share is served by smaller providers that individually provide no more than 0.4% of the beds each. The resulting market is considered to be fairly competitive, but also regionally fragmented.⁴

One explanation for these regional discrepancies is the composition of long-term care recipients in each local authority. Care homes may have two types of clients depending on how they fund their services. The first are private clients who purchase and fund their care individually based on their willingness to pay for different types of services. The second are clients whose care is

² In addition, the effects of planning regulations have been studied also in other contexts such as the retail sector for the UK (Cheshire et al., 2014; Griffith and Harmgart, 2008; Haskel and Sadun, 2012; Sadun, 2015) France (Bertrand and Kramarz, 2002), Italy (Schivardi and Viviano, 2011) or Spain (Sanchez Vidal, 2016).

³ Before 2008, these activities were managed by Primary Care Trusts (PCT), which were the top tier administrative structure of the National Health Service. The Health and Social Care Act (2008) transferred public health matters, including long-term care activities, from these PCTs to local authorities. In other areas, PCTs were replaced by clinical commissioning groups (CCG).

⁴ Considering registered care homes in all sectors, the South East is the region that has more registered care homes (currently more than 1,000). This proportion of care homes contrasts with the North East where there are about 360 registered care homes.

partially or fully funded by the local authorities. The eligibility and degree of this public support is based on a means-test that assesses their financial capacity. The market for this type of clients works as a quasi-market in which the local authorities purchase care services from private providers on behalf of the clients (Le Grand, 1991)⁵. The proportion of publicly funded clients is notably higher than the number of self-funded clients (Jarret, 2017).

The fact that local authorities purchase care on behalf of a significant part of the demand, suggests that they may have certain buyer power when negotiating the fees applied to publicly funded clients. This power pushes prices down and lead to lower fees paid by the local authorities for the same services that private payers receive. This case suggests a potential cross subsidisation of privately funded clients to publicly funded clients. This situation has been documented both in the English long-term care market (Forder and Allan, 2014, Hancock and Hviid, 2010, OFT, 2005) and in the US (Grabowski, 2004, Mukamel and Spector, 2002).

3. Data and empirical strategy

3.1 Data

We collapse data from different administrative sources on the level of 315 (district-level) local authorities. These define the unit of analysis of our sample. Besides, the main analysis consists of four time periods from January 2014 to December 2017 defined on a yearly basis. We obtain information concerning the characteristics of care homes from various directories of the CQC that include active, inactive and rated care homes respectively. The initial sample consists of records of 3,270 care homes registered for the practice of a legal activity regulated by the CQC.

Our main dependent variable is the number of care homes per 1000 population that are aged 65 or over in the local authority. This definition is based on Tokunaga and Hashimoto (2013) who analyse the entry of private providers in Japanese long-term care markets. We assume that a care home is active once it is registered. We drop registrations that occur due to organisational reasons such as changes in the address or take overs from a different provider⁶. Population data come from

⁵ The same approach has been applied for the delivery of various public services in the UK. Using the nursing and residential care market, Barron and West (2017) analyse the performance of different types of providers in terms quality standards. Their main result suggests that facilities that operate in quasi-markets are, on average, of higher quality than those operated by for profit providers.

⁶ This situation is typically found when dealing with information contained in registries of firms. Neglecting it, apart from potentially introducing measurement errors, may lead to incorrect conclusions regarding the market dynamics

the projections at the Office of National Statistics for the years 2014 to 2016. These projections are mid-year estimates as of 30th of June of each year.

We also use the date of registration to analyse the effect of the house prices on market entry. We adopt an ecological approach and define market entry rates considering the number of new registered care homes relative to the number of incumbents at the beginning of the period. This is a relative measure that allows comparing the process of entry between markets with different sizes (Audretsch and Fritsch, 1994).

There is further information on the number of beds in each care home, the postcode and postal address, the city and region where the care home is located as well as the local authority that is responsible for the purchase of social care services for publicly funded clients. We use those to generate two further outcomes associated with the capacity of the care home, namely the number of newly registered beds in a period as well as the average size of existing care homes.

We also use information on care homes' quality ratings from the inspection system implemented by the CQC since 2014. The main changes incorporated with this new system were essentially two: Inspections were conducted without prior announcement and were more systematic and structured. Thereby, the evaluation considers explicitly five quality components of the services that include the safety, the effectivity, the level of care and response to people's needs as well as the management and leadership of the services. In addition to these individual assessments, the CQC also releases an overall evaluation of the services. We use this general measure for our analysis. Besides, each of these quality dimensions is assessed according to four possible ratings namely *outstanding*, *good*, *requires improvement* or *inadequate*. We analyse the effect of house prices on the outstanding and bad dimensions (i.e. requires improvement and inadequate).

