

Regression results

New variables included in the analysis

We are interested in reflecting the effect of local house prices on local residential long term care markets. First we estimate the effect of house prices on the distribution of care homes per 1000 population over 65.

A potential problem for the empirical analysis concerns the endogeneity associated with the house prices. In order to tackle it, we exploit the variability on the restrictiveness of local planning regulations over time. The variable that we use for measuring this restrictiveness, the rate of refusal of 10 dwellings or more in a year, may be also subject to endogeneity problems given its procyclicality. In order to address them we use two alternative variables associated with planning regulations (the rate of delay for major projects) and the political composition of the local authority (the share of Labour voters)

Furthermore, there may be other variables which could affect the house prices. Particularly, there may be physical constraints such as the share of developable land in each local authority that can also influence the house prices. This proportion of land, however, is the result of the interaction between the supply and demand in each local housing market and then may suffer endogenous problems. To control for this limitations it is possible to use the share of population in 1911 as a proxy of former agglomerations.

Likewise the analysis includes a number of variables that represent various characteristics of the local long term care market. All the variables are summarised in Table [1](#)

IV results

Table [2](#) presents evidence corresponding to the validity of each of the instruments considered. Results from the first stage report the expected effect of planning regulations on prices. Local controls are expressed in terms of whether the local planning authority

Table 1: Summary statistics

	Obs	Mean	Minimum	Maximum	St.Dev
Care homes per 1000 population over 65	945	1.6678	0.4255	4.0611	0.5416
Average house prices	945	268564	91157	2170757	179558
Share of population 85+	945	0.0025	0.0002	0.0122	0.0016
Share of population receiving Attendance Allowance	945	0.0106	0.0043	0.0263	0.0039
Share of population with pension credits	945	0.0339	0.0130	0.0705	0.0100
Share of female claiming for JSA	945	0.0047	0.0007	0.0185	0.0032
Share of population with income support	945	0.0122	0.0028	0.0402	0.0059
HHI	945	0.0320	0.0064	0.4873	0.0352
Share of Labour voters 2015	945	0.2810	0.0698	0.7301	0.1448
Rate of refusal major projects	945	0.2563	0.0732	0.5090	0.0879
Rate of delay change	945	-0.0376	-0.6345	0.5310	0.2197
Historical share of Labour voters	945	0.1625	0.0010	0.4103	0.0886
Proportion of care homes (bad quality)	945	0.1905	0.0000	0.6585	0.1232
Proportion of care homes (good quality)	945	0.5597	0.0000	4.7143	0.5940
Average expenditure per capita	945	41004	2067	131972	29378
Share of developable land developed in 1990	945	0.2729	0.0090	0.9621	0.2356
Population density in 1911	945	774.7089	3.2504	22028.7969	2633.3879

is a unitary authority, with more competencies and tax discretion, or not.¹

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

	Average house prices (log)			
	Refusal rate	Change delay rate	Labour share	Labour share
	3.213*** (0.164)	-0.545*** (0.086)	-3.001*** (0.192)	-2.063*** (0.317)
Local Unitary Authority controls	Yes	Yes	Yes	Yes
Additional controls			No	Yes
Observations	945	945	945	945
F(excluded instruments)	382.97***	40.27***	246.29***	42.47***
Cragg-Donald Wald F statistic	803.155	92.210	565.55	97.108
Kleibergen-Paap Wald rk F statistic	382.970	40.267	246.29	42.475

Notes: Additional controls include the share of Labour voters in 2015. Robust standard errors are presented in parentheses. Standard errors are clustered at local planning authority level. ***/**/*/+ denote significance levels at 1%, 5%, 10% and 15%.

Table 3 reports the results of the second stage. The second column associated with the share of Labour votes controls for share of Labour voters in the last election in 2015.

¹The use of controls local planning authorities leads to problems of collinearity. Alternatively we use controls related to the type of local authority. We control for single tier local authorities - eg. unitary authorities which may have greater discretion on issues related to housing markets such as the council tax.

Table 3: Second stage results, 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)	0.270*** (0.038)	0.048 (0.154)	-0.053 (0.216)	0.245** (0.125)	0.429+ (0.288)
Main controls	No	Yes	Yes	Yes	Yes
Local Unitary Authority controls	No	Yes	Yes	Yes	Yes
Additional controls				No	Yes
Observations	945	945	945	945	945
F	51.27***	29.69***			
R2	0.0516	0.2129			

Notes: Main controls include: 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. Additional controls include the share of Labour voters for 2015. Robust standard errors are presented in parentheses. Standard errors are clustered at local planning authority level. ***/**/*/+ denote significance levels at 1%, 5%, 10% and 15%.

