Essays on the empirical economics of long term care

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May 2019

A thesis submitted to the Department of Economics of Newcastle University Business School for the degree of Doctor of Philosphy in Economics

If you get lost, get unlost

Mike Hall (1981 -2017)

Abstract

An ageing population combined with several socioeconomic changes are modifying the requirements and the ways by which long-term care is provided. This thesis comprises a collection of empirical chapters focused on key aspects concerning the provision and quality of long-term care services in England.

The organisation of long-term care in England is characterised by an important complexity that includes several institutions involved in the management and funding of these activities and they operate both at local and national level. Chapter 2 discusses the main characteristics associated with organisation of long-term care in England.

Using a sample of English local authorities and an instrumental variables design that exploits the degree of restrictiveness of urban planning regulations, chapter 3 documents, for the first time, the causal effect of house prices on the provision of long term care services in local markets. The analysis provides evidence that higher house prices lead to fewer care homes, fewer entries into the market and fewer beds available. Yet, the study also finds a positive effect of house prices on the proportion of care homes with high quality.

Using data on care home quality inspections, chapter 4 examines the effect of changes in local funding on the quality of long term care services. Particularly, the chapter explores the extent by which changes in the spending power of local authorities have contributed to the improvement and deterioration of care home quality. To describe the transition between ratings over time, the analysis fits a semi-parametric hazard model and corrects for unobserved heterogeneity. The findings of this chapter suggest that negative changes in spending power are associated with a lower frequency of inspections and a lower propensity to improve the quality. On the other hand, positive changes are not necessarily related to quality improvements, especially in care homes with bad management.

Chapter 5 provides the first evidence for the English care homes market on the causal effect of care home closures on other care homes. Using an instrumental variables strategy, with public administrative data, that exploits consolidations within the care home corporate group as shocks of exogenous variation for care home closures, the chapter shows that incumbent care homes increase the probability of downgrading their quality after the closure of a care home nearby. Yet, the effect is relatively small and decreases over time suggesting that remaining care homes accommodate the shock of demand and minimise the potential harm from the closure.

The joint theme and major contribution of this thesis consists of bringing new evidence on relevant issues in applied, health and long-term care economics by using datasets and applying econometric techniques in a novel manner.

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Acknowledgements

I am grateful to many people who have accompanied me until the completion of this thesis. First of all, I would like to thank my supervisors Volodymyr Bilotkach, Nils Braakmann and John Wildman for being always available for my queries and providing excellent advice, support and expertise through my PhD research. Under their supervision and guidance I have learned the main ingredients to become an independent researcher. Their attitude and approach for conducting research will remain as an outstanding example in the years to follow. I am also grateful to the Economic Social Research Council (ESRC) for the financial support of the project.

I would like to thank Morgan Beeson and Scott Kirkman who have patiently listened every single good or bad idea from this project. Heather Brown has been a great mentor before and during this PhD. Las reflexiones con mis amigos de la primera promoción del Máster de Economía en la Universidad Complutense de Madrid (UCM): Alberto, Juan, Mar, Gabi, Mateo, Martha y Carmen, contribuyeron a alimentar mi interés por la economía académica y en última instancia hacer un doctorado. Mención especial para Alberto Núñez quien con su experiencia me ha iluminado en incontables ocasiones en este viaje. Muchas gracias también a Juan César, quien además de ofrecer ánimo, ha estado siempre dispuesto a discutir y revisar muchos de los textos de esta tesis.

I am also grateful to people outside the university who have been interested in how this project was evolving and provided great support – even when they were not fully understanding what I was talking about. Special thanks to my friends in Newcastle who were in the inception of this project: Pepe, Elena, Irene and Raúl and those who have been during the development of it: Eleni, Panos, Helen and Michalis. En casa, Pol, Pablo y Jules han sido los grandes artífices de mantener en su sitio mi salud mental.

Aunque no sean muy conscientes de ello, gran parte del éxito de este proyecto corresponde a mi familia: mi madre Bego, mi padre Anselmo, mi hermana Isa y mi abuela Alfonsa. Ellos han sido mis grandes valedores y me han apoyado tanto en esta como en todas las decisiones que he tomado a lo largo de mi vida. De ellos he aprendido aspectos fundamentales para la consecución de un doctorado como son el esfuerzo, la curiosidad y la importancia por el trabajo bien hecho. Este trabajo está dedicado a ellos.