Information on property prices is obtained from the price paid dataset released on a monthly basis by the Land Registry. This dataset contains all the transactions of properties carried out in England and Wales since 1995. In addition to the price paid and the exact date of the transaction, the dataset includes further information such as the type of property, the address, the city, district and region where the property is located as well as whether the location was newly built and whether the

and the performance of the firm. Geurts and Van Biesebroeck (2016), for instance, analyse the effect of this measurement problem on the estimations of the firm's growth after the entry in the market

property was under leasehold or freehold⁷. We aggregate this information on the same level as the care home and obtain the average price⁸ for each year.

The sample has some caveats that include the number of local authorities and the period of analysis. First, our analysis uses only those local authorities that did not undergo any changes after the reform in the English local government in 2008. Some of the variables we use as controls were measured before 2008 and this may create an issue given that some counties were merged into a single Unitary Authority. It is not possible to determine what part of the information from the new created Unitary Authorities corresponds to the former counties. In order to tackle with this limitation, we have rerun all analyses using averaged values for these new Unitary Authorities and the results are essentially identical. Second, the period of the analysis begins in 2014 due to the availability of the information referred to some of the outcomes. The data in the directory of active care homes contain all registrations of care homes since 2010, year when it became a legal requirement. A substantive proportion of these registrations (16,054) were carried out during 2010 and the first two months of 2011. In additional analyses, we test validity of some our outcomes considering the period from March 2011 to December 2017 and March 2011 to December 2013.

3.2 Identification

We estimate regressions that follow the general form

$$Y_{irt} = \alpha + \tau \log P_{irt} + X_{it} + \delta_r + \eta_t + \epsilon_{irt} \quad (1)$$

where Y_{it} is the respective outcome variable i.e., proportion of care homes per 1000 population over 65, entry rates, number of newly registered beds and average size of entrant care home, for a local authority i in time period t . P_{it} is the average house price. We incorporate X as the share of people over 65 in the local authority to control for the demographic composition. We also include δ and η which are dummy variables for each region where the local authority is located and for the time period. The rationale of these variables is to control for all those factors, observed and

⁷ The difference between these two types of properties is based on the whether the ownership of the land or property is for a temporary (*leasehold*) or unrestricted (*freehold*) period.

⁸ The average price is calculated applying the geometric mean instead of the arithmetic mean. The former is the method adopted by the Land Registry in order to correct the potential skewness from high property values.

unobserved, that are constant within each region and time. We are interested in estimating τ . An important concern related to the OLS estimates of τ in (1), is that they are likely to be biased as we can easily imagine unobserved factors that influence both house prices and the provision of care homes. For example, the general wealth of an area. In addition, we can also imagine potential reverse causality between the number of care homes and the level of house prices if care homes are a (dis-) amenity that changes the quality of the neighbourhood and potentially the values of the properties in an area. A potential candidate to address this problem would be the use of the index of deprivation as a control. However, it could be related to the house prices and then produce endogeneity concerns.

In order to tackle these problems, it is necessary to obtain a source of exogenous variation in the house prices. For doing that, we borrow an identification strategy from Hilber and Vermeulen (2016) who study the effect of supply side constraints, such as the available land and the tightness of planning regulations, on the rise of house prices in England. Hilber and Vermeulen highlight that direct measures of supply constraints, such as the refusal rates, may be subject to endogeneity due to their pro-cyclical association with the business cycle and with developer attitudes once they knew the restrictiveness of the planning local authority. Whilst the former could be mitigated with averaged values, the latter are more challenging and could effectively result on an underestimation of the real level of tightness in the planning authority. To overcome these limitations, they use three instruments that we describe further below. Their findings confirm that tighter supply constraints, such as less available lands and more restrictive planning regulation, lead to increases in the prices.

Rather than instrumenting for the supply constraints, we use their instruments to identify the house prices which is the treatment variable in our analysis. Hilber and Vermeulen (2016) show in their first and second stage estimates that there is a valid set of instrumental variables (I) that addresses the endogeneity produced by confounding variables (u) when establishing the causal link between the supply constraints (S) and the house prices (P). Considering this, our identification strategy considers the instrumental variables in (I) to deal with similar endogeneity problems in the causal link between the house prices and the proportion of care homes (C). The former rationale is shown in Figure 2.

(Insert Figure 2 about here)

Hilber and Vermeulen use two instruments for the tightness of local planning regulations. The first is based on the impact of a planning reform aimed at speeding up the planning processes. Set in 2002, this reform aimed to avoid delays of major projects and included an explicit target for concluding this type of projects. Local authorities had incentives to reach this target since funds from the central government could be retained otherwise. Hilber and Vermeulen (and us) use as an instrument the change in the delay rate of major projects pre- and post-reform. The underlying logic is that compared to more permissive local authorities, restrictive local authorities, which were more prone to delaying projects before the reform, had to change their behaviour more strongly after the reform to meet the target. A potential criticism of this instrument is that the effects of this regulation may have affected to certain extent the development and provision of care homes in a local authority. If this is the case, then local authorities with greater differences in their delay rates would be those more restrictive and in principle would reject more planning projects that would include also care homes. In figure 3 we show the relationship between the average delay rates and the number of care homes per 1000 people older than 65 for each local authority. Delay rates do not influence on the number of care homes ($\rho = 0.0061$). Two reasons may explain this weak association. Firstly, major projects and more in general the design of planning regulations, mostly refer to projects that involve dwellings. Residential care homes normally fall under a different category that integrates care facilities such as hospitals or nursing care homes. In these cases, the applications may not be tested considering the housing development plans and may be approved despite the limits imposed by future settlements (King 2011). Likewise, the development of care homes planning also involves other local authorities different to the local planning authorities. Thus, in two-tier authorities, the county local authorities are in charge of the funding and commission of the services. Their aims may be different from the purposes of the local authorities that manage planning regulations.

