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

Eduardo Gonzalo Almorox[*†]   Nils Braakmaann[†]

Volodymyr Bilotkach[†]   John Wildman[†]

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Abstract

This study investigates the effects of house prices in the English care homes market. High house prices, as experienced currently in England, may disincentive the entry in certain markets restricting the access to long term care services in these areas. Alternatively, these areas may also suppose business opportunity. We provide evidence in order to disentangle these effects. Considering the variation of the planning regulations accross English planning authorities for addressing potential endogeneity, our instrumental variables estimates suggest that higher house prices lead to an increase of the distribution of care homes. These findings contribute to inform policy makers about the relationship between the long term care and housing markets.

Keywords: Care homes, house prices, long-term care, England

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[*]Newcastle University Business School. 5 Barrack Rd, Newcastle upon Tyne NE1 4SE

[†]Corresponding author: `e.gonzalo-almorox@newcastle.ac.uk`

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1 Introduction

England has experienced the fastest growth in house prices amongst all OECD country during the last decades. This inflationary trend has had consequences for both households, materialised in the so called "house affordability crisis", and to less extent businesses. In this paper we investigate the relationship between the house prices and the market structure of an industry that typically operates with low margins, the care homes that provide long term care services. Our interest in the long term care is not trivial. Elements such as the ageing of the population or some socioeconomic changes that include the inclusion of more women in the labour force as well as the composition of different family structures, have shifted informal caregiving towards more formal long term care provision. These patterns evidence the importance of this sector in the forthcoming decades. Yet, despite the will of policy makers to design policies that preserve a sustainable provision of long term care and that also ensure competitive market structures, there is limited evidence for the design of these policies. We aim at informing these policies by analysing the extent of the effect of high prices in the housing market on the entries in the market of care homes.

The way high prices in the housing market may affect the local long term care markets is a priori uncertain as there are two opposing effects that may appear. The first may consist of the effect of house price as a cost for running a care home. Hence, higher house prices may suppose an important barrier that can restrict the entry in certain local markets. Furthermore, higher house prices may increase the opportunity costs of alternative building projects and therefore suppose an incentive to deter potential development of care homes. A potential consequence derived from the former situations could be that people living in these areas may find less long term care choices closer to them.

The second existing effect may be derived from the the basis of how high house prices may represent a business opportunity. The segment of the population that benefits from current upward trend in the house prices are those elderly homeowners that are able to monetize the higher value of their asset by selling their houses and moving out cheaper

areas (**?**). If this argument holds, areas with higher prices may be associated with greater levels of affluence and consequently greater proportions of clients that are more willing to pay for the services of a care home. Although the latter may contribute to preserve the financial viability of care homes in the market, an issue that constitutes a current public policy concern, it may also result in an unequal distribution of long term care across different areas in England where the most affluent areas are more benefited from a greater supply of home care services.

In order to proceed with our analysis, we construct a unique dataset that merges information from several sources to collate information regarding the characteristics of the dynamics in the care homes market, the housing markets and the planning regulations. The dataset captures information regarding local authorities at different level (e.g. street, district and county level). A first technical hurdle concerning the dataset, consists of distinguishing de novo entries associated with providers that effectively produce a new activity. Secondly, there is an additional empirical caveat that we have to address with regards to effect of house price on care homes entries. It may be possible that care homes select markets that have high prices on a non-random basis due to unobservable variables. This sample selection bias may invalidate the estimates corresponding to the effects of house prices. In order to overcome these, we carry out and identification strategy which uses an instrumental variables approach that exploits the variability in the restrictiveness of planning regulations across English districts. Our identification relies on the assumption that changes in the planning requirements affect the entry of care homes in market through the levels of house prices.

To the best of our knowledge, no previous studies have been undertaken to provide causal evidence with regards to the effects of housing prices in the context of entries in the market of care homes. This research also makes a number of contributions to several strands of the literature. It provides further evidence to the growing literature that analyses aspects associated with the market of care homes in England. **?** study the elements that determine the competition amongst care homes and assess the consequences of this competition in both prices and quality. Also **?** evaluate empirically the causes of market exits by investigating the effects of maintaining minimum standards in the quality

of the service. We extend this literature by addressing issues referred to the entry of care homes in the market. Prior to this paper, only **?** have provided empirical evidence of factors affecting the market entry by analysing the effects of setting of a minimum wage. In addition to providing a more up to date evidence, this research uses a more extensive dataset provided by the regulator, the Care Quality Commission (CQC). Likewise, this research also extends the literature that studies the effects of the planning system and the high house prices in England using the care homes as a new sector for the analysis.