Finalmente, talvez a maior gratidão seja dada à Andreia por ser uma testemunha direta dos ”highs” e dos ”lows” do doutoramento. Muito obrigado pela paciência, tempo e compreensão.

Declaration

I declare that this thesis is a presentation of original work under the guidance and supervision of Dr Volodymyr Bilotkach and Professors Nils Braakmann and John Wildman. They have provided comments and suggestions on drafts of all chapters in this thesis. A substantial part of this research has been enriched with comments received in conferences and discussions with other colleagues in the profession.

An early version of chapter 3 has been discussed by Alex Perez-Laborda and Luke Munford at the 5th PhD Student Workshop in Industrial and Public Economics in Universitat Rovira i Virgili and the 2016 Health Economists' Study Group (HESG) in Aberdeen respectively. It has also received helpful comments and suggestions from participants in both meetings as well as Scott Kirkman.

An early version of chapter 4 has been presented at the conferences of the 2018 Spanish Health Economics Association (AES) in Gran Canaria (Spain) and the 2018 European Health Economics Association (EuHEA) in Maastrich (The Netherlands).

An early version version of chapter 5 has benefited from comments and suggestions of Heather Brown, Juan César Palomino, Mar Delgado Tellez, Francesco Longo, Scott Kirkman and Florin Vadean as well as participants in seminars at Durham PhD economics group, Universidad Complutense and the 2019 Health Economists' Study Group (HESG) in York.

Chapter 1

Introduction

This thesis addresses relevant aspects associated with the economics of long-term care. Focused on England, this thesis is articulated around three main research questions: What is the effect of housing markets in the provision and quality of long-term care? Do changes in the spending power of local authorities affect the quality of long-term care? What happens with the quality of a care home when another care home closes nearby?

Meeting the long-term care needs constitutes a major challenge for most developed societies. The demographic trends, characterized by an ageing population, as well as some societal changes, which include issues such as the incorporation of women to the labour markets or new family structures, are modifying the ways long-term care is delivered. Hence, the provision is shifting from family and friends to institutions such as nursing and residential care homes. Since most of the long-term care expenditure addresses the provision of services (Siciliani 2013), the delivery of long-term care is a recurring topic in policy agendas of OECD economies. Unlike healthcare, the main purpose of which is to cure or prevent ill-health, the aim of long-term care consists of preserving optimal levels of independence and functioning. Long-term care involves a range of different activities in addition to medical care and the provision concerns different types of providers grouped in two main categories: formal paid provision and informal unpaid provision. The work of this thesis is concerned with aspects that influence the provision of formal care giving special consideration to the services in care homes.

As it occurs in other areas of public policy, a key goal in the economic analysis of long-term care is to ensure the equity and efficiency of services. Nevertheless, as Fernandez et al. (2011) argue, this analysis is challenging for at least two reasons. The first challenge is associated with the complexity involved in the measurement of key issues such as the quality of the long-term care services. The number of different dimensions considered in the process of long-term care entail difficulties for the analysis of quality. Hence, quality is the second common theme across the chapters of this thesis. Specifically, the empirical work presented in this thesis deals with some aspect associated with the quality of long-term care services.

The thesis is organised in four chapters that share common elements such as the general background, a substantial proportion of the data sources and most of the bibliography. The management and organisation of long-term care in England is a complex matter organised locally and involving several key institutions. Chapter 2 provides a detailed presentation of the main elements regarding this organisation. The contents of this chapter will then feed the institutional framework of subsequent empirical chapters. Chapter 3 is concerned with the influence of another important local market, housing, on the provision and quality of long-term care. Further, in a context of economic austerity that led to reductions in the funding from the central government to local authorities, chapter 4 investigates the influence of changes in local public finance on the improvement and deterioration in quality of long-term care. The last study in chapter 5 explores the effects of changes in the market structure as a consequence of care home closures on the variation of quality in the existing neighbour care homes.