(Insert Figure 3 about here)

Hilber and Vermeulen's second instrument links local planning regulations to local political power. In addition to Hilber and Vermeulen (2016), similar strategies have been used by other authors such Bertrand and Kramarz (2002) or Sadun (2015). The information used here

corresponds to the share of the Labour party in the General Election of 1983 at the local district level. Hilber and Vermeulen obtain and compile these data at the level of the Constituency boundaries and then match them to the level of the local district authority by using GIS techniques. The underlying logic of this instrument is that Labour voters were historically predominantly low- and middle-income, and working-class. These voters gain from additional construction activity, both through more easily affordable homes and additional jobs. Furthermore, they are unlikely to own (more expensive) houses that could depreciate. Using data from a general election also ensures that local concerns, such as those related to housing, do not play a dominant role in voters' decisions. Our regressions additionally include the Labour vote share in the most recent general election (June 2015). By using this variable, we aim to control for changes in the demographic composition of areas that may lead to a more Labour-friendly population and may alter the voting behaviour and consequently the corresponding local policies. Cheshire et al (2015), for example, allude to the case of some neighbourhoods in London receiving important proportions of new wealthy residents when analysing the relationship between supply restrictions and housing vacancies.

Hilber and Vermeulen additionally look at physical constraints as another mechanism that may restrict the supply of houses. The share of developed land may be subject to endogeneity concerns given that the local authorities may discretionarily determine it. To correct for these potential problems, we instrument the share of developed land with the population density in 1911 with the underlying logic that land is pricier in historically more densely populated areas.⁹

An additional concern is that the location decisions of the elderly may be associated with the instruments used. It could happen that a potential client would want to move to an affordable area with lower living cost and a more affordable access to care. Whilst a plausible case, evidence show that location is a core element for the selection of a facility and choices are normally driven by the proximity to the original residence of the client (Zwazinger et al., (2002), Shugarman and Brown (2006))

⁹ Data on the instruments comes from the replication data from Hilber and Vermeulen (2016) available at Christian Hilber's website: <http://personal.lse.ac.uk/hilber/>. A copy of this data is also available as the supporting information in the electronic copy of the article. The Appendix provides a detailed explanation and description referred to the computation of the data used.

Table 1 displays the descriptive statistics for our estimation sample. On average, over the period of analysis there were almost 2 care homes per 1000 population over 65. Looking at inspected care homes, we can see that there is a surprisingly low number of outstanding care homes per population over 65 (0.01). Conversely, the average number of care homes that are either inadequate or require improvement is more than 0.22. Likewise, Table 1 provides further information on the dynamics of the market. Entry rates vary substantially across the sample with a comparatively average of 5%. Nevertheless, some local authorities reach values as high as 40%. The average size of the new care homes since January 2014 is 27 beds with a minimum of zero (equivalent to no new homes entering) and a maximum of 156. Local authorities gain on average 76 new care home beds per year. House prices are also highly variable across regions with an average of £247,835, but a range at the lower end of £71,650 and more than £1M for some local authorities in London.

(Insert Table 1 about here)

Table 2 shows the results corresponding to the first stage statistics for our estimation. We apply different sets of controls. First column shows estimates only with time fixed effects. Given that the variables used as instruments do not vary over time, if we did not include time effects the resulting predicted house price from the first stage would not vary over time. Consequently, the estimates would not explain the effects of house prices on the long-term care market. Hilber and Vermeulen use a different strategy based on interacting the instruments with time varying variable. The second column includes fixed effects corresponding to the regions. Unlike Hilber and Vermeulen (2016), we do not use fixed effects at a lower geographical level (e.g. the local planning authority) since it poses problems of collinearity.

The estimates point at the direction that we would expect from Hilber and Vermeulen (2016) - the relaxation of planning constraints lowers house prices, while higher (historical) population densities increase them. Likewise, the results associated with the local share of Labour voters also confirm the negative relationship presented before. The bottom of Table (2) presents Sanderson-Windmeijer (2016) multivariate F-tests for the excluded instruments. These evade the problem that simple F-tests in the case of multiple instruments can be misleading as they could mask a combination of strong and weak instruments. These results indicate the absence of any weak identification problems for all our endogenous regressors. Moreover, all the F statistics are above

10 which is the value suggested by Staiger and Stock (1997) as acceptable to reject the null hypothesis of weak instruments.