2 Institutional background

In England planning and long term care are activities that are ruled and applied by local governments. The structure of these is nonetheless complex and entails different organizational levels[1] depending on the type of services that are regulated. In this section we outline the main characteristics of the local government in England considering the particular cases of planning regulations and long term care. This will help to understand the geography that we adopting for our empirical analysis.

England has 152 local authorities that operate at council level[2] and have responsibilities on long term care through the commissioning – e.g. purchase of services. Since the mid-eighties, market mechanisms drive the provision of long term care services. The supply is mainly composed by private *for profit* providers and their distribution is quite unbalanced. About the 15% of market share is concentrated in 4 "main providers" and the remaining 70% of the market share is composed by providers that have a reduced number of beds - no more than 0.4% of the beds each. Despite this polarisation in market structure, the market for care homes presents a high level of competitiveness overall. Nonetheless there are notable discrepancies across different local authorities in England

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[1]These levels or tiers include three main groups: (i) county councils, (ii) district, borough or city councils and (iii) parish or town councils. Most of the activities designed by local governments are developed at county or district level (group (i) or (ii))

[2]The Health and Social Care Act (2008) supposed the transfer of public health matters from Primary Care Trusts (PCT) Clinical issues were responsibility of the clinical commissioning groups (CCG).

(**??**)[3]

A reason behind these regional divergences relies on how the demand for residential long term care services is composed in each different local authority. As a general characteristic, the demand for residential services presents two types of clients. On the one hand, there are private *self-funded* clients who purchase their care according to market rules and their willingness to pay for different types of services. On the other, there is also a proportion of clients who undertake a means test in order to determine their eligibility for public support. In the case of this type of clients, the market operates as a quasi market.[4]

Unlike social care activities, planning systems are managed at district level by the local planning authorities. These establish various strategic priorities for the areas that include the fulfilment of local needs at socio-economic, cultural, security and health level. These priorities are set out in the National Planning Framework. A national framework aimed at guiding policies that entail development decisions for meeting local needs. The health and social care are issues explicitly addressed by these framework. Concretely planning policies should enhance the collaboration between local planning authorities, public health authorities, commissioners and providers in order to promote healthy communities and analyse the implications of the development of health and social care infrastructures.

Several authors have investigated the effects associated with the design of the planning system in England and the net effects of the land use regulation. The main conclusions derived from this research are essentially two. Firstly, planning regulations in England are generally more restrictive than similar regulations in other countries (**??**). Secondly, the level of regulatory tightness differs notably across English local governments. Thus, local planning authorities where there are more affluent areas (specially areas located in the South East England) tend to be more restrictive since they are subject to greater

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[3]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.

[4]As introduced by **?** in these markets the state is not the funder and the provider of the services and rather it becomes a funder that purchases services from a set of private providers that compete against each other. **?** analyse the performance of different types of providers in these markets.

incentives to restrict the development and protect landlords and homeowners willing and therefore exploit the likely increases the value of their assets (**??**).

house_prices_england.png

Figure 1: House prices in England, 1995-2017

An important consequence derived from these restrictions has been a substantial increase of the house prices. Figure **??** plots the evolution on time of the house prices across different regions in England during the last two decades. In addition to London, the areas that have registered greater increases are the South East, Esat and South West

respectively.

3   Econometric framework

Main sources of data

The data corresponding to the sample of analysis in this paper cover years from 2011 to 2016 that we divide into three time intervals $t(t = 1, 2, 3)$ that include March 2011 – March 2013, March 2013 – March 2015 and March 2015 – September 2016. These data are retrieved from several sources and are referreed to 324 local planning authorities. We cluster our information at this level since these type of local authorities are likely to rule the housing planning policies and then determine the house prices. Therefore we assume that each of those represents a local market and a unit for the analysis.

Our main goal consists of studying the effect of prices on entry of care homes in the local market. In the spirit of ?, who analyse the choice local markets by private long term care providers in Japan, we proxy the entries as the proportion as the number of care homes per 1000 population in the local authority that are aged 65 or over. We obtain the information concerning the characteristics and dynamics of the care homes from the Care Quality Commission (CQC) directory of active and inactive care homes[5] This dataset contains all the registrations of care homes that have carried out a regulated activity since 2010. The initial sample includes 24,354 records. Our analysis is restricted to the entries from March 2011 onwards since a substantive proportion of the total registrations (16,054) were carried out during 2010 and the first two first months of 2011 as a result of a new regulation.[6] As we illustrate in Figure ??, this process was prolonged for the remaining months of 2011 particularly until July. The forthcoming years presented progressively a less intense level of registrations.

A major strength of this dataset for the purposes of this research consists of the opportunity to track the entries and exits of the care homes in the market. Besides,

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[5]This dataset is maintained by the CQC Directorate of Data and Statistics and available upon request.