Chapter 3 explores the relationship between the housing and long-term markets. Housing markets influence a number of household decisions on a range of issues. England is an interesting case study given the considerable increase in house prices compared to the real wages experienced during the last two decades and the underlying disparities of this process. The motivation of this chapter is to explore the role of house prices on services normally addressed to the elderly, the sector in the

population that have benefited the most by the growth in house prices. In particular, this chapter argues that house prices may lead to negative consequences if long-term care services, mainly demanded by the elderly, cannot locate in areas with high prices. The findings of this chapter provide evidence supporting the latter argument. In particular, high house prices reduce the entry of care homes in those local markets. Moreover, high house prices lead to smaller care homes and fewer beds available. Despite these findings, the chapter also finds evidence of the positive effect of house prices on the local proportion of care homes with high quality suggesting a positive valuation for the quality of service. The contributions of this chapter to the literature are twofold. It provides the first empirical evidence for the causal link between house prices and long-term care provision as well as the quality of residential care home services. Secondly, this chapter examines the most recent regulatory period regarding quality inspections.

Chapter 4 is concerned with the association between local public finance and the quality of long-term care services. Since 2010 English local authorities have experienced a general reduction in the financial resources from the central government, modifying the financial capacity of local authorities. This chapter examines to what extent such variations in the local spending power have affected the quality of care homes. The results suggest that negative changes in spending power are associated with a lower frequency of inspections and a lower propensity to improve the quality. On the other hand, positive changes in the spending power are not necessarily related to quality improvements, especially in care homes that are poorly managed. The findings of this chapter add to the literature by exploring the role of public finance on the quality of care homes. Unlike most studies analyzing the quality of care or nursing homes, this work measures quality by means of a quality rating instead of measures based on inputs and outcomes of the long-term care process.

The third empirical chapter (chapter 5) analyses the effects of change in the market structure on quality and provides the first evidence for the English care homes market on the causal effect of care home closures on the quality of other care homes. Whilst

most studies in the literature have been focused on the consequences of care home closures on displaced patients' conditions, less is known about the implications for other incumbent care homes in the market. This chapter examines the effects of care home closures on the quality of their neighbouring care homes that remain in the market. Results from the chapter show that for incumbent care homes the probability of downgrading their quality increases after the closure of a care home nearby. Yet, the effect is relatively small and decreases over time, suggesting that remaining care homes accommodate the shock of increased demand and minimise the potential harm from the closure.

A second challenge with respect to the economic analysis of long-term care, consists of establishing suitable relationships between variables of interest that enable an appropriate assessement of relevant outcomes (Fernandez et al. 2011). The chapters that compose this thesis are conceived from an empirical perspective and share the common aim of providing robust evidence to inform policies concerning long-term care in England. In addition to grasping the impact of policy measures, this perspective is useful for presenting facts and contributing to understand causal mechanisms between the variables of interest. This type of analysis is, however, subject to challenges such as the availability, analysis and manipulation of suitable sources of information to address key policy questions, the design of appropriate identification strategies to overcome the effect of potential biases and the external validity of the results from the analysis.

To this regard, a contribution of this thesis consists of combining existing open and public administrative data in novel ways. Hopefully, the final data used in this thesis can be considered as a relevant source of information for future analysis associated with the care homes market in England. Chapter 3, for instance, combines information released by the Care Quality Commission (CQC) on care homes registrations and quality ratings with information on property transactions from the Land Registry and an existing dataset with information on planning regulations. A crucial task to construct this dataset is to find the appropriate key variables that enable to link several

pieces of information referred to different units of observation and time frameworks. For chapter 4, a number of datasets with records on quality inspections were merged to track and understand the care homes performance in terms of quality. This information was linked to available data concerning local authorities public finance to build a dataset that collected information not only from the care homes but also from the characteristics of the market where it was located. A key challenge for this dataset is the definition of spells that are relevant to understand the variations in quality. Finally, chapter 5 involved calculating distances between active care homes and closing care homes within established catchment areas as well as defining time intervals between the dates of closure and inspection respectively.