(Insert Table 2 about here)

4. Results

Table 3 looks at the link between contemporaneous house prices and the number of care home per 1000 population over 65 as well as the house prices and the rate of market entry. In both cases, the results reported in the first column show OLS estimates and the subsequent columns various IV specifications. All our estimates imply that higher house prices decrease the number of care homes and the entries in the market. In our preferred specification including both time and regional controls, an increase of a 100% in the level of prices entails a reduction of 0.6 care homes per 1000 population over 65. Expressed in terms of standard deviations, our results suggest that a 1% increase in the log of the house prices lowers the number of care homes by 107% of a standard deviation. These findings suggest that the production cost effect derived from higher house prices dominates any eventual demand effect operating through potential clients becoming wealthier. The right panel in Table 3 considers the impact of house prices on the entry rates of care homes. Although, we find a negative causal relationship between the increases in the house prices and the entry dynamics of the market, this effect is not significant controlling for both time and regional fixed effects.

(Insert Table 3 about here)

A potential concern is that the decision of entry in the market may be lagged to certain extent. For instance, providers may base their decision to enter a local market on historical house prices or the date of registration of the care home may differ from the date of the purchase of the property. Table 4 explores the effects of lagged house prices on the number of care homes and entry rates respectively. We apply lags of 1, 2 and 3 years in the house prices. These lags fit the time frame required for setting up and opening a care home in England. Particularly, this process entails not only the construction of the building but also the application of “statement of purpose” and the confirmation of a registration. The effects using different lagged prices, are along the same lines

as the findings presented in Table 3 for both the number of care homes and the rate of entries. These findings therefore indicate that potential different time frames do not affect our analysis.

In general, these results suggest that the decision of entry by long-term care providers in local markets may be driven mainly by financial incentives that determine the cost of development¹⁰. Investing in the development of a care home in areas where the value of alternative uses of land, such as housing, are high, may also entail high opportunity costs. Developers may prefer to develop houses instead of care homes despite having a potential demand. Furthermore, in order to develop a new care home, developers have to compete with other types of developers such as house builders for getting the available land. Due to their greater profit margins, house builders may be willing to pay higher prices for a site. A final argument is linked to the way public finance at both local and national level affects the development of care homes in comparison with other types of buildings. At local level, for instance, the Community Infrastructure Levy is charged for additional spaces required in a care home but that are not subject to rental revenues such as laundries or common rooms (Campbell, 2015). Besides, national grants such as the New Homes Bonus support local councils for building new houses in their area. The former jeopardise and disincentivise the development of new care homes.

We also observe how house prices affect the capacity of those care homes registered since January 2014. We consider the capacity from two perspectives: the total number of beds newly registered in a local authority and the average size of the care homes registered in the local authority. The results of the impact of the house prices are reported in Table 5. We find evidence of a significant negative effect so that higher house prices lead to the registration of fewer beds and smaller care homes. A 100% increase in the house prices implies reductions of 98 new beds registered in the local authority per year. In terms of the standard deviations, these results suppose that a 1% increase in the house prices imply a reduction in the average size of the newly registered house of about a 103% of a standard deviation. . We can outline two implications derived from these results. First, older populations living in areas where house prices are high would face a restriction in the long-term care choices available to them. Particularly there would be fewer beds available for

¹⁰ See for example: <https://www.carehome.co.uk/news/article.cfm/id/1568598/affluent-self-funders-market-in-the-south-driving-care-home-operators-away-from-the-north>

them. Second, despite having fewer options regarding the provision of care, the services could be of better quality. Bigger care homes tend to have lower levels of quality since they encounter more difficulties to provide a more personalised care (Barron and West, 2017).

We explore this quality aspect in further detail. In addition to the differences in quality derived from a different care home dimension, it may be possible that house prices affect directly on quality level in the care home. There is evidence that care homes rely on privately-funded clients to cross-subsidize publicly-funded clients. Humphries et al. (2016) argue that this strategy is followed by a number of long-term care providers in order to preserve their financial viability. This argument would suggest that areas with a greater proportion of clients that self-fund their care should be more attractive for care homes.

Given that self-funded clients in the UK are price takers, they also choose which care home they use. In particular, it seems reasonable to assume that they prefer better care homes over worse. If higher house prices imply more asset-rich clients who can afford better care, care homes can execute a vertical quality differentiation in those areas and set higher fees for services of better quality. If this occurs, we would expect a positive effect of house prices on the quality of care homes in an area.

Table 6 reports the results of the effect of house prices on the number of care homes per old population by quality rating. The panels show information on the care homes that are rated overall as outstanding, require improvement or inadequate. The IV estimates reveal a positive effect of the house prices on the number that obtain an outstanding rating and a negative effect on those that are rated badly. Specifically, a 1% increase in house prices leads to an increase in the number of care homes rated as outstanding by approximately a third of a standard deviation. Regarding the number of care homes that require improvement or are inadequate, a similar increase in house prices leads to a negative and statistically significant effect of around 50% of a standard deviation (46% and 56% respectively). The effects are greater for the care homes that require improvement. This is possibly because of the greater proportion of care homes that obtain this rating. These results are consistent with the reasoning above, namely that care homes would be upgrading and improving their quality to capture asset-rich private clients.