[6]Since October 2010 registration in Care Quality Commission became a legal requirement for every long term care provider who wanted to carry out a regulated activity.

it provides further individual information regarding the care homes that includes the number of beds in the care home, the identifier code, the name of the care home, the postcode and postal address, the city and region where the care home is located as well as the local authority responsible for the social care activities corresponding to the location of the care home. Likewise, with the exception of the number of beds, the same information is available with regards to the providers where the care homes belong to.

In our analysis we only consider *de novo* entries that represent the beginning of a new activity and effectively the entry in the market. Neglecting these may introduce bias in the results. **?**, for instance, analyse the effect of this measurement problem on the estimations of the firm's growth after the entry in the market.[7]

In a second stage of our analysis we use information corresponding to quality ratings derived from the system implemented by the CQC since 2014. On the basis of five dimensions[8], this new approach set a systematic method for collecting evidence that enables a more consistent assessment and comparison of the care homes' performance. Services are rated according to four categories: *outstanding*, *good*, *requires improvement or inadequate*. For our analysis we collapse these categories into two: bad (requires improvement and inadequate) and good (outstanding and good). Because the information is only available since October 2014, this part of the analysis considers a different timeframe that involves three waves from October 2014 - May 2015, May 2015 – February 2016 and February 2016 – September 2016.

Likewise we test the effect of the house prices on the level of residential care expenditure for each local authority. We represent the level of public expenditure throughtout the yearly gross current expenditure per adults over 65.[9] For our analysis we select

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[7]In the Appendix **??** we present further details about the computation of this variable

[8]These dimensions entail the evaluation of issues related to the safety, the effectivity, the level of care and response to people's needs as well as the management of the services.

[9]This is a well established fiscal measure of government spending and it represents the expenditure that is not offset by income from clients and does not include capital charges either. Gross current expenditure G is calculated as: $G = T - C$ where T is Gross Total Expenditure and C incorporates capital charges. Likewise, T is obtained from deducting incomes from joint arrangments I, the NHS N and other incomes O to the total expenditure E, $T = E - (I + N + O)$

information corresponding to the report of years 2011/12 to 2015/16 released by the NHS Digital[10] (formerly the HSCIC).

The information corresponding to prices of the properties 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 for 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 other information such as whether it is newly built and whether the property is under leasehold or freehold. The information regarding the transactions is collected on a daily basis we are able to subset the information according to the pre-defined periods of analysis. Then we group transactions that belong to the same planning authority and retrieve the average price of them. The final output consists of an average price for each local planning authority for each period of analysis.

Inspired by **?**, our identification strategy exploits changes over time in the restrictiveness of the planning regulations. This variable is built considering a series of historical planning applications from the Department of Communities and Local Government (DCLG) since 1978 and it is defined as the refusal of 10 dwellings or more per year. As we shall explain in further detail below, this measure may be subject to endogeneity concerns. In order to correct for these potential limitations, we use an alternative measure of planning regulations, the rate in change of delay of major projects which is also obtained from the DCLG. We also use the variation in the historical political composition of the local authorities. Using data from the British Election Studies Information System, we capture a series of the historical Labour vote share at the General Election since 1983. In order to control for possible bias of associated with the former, we also include data on the most recent election corresponding to June 2015. Data are obtained from the Parliament website platform.[11]

Finally our regressions also include a number of control variables that represent

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[10]Further details may be found in https://www.digital.nhs.uk/article/219/What-is-NHS-Digital-

[11]Further information is provided in the following link http://www.data.parliament.uk/dataset/general-election-2015

various characteristics of the local markets where the care homes enter. These variables are retrieved mainly from the Department of Work and Pensions (DWP) and we provide a more detailed justification of their choice in the following subsection.

Table 1: Descriptive statistics

	Obs	Mean	Minimum	Maximum	Stdev
Care homes per 1000 population over 65	945	1.67	0.43	4.06	0.54
Average house price	945	268564.40	91157.13	2170757.48	179557.85
Share of population 85+	945	0.00	0.00	0.01	0.00
Share of population receiving Attendance Allowance	945	0.01	0.00	0.03	0.00
Share of population with pension credits	945	0.03	0.01	0.07	0.01
Share of female claiming for JSA	945	0.00	0.00	0.02	0.00
Share of population with income support	945	0.01	0.00	0.04	0.01
HHI	945	0.03	0.01	0.49	0.04
Share of Labour voters 2015	945	0.28	0.07	0.73	0.14
Rate of refusal of major	945	0.26	0.07	0.51	0.09
Rate of delay change	945	-0.04	-0.63	0.53	0.22
Historical share of Labour voters	945	0.16	0.00	0.41	0.09
Proportion of bad quality	945	0.19	0.00	0.66	0.12
Proportion of good	945	0.56	0.00	4.71	0.59
Average expenditure per capita	945	41004.65	2067.00	131972.00	29378.64