A second common theme of this thesis is the methodological approach. All chapters of this thesis intend to establish causal relationships between variables of interest using the econometric techniques that compose the toolset in applied microeconomics and policy evaluation. The interest in knowing causal relationships is important for making predictions about what would happen in alternative (counterfactual) worlds (Angrist and Pischke 2009). However, defining good counterfactuals that allow an *"other things equal"* comparison (Angrist and Pischke 2015), is always challenging. The variation in the observations used for comparisons is unlikely to be produced only by the variable of interest but also by other variables, normally unobserved, that could influence the outcome. To overcome the influence of the latter, a gold standard strategy consists of assigning randomly the variable of interest across the observations. For this, a benchmark research design are randomized controlled trials (RCT). Yet, since experiments are time consuming and expensive, they are not always the most efficient research design and may have some limitations[1]. Further, the experimental data from trials are hard to find. An alternative strategy is the use of natural or quasi experiments that enable the comparison of non-experimental data by exploiting the variation of exogenous events in the main explanatory variables (Meyer 1995). Using economic

[1] In cases where participation is voluntary among those randomly assigned to receive the treatment, RCTs may have a problem of self-selection leading to a misleading comparison between treated and controlled groups (Angrist and Pischke 2009).

theory as the context to define the causal questions and framed in the credibility revolution (Angrist and Pischke 2010), the aim of these empirical strategies is to detail the use of non-experimental data to mimic a real experiment (Angrist and Krueger 1999)[2]. Chapters 3, 4 and 5 are produced considering this methodological framework and using such techniques.

Chapter 3 uses an instrumental variables (IV) strategy to examine the effects of house prices on care homes' provision and quality. This method, pioneered by Wright (1928) in the estimation of supply and demand of flaxseed, has been widely used in economics (see Angrist and Krueger (2001) for a review). An instrument is a variable that affects the variable of interest and that represents the treatment intake but is not directly associated with the variable that is the outcome. Chapter 3 uses the variation in the adoption of a local planning policy, the changes in the vote share, physical constraints and historical population density of English local authorities. This set of instruments has been used previously for the examination of tight supply constraints on house prices in England (see Hilber and Vermeulen (2016)).

Chapter 5 also uses an IV approach to analyse the effects of care home closures on the quality of care homes nearby. The instrument used in this study is based on a corporate decision of the care group by which a provider with care homes across several parts of the country decides to consolidate (i.e. close several care homes) to maintain its financial position. This instrument is inspired in Nguyen (2019) who analyses the effects of bank branch closings on local access to credit. The instrument used in this paper is based on within-county tract-level variation in the exposure to post-merger branch consolidation.

Chapter 4 uses a duration model to study the time a care home remains in a certain quality rating and how this duration is affected by changes in local public finances. In economics[3], early applications using duration analysis have been based on labour economics for the analysis of duration of unemployment and jobs (see Devine, Kiefer

[2]See Wooldridge (2010) or Abadie and Cattaneo (2018) for a more recent review of these methods.
[3]See Kiefer (1988) for an introduction in economics.

et al. (1991) for a review), strike durations (Kennan 1985) or the duration of training programs (Bonnal et al. 1997). More recent applications have been devoted to other fields such as business, population or political economics (see Van den Berg (2001) for extensive review). In a health economics context duration models have addressed issues such as smoking cessation and innitiation (see Forster and Jones (2001), Balia and Jones (2011) or Jones et al. (2013) for examples).

Chapter 2
The organisation of long term care in England

2.1 Introduction

Long-term care involves care and support for activities that most of the population take for granted (Singh 2014). The main purpose of long-term care consists of providing support to make people live as independently as possible and help in situations of crisis (Humphries et al. 2016). Current demographic trends in England are showing an increase in the share of aged population. People, in addition to living longer, also present more complex cases that entail greater needs and require more specialised care. These factors are increasing the need for a type of long-term care that ensures a good quality provision of the services. In England, there are several types of services as well as institutions involved in the provision of long-term care services. This chapter introduces their main characteristics.

Considering a general perspective, the chapter begins discussing the primary aspects associated with the demand of long-term care. Although it is not necessarily a problem per se, longer lifespans normally are linked to greater levels of dependency and need. The chapter then reviews the main factors that have led to an increase in the life expectancy and explores the demographic structure in England showing the differences over the country. Also, it addresses the main points associated with another key determinant of the demand for long-term care: the composition of informal – unpaid care. Due to several socioeconomic changes, the provision of informal care will likely change in next decades. The chapter addresses the main challenges faced by the informal care of the future.