Robustness

One may argue that these effects are not correctly measured since the decision of entry in the market entails certain lags. For instance, providers may make their decision of entry on the basis of past house prices rather than the existing in the market. Furthermore using contemporaneous prices may lead to reverse causality issues. Care homes may constitute an amenity in the area that may increase the value of the properties located there. In order to tackle with this problem, Table 4 shows the results of the effects of lagged house prices on care homes entry.

We run alternative robustness tests of our results based on different subsamples of our initial sample of analysis. 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 5. The specifications corresponding to each of the columns are identical to the specifications that resulted in the estimates presented in Table 3. The order of the columns follow the same order as Tables 3 and 4

Table 4: Robustness test, lagged prices

	OLS			IV	
	No controls (1)	Controls (2)	Change delay rate (3)	Labour share (4)	Labour share (5)
Lagged average prices (log)	-0.25*** (0.039)	0.056 (0.151)	-0.053 (0.219)	0.237** (0.121)	0.416+ (0.275)
Main controls	No	Yes	Yes	Yes	Yes
Local Unitary Authority controls	No	Yes	Yes	Yes	Yes
Additional controls				No	Yes
Observations	945	945	945	945	945
F	41.73***	26.49***			
R2	0.0424	0.2131			
Cragg-Donald Wald F statistic			90.586	642.005	110.643
Kleibergen-Paap Wald rk F statistic			38.311	269.761	49.582

Notes: Main controls include: 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. Additional controls include the share of Labour voters for 2015. Robust standard errors are presented in parentheses. Standard errors are clustered at local planning authority level. ***/**/*/+ denote significance levels at 1%, 5%, 10% and 15%.

Table 5: Robustness tests, effects of house prices on care homes entry

	Top and Bottom 5% excluded					London Region excluded				
	OLS	OLS	IV	IV	IV	OLS	OLS	IV	IV	IV
	-0.146*** (0.032)	0.203*** (0.067)	0.168 (0.190)	0.183** (0.086)	0.43** (0.219)	-0.232*** (0.048)	0.088 (0.119)	0.044 (0.254)	0.314** (0.145)	0.684 (0.585)
Main controls	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Local Unitary Authority controls	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Additional controls				No	Yes				No	Yes
Observations	841	841	841	841	841	849	849	849	849	849
F	20.30***	31.34***				23.68***	24.16***			
R2	0.0236	0.2254				0.0272	0.1961			
Cragg-Donald Wald F statistic			81.390	552.080	101.174			80.132	492.903	33.315
Kleibergen-Paap Wald rk F statistic			35.692	245.877	41.813			31.793	239.974	19.815

Notes: Main controls include: 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. Additional controls include the share of Labour voters for 2015. Robust standard errors are presented in parentheses. Standard errors are clustered at local planning authority level. ***/**/*/+ denote significance levels at 1%, 5%, 10% and 15%.

Alternative mechanisms

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. We then test the effect of the house prices on the level of per capita expenditure that local authorities spend on 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. Results are reported on Table 6

Table 6: Effects on per capita residential expenditures

	OLS		IV		
	No controls	Controls	Change delay rate	Labour share	Labour share
	(1)	(2)	(3)	(4)	(5)
	-0.133	0.292	0.713 0.323	-1.783 ⁺	
	(0.125)	(0.304)	(1.955)	(0.812)	(1.136)
Main controls	No	Yes	Yes	Yes	Yes
Local Unitary Authority controls	No	Yes	Yes	Yes	Yes
Additional controls				No	Yes
Observations		945	945	945	945
F	1.13	18.97***			
R2	0.0012	0.3488			
Cragg-Donald Wald F statistic			27.77	170.219	89.793
Kleibergen-Paap Wald rk F statistic			11.49	70.394	39.884

An alternative channel can be the distribution of care homes by their level of quality. In Table 7 we show the results derived from the effect of house prices on the distribution of care homes according to their quality rating.

Table 7: Second stage results, effects on distribution of care homes by quality

	Good quality care homes					Bad quality care homes				
	OLS	OLS	IV	IV	IV	OLS	OLS	IV	IV	IV
	0.155***	0.13*	-1.02*	0.458**	0.317	0.032***	0.054**	-0.012	0.004	0.036
	(0.042)	(0.071)	(0.578)	(0.215)	(0.3)	(0.009)	(0.016)	(0.109)	(0.053)	(0.071)
Main controls	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Local Unitary Authority controls	No	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes
Additional controls				No	Yes				No	Yes
Observations		945	945	945	945	945	945	945	945	945
F	13.54***	38.90***				13.71***	67.12***			
R2	0.0142	0.2335				0.0143	0.3577			
Cragg-Donald Wald F statistic			27.769	170.219	89.793			27.769	170.219	89.793
Kleibergen-Paap Wald rk F statistic			11.494	70.394	39.884			11.494	70.394	39.884