Table **??** shows descriptive statistics of the main variables of our estimation sample.The information is presented at the level of local planning authorities and we also include the sources of information employed. On average, over the period of analysis (March 2013 – September 2016) there were about 1.7 care homes per 1000 population over 65. Yet, this proportion varied notably across the different local planning authorities where some present less than 1 (0.4) care homes per 1000 population and some others more than 3.5 up to a maximum of 4.06. Other variables in Table **??** also reflect this local variation in the market for long term care. Interestingly there is a planning authority that registers a maximum average value for the houses of £2,170,757. Apart from this outlier, the average house prices is £268,764.

Econometric specification

Our purpose is to test the effect of the house prices on the proportion of care homes in local long term care markets. Considering a local authority i during a time period t, the proportion of care homes C can be estimated with a simple regression model specified as follows

$$C_{it} = \beta X_{it} + \alpha P_{it} + \psi_c + \epsilon_{it} \tag{1}$$

where X_{it} represents a vector with different observable variables that characterize the composition of local long term care markets and that we use as controls. Hence, on the one hand we define the demand for long term care in the local market by addressing a number of issues. Firstly, we include the proportion of people older than 85 and proportion of people that receive the attendance allowance[12] as proxies of the level of health dependency. Also, given the association between the financial needs and the funding support determined by the means-test, we incorporate the proportion of people that receive some sort of income support and the proportion of people that receive pension credits to reflect the payer composition within the local population. These variables have been previously used in the literature for these purposes (??). Likewise, given that long term care is a labour intense activity, we add the proportion of females that claim for job seekers' allowance in order to get a proxy for unemployment.

In addition to the former, X also includes a measure of the Herfindahl–Hirschman Index (HHI) to control for the competition between care homes in the local market. In our case, the HHI is a measure of concentration that reflects the squared shares of beds across all the providers in a local market. The values range from 0 to 1 where higher values represent higher concentration and therefore less competition. We also include county fixed effects ψ_c associated with each local authority in order to capture

P_{it} is the average of the house prices and ϵ represents an error term that is identically and independtly distributed. In this specification α is the parameter of interest and thus is

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[12]This benefit aims to support those people with physical disabilities in UK that live independently and might require residential care services otherwise.

interpreted as the impact of house prices on the proportion of care homes. Equation **??** can be estimated by OLS and will produce an unbiased estimate of α only if P_i is exogenous so that $Cov(P_i, \epsilon_i) = 0$. In case this occurs, this estimate may be effectively interpreted as a causal effect. Nonetheless, as we argue below, there may be elements that violate the former and introduce correlation between P_{it} and ϵ_{it} resulting in biased estimates of α. We address this concern by using an instrumental variables (IV) approach and estimating the two-least squares estimator of α.

Bias and specification

A potential element that can lead to inconsistent estimations of α may be the presence of unobserved variables that confound the effect of the house prices and proportion of care homes. For example, one may think about the effect of unobserved incomes that may affect positively the values of the properties and also incentivise the entries in the market given likely wealth effects. Hence, higher level of housing prices may result in wealth effects that lead to greater levels of consumption and then attract businesses. Hence the selection of an area by a care home provider is likely to be non-random and the effect of P_i may be associated partially with ϵ. In order to tackle with these potential problems, it is necessary to find an instrumental variable z that is uncorrelated with ϵ but is correlated with P_i.

The identification strategy for meeting this purpose is inspired on **?**. The underlying idea of their strategy relies on the variability in the level of restrictiveness associated with planning regulations across UK planning authorities for analysing the effects of local earnings on house prices. Their findings confirm the vision that tight supply regimes – e.g. with more regulatory constraints in the planning regulations, lead to increases in the prices. In our case, we apply directly the planning regulation instruments to the house prices. For our identification we assume that this instrument, in addition of being correlated with local earnings is also correlated with the house prices.

Both the relationship between planning regulations and house prices as well as the use of planning regulations for addressing endogeneity bias associated with house prices have been well documented in the literature. Considering the case of UK, several authors

have shed light with regards to the effects of tight planning regulations on house prices suggesting a positive relationship (**????**)

Yet there is a remaining problem concerning the way developers perceive the planning regulations. One may question whether the behaviour of developers is modified when they are aware of the level of tightness of certain local planning authorities are tighter than others. It may happen that if they know that some local planning authorities are particularly restrictive they may deter their applications and focus on other markets. If this occurs, then the observed refusal rates may not reflect the level of real restrictiveness, especially in the cases of more limiting local planning authorities. For coping with this limitation it is possible to exploit two identification strategies on the basis of **?**.