After addressing the core elements that comprise the demand for long-term care, the chapter turns its attention to the core foundations associated with the supply

of institutional – paid long- term care. It discusses the differences between health and social care in England and the funding implications that apply to both types of care. Unlike health care, which is free at the point of use, social care is means tested and managed independently by local authorities. These assessments, in addition to evaluating the level of need, also determine the degree of financial support from public budgets. The chapter explores the types of activities that are covered as well as the levels of income that determine the limits for public support. Further, the chapter also analyses the market composition resulting from the reforms aimed at including market mechanisms for the provision of long-term care. As Propper (2018) describes for the case of health care, these reforms, which commenced with the Health Care Act in 1990, have been characterised by three general elements. First, a decentralisation of the decision making leaving local governments as the main institutions in the management of long-term care services; second, a wider competition between providers on the basis of a split between the provision and funding model that enables wider choice for the users; third, a quasi-market that differentiates two types of demand depending on their funding schemes. The chapter discusses the principal elements corresponding to each of these points.

The final part of the chapter presents the main elements of Local Governments. Local Governments are key for the management of long-term care services. Nonetheless, both their organisation and funding arrangements are complex. The chapter reviews the structure of Local Government, based on two tiers with different responsibilities, and the different sources that compose local budgets. This is an important matter given the forthcoming refroms aiming at localising some funding currently retained by the central Government. Also, the chapter presents other institutions involved in long-term care. In particular, it introduces the Care Quality Commission (CQC) which is the independent regulator of long- term care in charge of registering, inspecting and monitoring long-term care services. As there are other institutions that play a role over other essential elements of long-term care, such as workforce, the chapter introduces their main purpose and characteristics.

The chapter concludes examining a key topic for this thesis such as the quality of long-term care care services. It firstly reviews the main approaches to measure the quality and follows with the introduction of the primary elements that compose the quality systems in long-term care.

2.2 The demand for long-term care

The provision and quality of long-term care services depend notably on the magnitude and characteristics of the demand for long-term care. The demand is essential to explain the pressures faced by long-term care and it is crucial for shaping the composition of the long-term care services in the future. Colombo et al. (2011) highlight four important aspects associated with the demand for long-term care. First, there is a rapid increase in the share of older people in the adult population which will lead to more long-term care. At the same time, some societal changes are modyfing the way long-term care is provided. Whereas in past decades most long-term care was provided informally by family relatives and friends, now there are new family compositions with fewer children. At the same time, there has been an incorporation of women in the labour market. Both facts have resulted in reductions of the informal care provision and increases in formal care. Related to the former points, the third main element associated with the demand for long-term care is the request for more and better quality in the services. A final factor consists of the technological changes that enable different ways of care provision and require different organisation of the services. This section focuses primarily on the population trends and the changes in the informal care provision.

OECD countries are currently experiencing an ageing population. Life expectancy has increased in all countries (see Figure 2.1) due to a number of factors such as low fertility rates, the adoption of healthier lifestyles, improvements in the socioeconomic conditions or the increase in health spending. Figure 2.2 shows the relationship between life expectancies and health expenditures for OECD countries. Despite having

similar levels of health spending per capita, some countries show substantial differences in their life expectancy trends. Countries such as the US, for example, have a high health spending but a low life expectancy. These results suggest that other factors such as the adoption of healthy lifestyles also play an important role for the increases in life expectancy. Since the beginning of the 2000s, societies have become healthier in general. However, obesity or behaviours such as smoking or alcohol consumption have followed disparing patterns. Considering the period from 2000 to 2015, whilst smoking has generally decreased in the majority of countries, alcohol consumption and obesity have registered increases. Figures 2.3, 2.4 and 2.5 show the trends on alcohol consumption, smoking and obesity respectively. In addition to having older societies, OECD countries also are also having greater proportions of old people as share of the total population.

Looking at the demographic trends in England, we observe that the proportion of people over 65 per 1000 adult population (defined as the old age dependency ratio) will experience a general increase although the distribution will not be even across local authorities (see figure 2.6). Neighbouring local authorities to London have and will remain having the highest proportions of young populations. Although these trends associated with the ageing shed some light about the demand for long-term care, they do not represent the whole picture. A relevant aspect related to the demand for long-term care concerns the degree of (in)dependence that potential long-term care users have. Since disability increases with age[4], it is likely that an older population that grows more than any other generation within the population will increase the levels of dependency and consequently the need for long-term care. The proportion of dependency rates also show regional disparities in England with London and the North East presenting the two extremes[5]. Compared to other countries in the OECD,

[4]Wittenberg (2016) reports that the proportion of people with disability in Britain rises from about 10% in people aged 65-69 to 50% in people aged 85 or more.