(Insert Table 6 about here)

For testing the validity of our results, we run further analyses considering two different samples on those outcomes where we have additional information. First, we incorporate a sample that includes years before and after the quality rating system was established. This sample comprises the period 2011-17. Likewise, we also consider a sample containing years before the quality system was established. The specifications include both time and region fixed effects and results are reported in Table 7. Our findings are consistent to those shown in previous tables although they generally increase in magnitude, especially for the period before 2014.

(Insert Table 7 about here)

5. Discussion and conclusion

We contribute to the existing literature on long-term care by investigating the causal link between house prices and the provision of social care in England. Our findings suggest that high house prices have a hitherto unexplored social cost that implies a reduction in the provision of long-term care. Our estimates show reductions in the number of care homes and the entry rates. Likewise, we find a negative effect of the prices on the number of new registered beds and the average size of care homes. Taking into account the estimated 70,000 extra residential beds that will be required by 2025 in England (Kingston et al., 2017), these results provide evidence on the future challenges faced by local authorities to meet the long-term care needs of their populations.

A potential implication of these results is that high house prices are not as uniformly beneficial to older home-owners as often implied in public debates. That being said, we do find evidence that higher house prices go hand in hand with better quality rated care homes, suggesting that care home providers might be motivated by a desire to attract asset-rich private clients. These findings would be in line with evidence found for other countries such as the US. McMillen and Powers (2017) show evidence regarding the prevalence of nursing care homes to locate in areas with older and wealthier people and Stevenson and Grabowski (2010) show similar results for the case of assisted living facilities. An alternative potential implication derived from the increases in wealth is that the demand of residential care could be substituted by alternative formulas of care. Costa i Font et al., (2017) find that increases in the wealth do not increase the demand of residential care

but rather lead to greater demand of home care and informal care. In these cases, residential care would be considered as an inferior good.

Our findings also lend support to the idea that the development of care homes is driven by financial incentives. High house prices suggest that projects, which undertake alternative developments to care homes, such as building property houses for example, are a more attractive option for developers' investment. This is because of two core reasons. Housing development entails less opportunity costs and higher profit margins that lead to a better bargaining power for accessing to available developable land. Likewise, the development of care homes is associated with less fiscal incentives, both at local and national level. Regarding this, our findings illustrate potentially important interactions between various areas, such as urban planning and the provision of social care, that are responsibility of local authorities at different level. Our results can contribute to inform the reforms based on an increase of the local government funding and that directly involve the housing market and that present substantial trade-offs. For instance, the introduction of new national grants, such as the New Homes Bonus in 2011, aiming at encouraging the development of new residential properties, may compromise the provision of long-term care. Notwithstanding, the funding derived from these grants may be used to alleviate the current funding needs in the social care. Disentangling these relationships, given the context of constant reforms in the local public finance, may be a future avenue of research.

These findings should be read alongside the current funding schemes for social care where the value of the properties plays a key role, especially for those people residing in care homes. In these cases, the value of the property is included in for means test that determines the public support buy the local authorities. Likewise, the value of the property is considered for assuming the cost of deferred payments in those patients that are in a care home and decide to postpone the payment of their care. Under these situations, homes can be sold to pay the local authorities. Hence, from the perspective of a local authority, higher house prices would entail greater revenues that could be used to meet its funding requirements. Likewise, higher house prices could also contribute to increase the council tax, which is the main important source of local revenue and that is partially used for meeting the needs of local governments in terms of long-term care. Despite long-term care has been an area relatively protected from the budgetary constraints occurred since 2010 (Smith et al. 2016), both local authorities and national government need to agree in a funding

scheme to meet the rising needs and the challenges derived from the provision and funding of long-term care in residential care homes.

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Tables

Table 1: Summary statistics

	mean	sd	min	max
Care homes per 1000 population 65 +	1,76	0,58	0	4,5
Entry rates	0,05	0,04	0	0,4
New registered beds	76,61	95,15	0	862
Average size	26,64	24,92	0	156
Care homes per quality (outstanding)	0,01	0,02	0	0,16
Care homes per quality (requires improvement)	0,2	0,18	0	1,7
Care homes per quality (inadequate)	0,02	0,04	0	0,34
Average house price	247,835	134,049	71,650	1,276,781
Historical share of Labour votes	0,16	0,09	0	0,41
Share Labour votes (June 2015)	0,28	0,14	0,07	0,73
Change delay rate	-0,04	0,22	-0,63	0,53
Population density 1911	774,67	2633,05	3,25	22028,8
Share population 65+ (%)	19,13	4,79	6	33,3
East Midlands (1 = yes)	0,13	0,33	0	1
East of England (1 = yes)	0,14	0,35	0	1
London (1 = yes)	0,1	0,3	0	1
North East (1 = yes)	0,03	0,18	0	1
North West (1 = yes)	0,12	0,32	0	1
South East (1 = yes)	0,21	0,41	0	1
South West (1 = yes)	0,11	0,31	0	1
West Midlands (1 = yes)	0,09	0,29	0	1
Yorkshire and the Humber (1 = yes)	0,07	0,25	0	1
Observations	1260			
Local authorities (districts)	315			