The first involves a planning reform aimed at speeding up the planning processes and the second links the planning regulations and the variation in the share of local political power. The main idea corresponding to the identification strategy based on the planning reform consists of exploiting the variation in the change in the delay rates before and after the reform. Set in 2002, the reform included the establishment of an explicit goal for major development projects. The main purpose of this target was to avoid the delays of major projects by local planning authorities. Despite they were not formally penalised for not meeting the target, local planning authorities did not have the incentive for neglecting the target either. The central government could retain financial resources addressed to local planning authorities. An option for local authorities to meet the target was to refuse greater projects and conversely approve smaller projects which could be finished on time.

On the basis of the former, it is possible to think on the behaviour of the local planning authorities before and after the reform paying particular attention to their level of restrictiveness. Thus, before the reform local planning authorities that were more restrictive would be also the ones that had greater delays and thereby the least likely to meet the target. Once the reform was established, these local planning authorities would be also the ones more likely to refuse more projects and therefore suffer less delays. Less restrictive local planning would not have to alter their behaviour substantially. Considering this, we allow for a 10-year period to represent the average delay rates pre and post reform. Hence we consider the delay rates 1994 and 1996 and the delay rates between 2004-2006.

Regarding the relationship of political power and the application of local planning regulations we take advantage of the variation in the political composition of the local council. In addition to **?**, this strategy has been used by other authors such **?**, **?** or **?**. Hence, we use the share of Labour party votes at the General Election of 1983. The information is obtained from the British Election Studies Information System. We choose the share of Labour voters since we believe that the attitudes of these voters will be more inclined to grant house access rather than to preserve the value of the properties. Also, we could have used the results derived from local elections. Yet, these might be correlated with the development of local housing markets and constitute a source of potential bias. The time frame of 1983 provides the earliest date where election results can be linked to data corresponding to local authorities and then minimizes the potential association between the outcome of the election and the planning process.

Considering these caveats, we specify equation **??** in order to estimate first-stage fitted values of the log house prices. The predicted values derived from this equation are used as instruments and incorporated in **??**in order to get a consistent estimate of α.

$$P_{it} = \delta Z_{it} + X\beta_{it} + \psi_c + u_{it} \tag{2}$$

where Z are a set of observables that will be used as instruments. For the reasons discussed above, we employ the share of Labour voters and the changes in delay rates pre and post reform. X incorporates the same set of market controls included in **??**.

Table **??** shows evidence on the validity of the instruments that we could consider for overcoming the endogeneity problems in our analysis. On te basis of the regression specified in equation **??**, the first column provides the estimates referred to the relationship between the rate of refusal and the house prices. The positive relationship between the level of regulatory tighhtness in the planning regulations and house prices is consistent with previous findings in the literature . Nonetheless, for the reasons exposed above the rate of refusal may suffer endogeneity so considering the regression with only this instrument would validate our results corresponding to the second stage. Columns 2 and 3 present the estimates corresponding to the instruments proposed to tackle with this

limitation - the change in the rate of delay and share of Labour voters respectively. The results of this first stage point at the direction that we would expect. Hence, the greater changes in the delay rates pre and post reform influence negatively the prices. In this case, these big differences would imply reductions in the rate of delay for restrictive local authorities which would be substituted with more rejections of the major projects and therefore greater refusal rates. Likewise, the share of Labour voters is also associated with lower levels in the house prices.

Table 2: First stage results, dependent variable house prices (log)

	Average house price (log)		
	Refusal rate	Change rate of delay	Share votes of Labour
	1.222***	-0.095	-1.672***
	(0.28)	(0.066)	(0.328)
Observations	945	945	945
R2	0.694	0.672	0.695
F (excluded instruments)	19.42***	2.07	46.32***

Notes: All regressions include the following controls. Share of people 85+, Share of people receiving Attendance Allowance, Share of people with pension credits, Share of females claiming for Job Seekers Allowance, Share of adults with income support, Herfindahl-Hirschmann Index, share of Labour voters for 2015. All regressions include fixed effect controls at county level. Robust standard errors in parentheses. Standard errors are clustered at local planning authority level. ***/**/*/+ denote significance levels at 1%, 5%, 10% and 15%. Standard errors are presented in parentheses.

According to the results derived from the F test of excluded instrument, we can conclude that P_i is weakly identified through the rate of delay change. Therefore we consider the share of Labour votes as the preferred instrument.