[5]The ONS argues that these differences respond not only to age but also to socio economic reasons. London, in addition to having a younger population, has a healthier working effect derived from a regeneration of the city in issues green zones, transportations systems and an attraction of more trained and skilful workforce. The North East, on the other hand, was affected by the decline of heavy manufacturing industries and the lack of job opportunities. Furthermore, there was an increase of

England, and the UK in general, presents mixed evidence on whether the disability rates have increased, remained stable or decreased (Wittenberg 2016). In a recent exercise using a dynamic microsimulation model, Kingston et al. (2018) forecast the needs for people aged 65 years or more until 2040. Whilst they predict a reduction in the number and prevalence of people with dependency, they also forecast an increase in people with more complex needs driven essentially by the increase in people aged 85 years or more. In particular, older adults with medium or high dependency will be likely to have two or more concurrent conditions.

The former demographic figures pose challenges to the current means of long-term care provision and more specifically the composition of the informal care. Ageing also affects the informal carers who eventually may also require long-term care. Given that informal care is the most frequent provision of long-term care, small changes in informal care could entail important variations in the provision of formal paid care (Colombo et al. 2011)[6]. Considering this relationship, a core strand of the literature on informal care has focused on investigating the substitutability between formal and informal care to determine the optimal provision of both types of care. Bolin et al. (2008) and Bonsang (2009) have shown substitution between informal care and paid domestic care although substitutability decreased as the clinical complexity increased (e.g. measured by higher disabilities or hospitals visits). These studies have been based on several European countries excluding the UK. For the UK, Mentzakis et al. (2009) show substitution between informal and formal care for simple tasks but complementarity for cases of complex and technical activities. Furthermore, Pickard (2012) reported substitution between nursing and care hospitals in cases of very intense care given by adult children to their older parents. Despite this, in general the evidence suggests that informal and formal care may be substitutes for specific activities that do not require specialised skills. Van Houtven and Norton (2008) utilising American

the negative effects in health resulting from working on these industries (Office of National Statistics 2013).

[6]Using a replacement cost approach, Buckner and Yeandle (2011) conclude that the economic value of informal unpaid care was £119 billion for the UK.

data showed an inverse relationship between the number of hours spent caring by children and the number of visits to care and nursing homes. The trade-off between formal and informal care is also associated with the level of publicly funded care. More generous systems seem to deter the provision of informal care (Ettner 1994; Viitanen 2007; Stabile et al. 2006) since it can relieve informal caregivers.

Another important strand in the informal care literature has addressed the implications of caring for informal carers. From an economics perspective, research has focused on labour opportunities and earnings (Carmichael and Charles 2003). Although some reports have shown an association between caregiving and a reduction of hours of work (see Colombo et al. (2011)), the empirical evidence addressing potential endogeneity problems suggests that these negative effects from informal care on labour outcomes are actually less severe (Carmichael et al. 2010). Bauer and Sousa-Poza (2015) find similar results after reviewing the literature based on the effects of informal care giving. These authors also conclude that this type of provision has negative effects on both the mental and physical health of the caregivers.

2.3 The provision of long-term care in England

Section 2.2 suggested two challenges associated with future long-term care services that consist of a likely increase in the demand for long-term care and a shift in the provision from informal to formal care delivered by paid providers. This section discusses the main characteristics of the formal long-term care in England including the formulas that drive the means tests for public support and the composition of the institutional providers.

The formal long-term care system in England is organised according to a "safety-net" system by which only the most vulnerable people receive public support. The severity of their needs is determined according to their health and the financial capabilities of patients to fund their care. Hence, patients with severe needs have their health care fully covered. In these cases, health care is "free at the point of use" and the needs

apart from being centrally managed, are also fully assessed by the National Health Service (NHS)[7].

On the other hand, in addition to health related needs, patients may have needs in other sorts of activities that are not necessarily related to health care. These activities are normally referred as *Activities of Daily Living (ADL)* and compose the range of activities addressed by long-term care. The ADL include domestic tasks, assistance with personal care tasks and in some cases nursing care. Unlike health care actitivities, ADL are essentially considered as "social" activities and their level of public support is subject to means tests designed and managed by local governments.