Table 2: First stage results

	Average house prices (log)	
Historical share of Labour voters	-2.284*** (-0.316)	-1.088*** (0.135)
Contemporaneous share of Labour voters	-1.032*** (0.212)	-0.884*** (0.0970)
Change delay rate	-0.206*** (0.065)	-0.0919*** (0.0294)
Historical density population	0.0000796*** 9.11e-06	4.47e-05*** (3.10e-06)
Time FE	Yes	Yes
Region FE	No	Yes
Observations	1,260	1,260
Number of local authorities	315	315
Sanderson-Windmeijer test of excluded instruments	126.41***	36.67***

Note: Robust standard errors are presented in parentheses. Standard errors are clustered at local authority level. ***/**/* denote significance levels at 1%, 5% and 10% respectively.

Table 3: Effect of house prices on number of care homes and rate of market entry

	Number of care homes per 1000 population 65+			Entry rates		
	(1)	(2)	(3)	(4)	(5)	(6)
Average house prices (log)	-0.780*** (0.118)	-0.107 (0.0898)	-0.622*** (0.178)	-0.00385 (0.00478)	-0.0103** (0.00406)	-0.00652 (0.00868)
Estimation	OLS	IV	IV	OLS	IV	IV
Time FE		Yes	Yes		Yes	Yes
Region FE		No	Yes		No	Yes
Observations	1,260	1,260	1,260	1,260	1,260	1,260
Local Authorities	315	315	315	315	315	315
R-squared	0.209	0.043	0.204	0.021	0.014	0.048

Note: Robust standard errors are presented in parentheses. Standard errors are clustered at local authority level. ***/**/* denote significance levels at 1%, 5% and 10% respectively.

Table 4: Effect of lagged house prices on number of care homes and rate of market entry

	Number of care homes per 1000 population 65+			Entry rates		
	(1)	(2)	(3)	(4)	(5)	(6)
Average 1-year lag house prices (log)	-0.627*** (0.174)			-0.00652 (0.00865)		
Average 2-year lag house prices (log)		-0.631*** (0.173)			-0.00659 (0.00870)	
Average 3-year lag house prices (log)			-0.642*** (0.177)			-0.00663 (0.00884)
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes	Yes
F statistic of instruments	36.44***	36.13***	36.2***	36.44***	36.13***	36.2***
Observations	1,260	1,260	1,260	1,260	1,260	1,260
Local Authorities	315	315	315	315	315	315
R-squared	0.204	0.202	0.201	0.020	0.020	0.021

Note: Robust standard errors are presented in parentheses. Standard errors are clustered at local authority level.

***/**/* denote significance levels at 1%, 5% and 10% respectively.

Table 5: Effects of house prices on capacity

	New registered beds			Care home average size		
	(1)	(2)	(3)	(4)	(5)	(6)
Average house prices (log)	-38.08*** (9.407)	-65.47*** (11.29)	-98.42*** (21.95)	0.0839 (2.673)	-5.893*** (2.028)	-9.259** (4.228)
Estimation	OLS	IV	IV	OLS	IV	IV
Time FE		Yes	Yes		Yes	Yes
Region FE		No	Yes		No	Yes
Observations	1,260	1,260	1,260	1,260	1,260	1,260
Local Authorities	315	315	315	315	315	315
R-squared	0.121	0.087	0.094	0.058	0.036	0.048

Note: Robust standard errors are presented in parentheses. Standard errors are clustered at local authority level.

***/**/* denote significance levels at 1%, 5% and 10% respectively.

Table 6: Effects of house prices on care homes by quality rating

	Outstanding			Requires improvement			Inadequate		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Average house prices (log)	3.70e-05 (0.00185)	0.00432*** (0.00130)	0.00675** (0.00300)	-0.115*** (0.0217)	-0.0310** (0.0136)	-0.0825*** (0.0303)	-0.0197*** (0.00446)	-0.0111*** (0.00284)	-0.0227*** (0.00648)
Estimation	OLS	IV	IV	OLS	IV	IV	OLS	IV	IV
Time FE		Yes	Yes		Yes	Yes		Yes	Yes
Region FE		No	Yes		No	Yes		No	Yes
Observations	1,260	1,260	1,260	1,260	1,260	1,260	1,260	1,260	1,260
Local Authorities	315	315	315	315	315	315	315	315	315
R-squared	0.115	0.094	0.107	0.467	0.430	0.464	0.176	0.130	0.175

Note: Robust standard errors are presented in parentheses. Standard errors are clustered at local authority level. ***/**/* denote significance levels at 1%, 5% and 10% respectively.