As we introduced before a potential issue for the reluctance of this instrument may be related to unobserved trends. For instance, some areas have been exposed to the inflow of certain residents that may changed the demographic composition of certain areas and this also modified the voting behaviour. In order to control for this we include the share vote for each local authority corresponding to the results of the last national elections celebrated in June 2015.[13]

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[13] **?** use this instrument for analysing the effect of planning regulations on the proportion of vacant

4 Results

4.1 House prices and market entries

Table **??** reports the main results derived from the estimation regarding the impact of house prices on the proportion of care homes based on the second stage of our specification presented in equation **??**. The results in first column ignore the fact that prices may be subject to endogeneity and report OLS estimates that indicate and adverse association between the care home entries and the level of prices in the housing market.

Table 3: Second stage results, effects of house prices on care homes entry

	Care homes per 1000 people over 65			
	OLS	IV	OLS	IV
Average house prices (log)	-0.111	0.846*		
	(0 .128)	(0.329)		
Average lagged house prices (log)			-0.132	0.863**
			(0.127)	(0.33)
Observations	945	945	945	945
R2		0.1406		
F statistic	17.02***		16.53***	
Cragg-Donald Wald F statistic		70.96		72.86
Kleibergen-Paap rk Wald F statistic		26.04		29.12

Notes All regressions include the following controls. Share of people 85+, Share of people receiving Attendance Allowance, Share of people with pension credits, Share of females claiming for Job Seekers Allowance, Share of adults with income support, Herfindahl-Hirschmann Index, share of Labour voters for 2015. All regressions include fixed effect controls at county level. Robust standard errors in parentheses. Standard errors are clustered at local planning authority level. ***/**/*/[+] denote significance levels at 1%, 5%, 10% and 15%. Standard errors are presented in parentheses.

The second column provides the estimates when we control for the endogeneity of the houses in England. They provide housing markets in Greater London as an example of areas that could have changed their voting behaviour as a consequence of these inflows.

house pricesg by using the Labour share of voters corresponding to each local authority. Thereby, areas that have higher level of house prices seem to attract care homes. Hence, we find that an increase of 100% in the level of prices would supposed an increase of 0.84 care homes for 1000 population over 65. Yet, this positive effect is significant at the 10% level.

One may argue that this effect is not correctly measured since the decision of entry in the market entails certain lags. For instance, providers may base their decision of entry in past house prices rather than the existing in the market. Furthermore using contemporaneous prices may lead to reverse causality issues. For the reasons outlined in previous sections, house prices may affect the entry of care homes. Analogously, care homes may be also an amenity in the area that may lead to an increase in the value of the properties located there. In order to tackle with these concerns, in columns three and four we present the results of the effects derived from house prices that are lagged two years. The effects are similar to the findings that we obtain while using contemporaneous house prices. Thus, the positive effect derived from the IV regression apart from being greater (0.86) is more significant at the 5% level.

In any case, according to the results from the Kleibergen-Paap and the Cragg-Donald Wald statistics, potential objections regarding the weakness of the identification for both contemporaneous and lagged prices, do not seem to be an issue.

Robustness checks

In order to test the robustness of our results, we run various models. Firstly, a plausible concern may be the presence of some outliers in the distribution of care homes. In order to overcome the potential influence of these observations we remove from the sample the top and bottom 5% of the care homes. Likewise, we also consider a sample without the planning authorities belonging to the region of London. The results of these analyses are shown in Table **??**. It is important to highlight that the specifications corresponding to each of the columns are identical to the specifications presented in Table **??**.

The results from Table **??** confirm the consistency of the baseline results. As shown in Figure **??** London reported the greatest increase in housing prices during the last two

Table 4: Robustness checks, effects of house prices on care homes entry

	OLS			IV	
	No controls	Controls	Change delay rate	Labour share	Labour share
	(1)	(2)	(3)	(4)	(5)
Average prices (log)	-0.2499***	0.0558	-0.0535	(0.2373)**	0.4160+
	(0.0387)	(0.1512)	(0.2195)	(0.1206)	(0.2755)
Main controls	No	Yes	Yes	Yes	Yes
Local authority controls	No	Yes	Yes	Yes	Yes
Additional controls				No	Yes
F	41.73***	26.49***			
R2	0.0424	0.2131			
Observations	945	945	945	945	945

Notes:All regressions include the following controls. Share of people 85+, Share of people receiving Attendance Allowance, Share of people with pension credits, Share of females claiming for Job Seekers Allowance, Share of adults with income support, Herfindahl-Hirschmann Index, share of Labour voters for 2015. All regressions include fixed effect controls at county level. Robust standard errors in parentheses. Standard errors are clustered at local planning authority level. ***/**/*/+ denote significance levels at 1%, 5%, 10% and 15%. Standard errors are presented in parentheses.

decades. The influence of those local authorities belonging to London is shown by a positive and higher but less significant effect of the house prices on the entry of care homes. Hence, an 100% increase of the house prices leads to increases of 1,6 and 1,5 care homes depending on the whether the house prices are correspond to the existing period of time or conversely are lagged.