2.3.1 Needs assessment and services provided

For those cases that are eligibile for some kind of public support, there are two main types of benefits available: in-kind or in-cash. The former schemes entail some sort of professional service such as residential care or home care. The latter refer to direct payments and recipients are free to choose the sort of benefits according to their preferences and circumstances (Brugiavini et al. 2017). Based on these direct payments, Da Roit et al. (2016) indicate that an alternative consists of a personal budget that gives recipients the opportunity to choose between direct payments that compose a budget managed primarily by the user or, alternatively, the management of a personal budget by the local authority or an unpaid carer. Generally, these schemes have shown good levels of acceptance among users (Foster et al. 2003; Clark et al. 2004; Wiener et al. 2007) although there have been cases of anxiety of the users due to the responsibility of managing one's budget (Moran et al. 2011).

Local authorities are responsible for the assessment of needs which may be applied to both adults with care and support needs and also carers with support needs. The eligibility criteria are based on three general conditions[8] that structure the outcomes

[7] This type of provision is similar to other countries such as Italy or Spain (Comas-Herrera et al. 2006). The funding corresponding to cover the health needs do not account for social care and therefore are not considered in the estimations of social care expenditure.

[8] See https://www.scie.org.uk/care-act-2014/assessment-and-eligibility/

considered for the assessment. These conditions concern several dimensions of the patient that involve the mental and physical impairment of the patient, the ability to achieve certain outcomes and the implications for his/her wellbeing. The list of outcomes assessed for people with care and support needs includes:

- Managing and maintaining nutrition.
- Maintaining personal hygiene.
- Managing toilet needs.
- Being appropriately clothed.
- Being able to make use of the adult's home safely.
- Maintaining a habitable home environment.
- Developing and maintaining family or other personal relationships.
- Accessing and engaging in work, training, education or volunteering.
- Making use of necessary facilities or services in the local community, including public transport, and recreational facilities or services
- Carrying out any caring responsibilities the adult has for a child.

The eligibility for public support also considers the conditions and availability of informal care. The eligibility criteria therefore also take into account explicitly a list of outcomes concerning carers with needs:

- Carrying out any caring responsibilities the carer has for a child.
- Providing care to other persons for whom the carer provides care.
- Maintaining a habitable home environment in the carer's home, whether or not this is also the home of the adult needing care.

eligibility/outcomes-care-support-needs.asp

- Managing and maintaining nutrition.
- Developing and maintaining family or other personal relationships.
- Engaging in work, training, education or volunteering.
- Making use of necessary facilities or services in the local community, including recreational facilities or services.
- Engaging in recreational activities.

In addition to the needs, there is also an assessment of the financial capacity of the eligible person. This financial capacity is determined mainly by the assets of the person and consist basically of income and capital (e.g. property value). The Care Act in 2014 set two main income limits that determine the level of public support to cover residential needs. These limits are defined nationally and are applicable to local authorities. The upper income level, £23,250 for 2017, sets the point below which a person may access some sort of public benefit and the lower income level, £14,250, sets the point below which a person's social care needs are fully covered by the local authority. This framework[9] replaced the former approach defined by the Fair Access to Care Services guidelines where the limits were set individually by each local authority. Services different to residential care are only subject to lower limits leaving the maximum upper level to the discretion of the local authority. To this extent, before the Care Act in 2014 there were notorious differences between local authorities with regards to the assessment. After that, the Care Act in 2014 set the foundations to a more coordinated framework that involved the direct association between local authorities, providers and users.

According to the former, care homes may host three types of residents depending on how they fund their care. Those whose social care needs are fully funded with public

[9]These limits are currently reformed on the basis of the recommendations released in the *Dilnot report* released by the Care and Support Commission (Dilnot 2011). The main points of these recommendations were a more generous means-testing threshold raising the current threshold of £23,250 to £100,000 and a cap in the care costs of £35,000. Hence, once someone reached that limit the state will assume the resulting care costs.

funds; those who are self-funded; and those who are partially funded by the local authority and also make top-up payments. Further, there is also a fraction of residents funded by the NHS due to severe health care needs. Using data for LaingBuisson, Wenzel et al. (2018) argue that there are 392,000 people in independent care homes. Of these, a 44% were self-funded and 35% were fully supported by local authorities. A further 12% were funded partially and a 9% were funded by the NHS. The Competition and Markets Authority (CMA) obtained similar figures in their report for care homes[10].