Table 7 Effects of house prices on different care homes outcomes

	Care homes	Entry rates	Registered beds	Average size
Average house price (log) - sample 2011-17	-0.715***	-0.0166	-126.7***	-3.726
	(0.194)	(0.0104)	(24.44)	(3.212)
Observations	2,205	2,205	2,205	2,205
R-squared	0.241	0.404	0.256	0.049
Average house price (log) - sample 2011-13	-0.846***	-0.0289	-164.9***	3.249
	(0.222)	(0.0182)	(33.31)	(3.999)
Observations	945	945	945	945
R-squared	0.222	0.435	0.318	0.047

Note: Robust standard errors are presented in parentheses. Standard errors are clustered at local authority level. ***/**/* denote significance levels at 1%, 5% and 10% respectively.

Figures

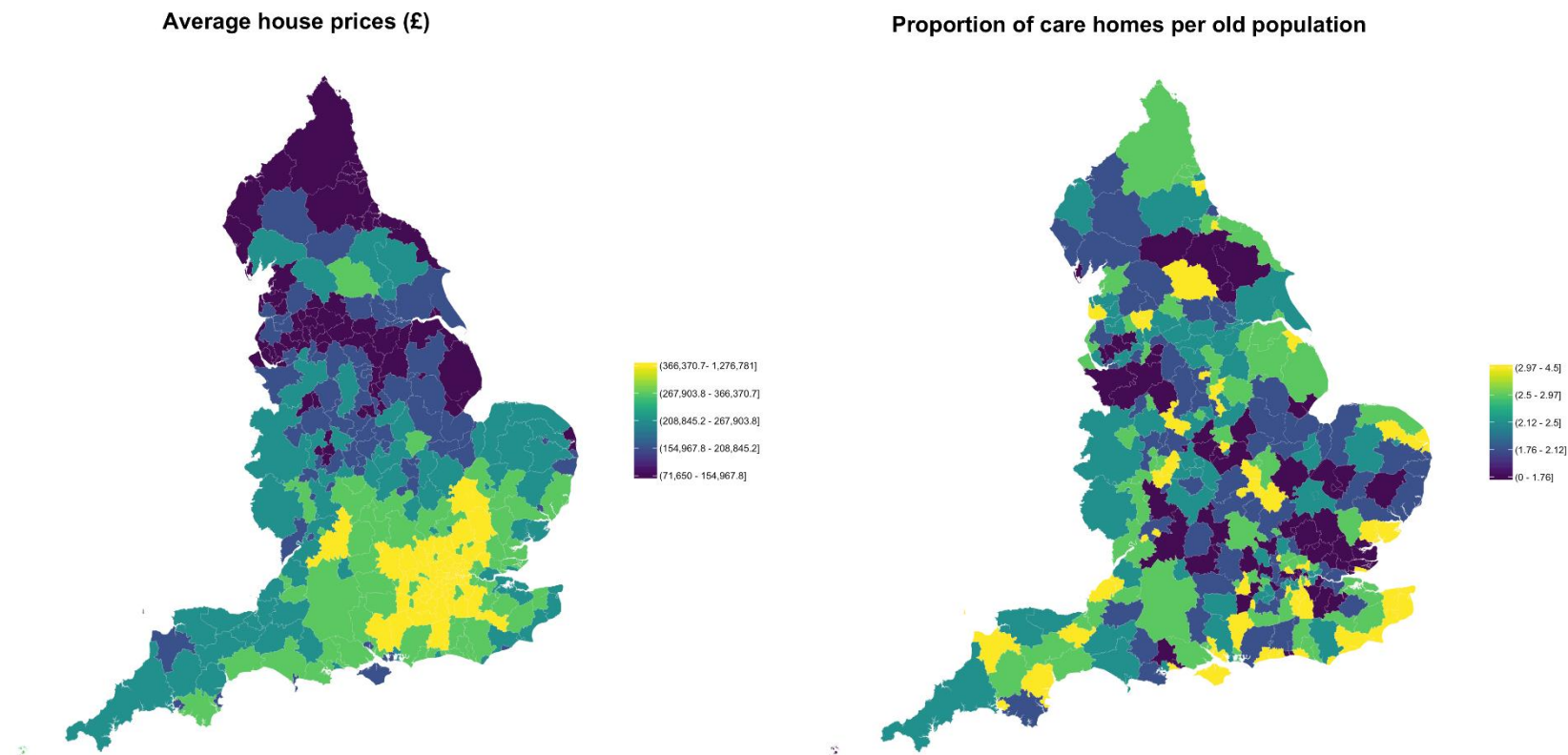


Figure 1. Average house prices and care homes per 1000 population over 65 and in English districts in 2017