The presence the outliers, as represented by the top and bottom 5% of our sample appear to have some influence in the results. Considering columns 5 to 8 in Table ?? the effect of house prices on the entry of care homes in addition of being positive, even for the OLS estimates, is significant at 5% level.

In general, these findings suggest that providers would be focusing on more affluent areas possibly aiming at securing potential clients that do not rely on public funding arrangements. A reason for this may be the aim of providers for minimizing the effect derived from the existing cross-subsidisation from self-funded to publicly funded clients. ? argue that this strategy has been followed by a number of long term care providers in

order to preserve their financial viability and overcome the funding crisis. In the next section we investigate further mechanisms that may explain the effects reported in Tables **??**.

4.2 Exploration of further channels

Effect on the social care expenditure

The positive effect of prices on the entry of care homes may be indicative of a transfer in the demand from the public to the self funded clientele. Next we test the effect of the house prices on the level of per capita expenditure in residential care. Rather than the whole adult population, we restrict our analysis to the population who is 65 or more since this is the segment of population more likely to demand these services.

Table 5: Second stage results, effects on per capita expenditures

| | Per capita expenditure on residential care | | | |
	OLS	IV	OLS	IV
Average house prices (log)	-0.153	-0.725^{+}		
	(0.122)	(0.483)		
Average lagged house prices (log)			-0.197	-0.74^{+}
			(0.128)	(0.484)
Observations	945	945	945	945
R2	0.8604			
F statistic	103.88***		103.59***	
Cragg-Donald Wald F statistic		70.959		72.864
Kleibergen-Paap rk Wald F statistic		26.039		29.122

Notes:All regressions include the following controls. Share of people 85+, Share of people receiving Attendance Allowance, Share of people with pension credits, Share of females claiming for Job Seekers Allowance, Share of adults with income support, Herfindahl-Hirschmann Index, share of Labour voters for 2015. All regressions include fixed effect controls at county level. Robust standard errors in parentheses. Standard errors are clustered at local planning authority level. ***/**/*/$^{+}$ denote significance levels at 1%, 5%, 10% and 15%. Standard errors are presented in parentheses.

The results derived from Table **??** are in line with what should be expected. The negative effect of house prices on the expenditure per capita is the result of the inclusion of the property value in the means test. Higher values of the properties reduce the elegibility for being publicly funded. Also, the low significance may be explained by the fact that in these local authorites there may be a fewer proportion of people that actually demand these public support.

Effect on the distribution of care homes per level of quality

An alternative channel can be the distribution of care homes by their level of quality. In Table **??** we show the results derived from the effect of house prices on this distribution. We can see that the effects are to greater extent more pronounced in the case of care homes of better quality although in any case these effects are not significant.

Table 6: Second stage results, effects on distribution of care homes by quality

	Good quality care homes				Bad quality care homes			
	OLS	IV	OLS	IV	OLS	IV	OLS	IV
House prices	0.144*	0.189			0.06**	0.02		
	(0.086)	(0.24)			(0.018)	(0.06)		
Lagged House prices			0.138+	0.193			0.04*	0.02
			(0.09)	(0.246)			(0.02)	(0.061)
Observations	945	945	945	945	945		945	
R2	0.2942		0.2936		0.4379		0.432	
F statistic	12.34***		11.91***		21.25***		20.72***	
Cragg-Donald Wald F statistic		70.959		72.864		70.959		72.864
Kleibergen-Paap rk Wald F statistic		26.039		29.122		26.039		29.122

Notes All regressions include the following controls. Share of people 85+, Share of people receiving Attendance Allowance, Share of people with pension credits, Share of females claiming for Job Seekers Allowance, Share of adults with income support, Herfindahl-Hirschmann Index, share of Labour voters for 2015. All regressions include fixed effect controls at county level. Robust standard errors in parentheses. Standard errors are clustered at local planning authority level. ***/**/*/+ denote significance levels at 1%, 5%, 10% and 15%. Standard errors are presented in parentheses.

5 Conclusion

In this study we have investigated whether the high prices in the English housing market respresent a barrier to the provision of long term care services or contrarily they provide an incentive for care homes to set their services. First, we test for simple OLS regression and we show that there are empirical constraints that produce biased estimates. Consequently we address these concerns by considering different variables associated with planning regulations to instrument the house prices. According to our findings, the use of the share of political power performs as a better instrument for addressing potential endogeneity concerns related to house prices.