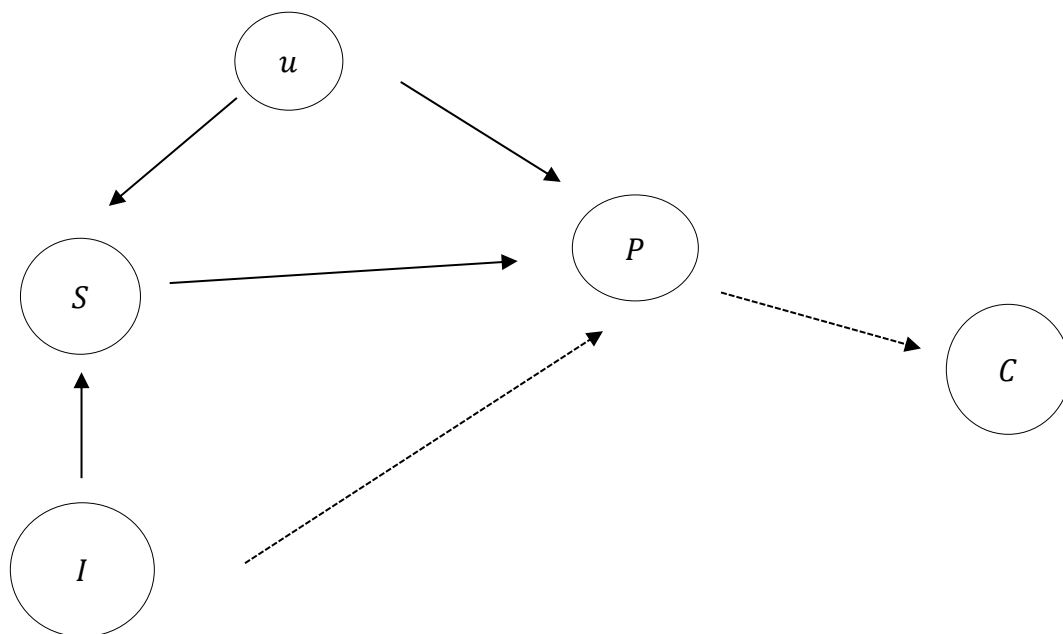


Figure 2: Diagram of causal links between instruments

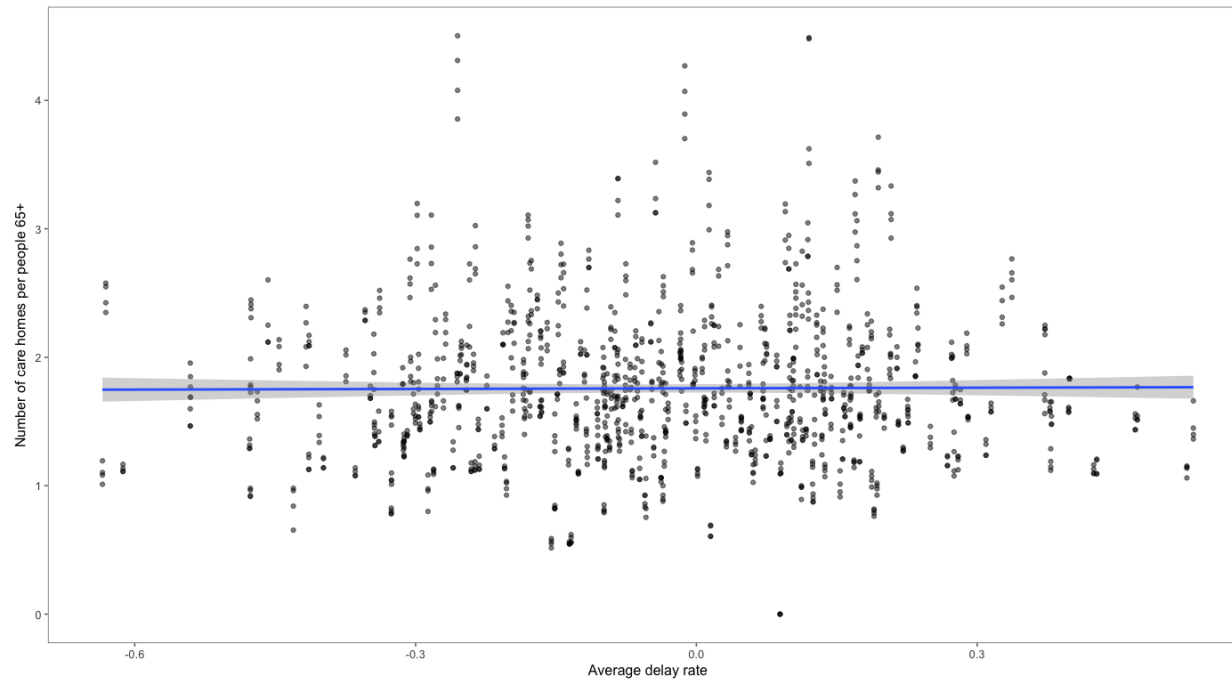


Figure 3: Number of care homes and average rate of delay