The results then suggest that house prices are positively associated with the entries and providers might therefore be driven to set their businesses in places where the prices of the properties higher. We explore the underlying mechanism of this effect by examining how house prices affect the number of care homes according to their quality rating. In sum, the positive effect of house prices on the entry of care homes is greater in cases where care homes have a better overall rating. A further avenue for this research could consider each of the dimensions involved in the quality inspections.

Our results also point out at the connection between the housing market and the market of long term care activities. The coordination between local authorities at both county and district level is therefore encouraged to facilitate the provision of further evidence about the relationships between both types of markets.
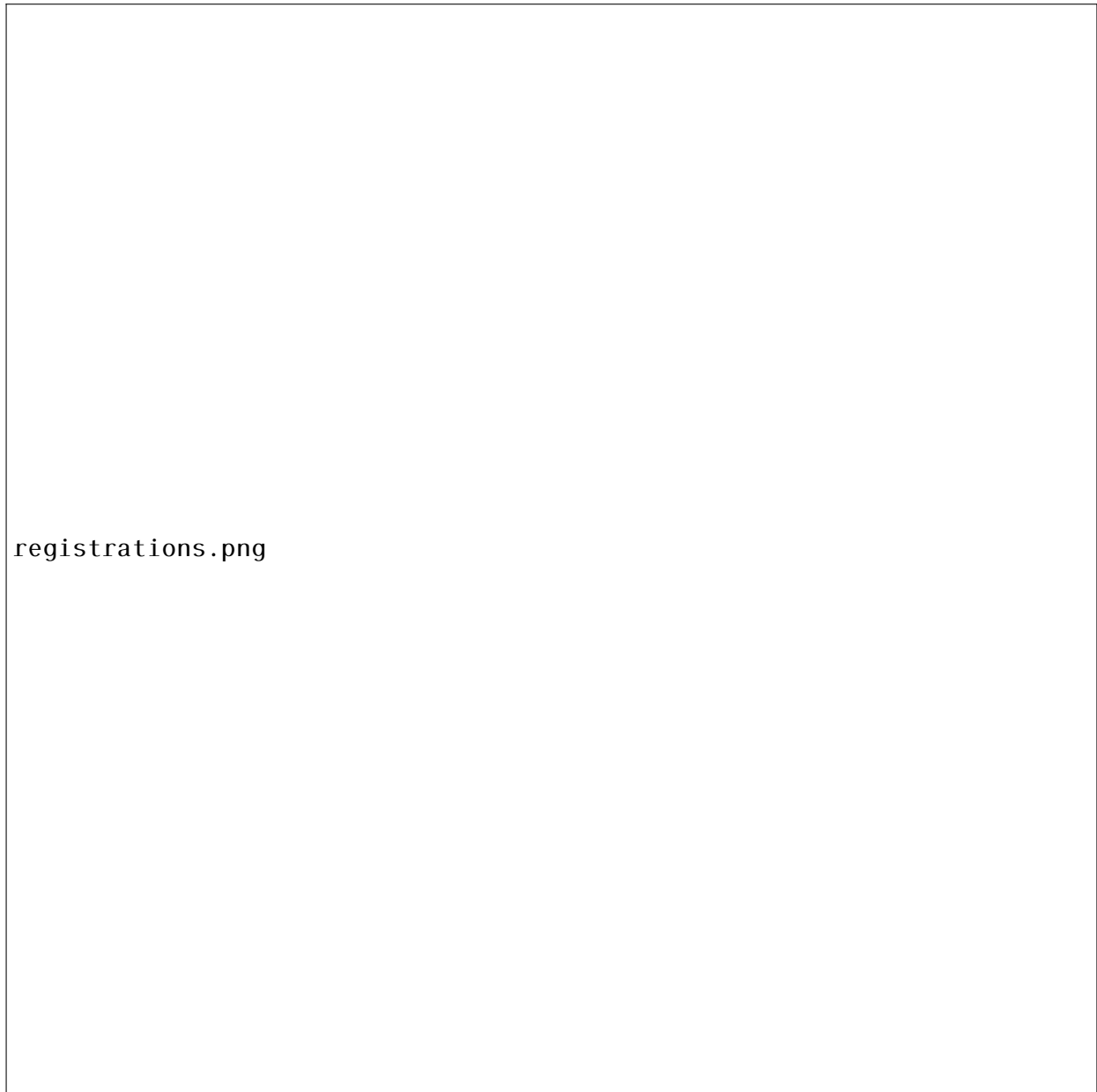
registrations.png

Figure 2: Care homes registrations in the CQC (2011- 2016)