2.3.2 Institutional care

There are a number of alternatives for the provision of long-term care at the formal *paid* level. These services include local authority social services, community health services, charities, nursing homes, day care, home care services and independent (non public) residential care providers. Within the former group, the institutional care is articulated in residential and nursing care homes as well as long-stay provision centres.

Most providers of residential care are private. The CMA reckons that 83% of care home beds belong to a for-profit provider, 13% correspond to the voluntary sector and the remaining 4% of care home beds are public (Competition and Markets Authority 2017a). Unlike other countries with similar models for long-term care[11], England has outsourced long-term care services to the private independent providers more recently in comparison to those. Particularly, with the Community Care Act in 1990 local authorities had to allocate part of their public funds to independent private providers (Pavolini and Ranci 2008). This was one of the measures aimed at increasing the marketization of long-term care services. In addition to promoting the competition between providers by increasing the choices available for users, the inclusion of market mechanisms also aimed at increasing the quality of the services. Aiming to meet this purpose, the Care Act on 2014 also promoted the development of markets and the

[10] *"Care Homes market study: Final report"* (Competition and Markets Authority 2017a).

[11] In countries such as Australia, US or Canada, private providers traditionally deliver publicly funded services. The participation of public organisations is reduced to registration, licensing and monitoring of facilities (Marczak and Wistow 2015).

choices of providers available (Marczak and Wistow 2015).

An important consequence resulting from the former reforms was the split between purchasers and providers of long-term care services. This implied changes in how services were commissioned. Thus, there was the separation of roles concerning the acquisition and delivery of long-term care services between different types of institutions that led to an increase in the marketization of the sector. Also, the local commissioning replaced the previous system based on the integration of services into a single entity such as the central government.

Likewise, the division between purchasers and providers entailed the creation of quasi-markets. This concept, firstly introduced by Le Grand and Bartlett (1993), defines a market in which the provision and funding were divided into institutions with different characteristics and ownership (e.g. private vs public). The services provided are mainly free at the point of use for their users and providers can be private and have a for-profit motivation (Grand 2011)[12]. The choice can be exercised by users or agents on their behalf. As we shall see later, in the case of long-term care these agents are local governments. Furthermore, providers despite being private, may not necessarily maximise profits and some sort of earmarked budget, such as vouchers, determines the spending power of the user. This type of markets was firstly introduced in late 1980s and are not only associated with long term care markets. Other sectors such as education or health care have also opted for this type of markets. Despite increasing the competition and efficiency in the market, outsourcing the provision of long term care services may be associated with costs that can exceed the gains (Knapp et al. 2001; Rodrigues et al. 2014). These costs are mainly based on tendering, reaching, monitoring agreements with providers and the asymmetries of information between purchasers and providers.

As Jarret (2018) presents, two main types of providers compose the structure of the

[12]The use of quasi markets as a system to introduce market mechanisms in the public sector has not been restricted to long-term care services. Other sectors such as education and health care have also incorporated these type of markets. See Allen and Burgess (2010) and Propper (2018) for respective reviews in education and health care respectively.

market. On the one hand, 70% of the total beds are owned by small family businesses with one or few care homes. Their single share of the market represents no more than 0.4% of the total beds. The remaining 30% of the total beds correspond to the 25 biggest providers and within these, there are 4 - the Big Four[13], that concentrate about half of these 30% share. There is little evidence studying the effects of these big care groups on issues such as the market or the quality of services of long-term care in England. An exception is Harrington et al. (2017) who compare large care homes chains in five countries including the UK. Considering data from the CQC in 2015, they report that about 40% of the care homes in these groups did not have a good rating. These figures were similar for the case of care homes chains in the American market. A complementary literature has examined the role of managerial ownership and its effects on the quality of the services. For instance, Huang and Bowblis (2018a) find that care homes where the owners are also the managers, provided better quality that care homes where managers are salaried. These results contrast with a previous study of these authors where they find that owner-managed care homes do not have higher quality despite having higher nurse staffing levels (Huang and Bowblis 2018b).

Regarding their capacity, care homes have 40 beds on average[14]. Also, most care homes operate at the 90% of their capacity. As shown above, the clientele is composed of residents subject to all funding schemes. The average weekly fees paid by each type of resident also differ being £846 for self-funded residents[15] and £621 for local authorities (Competition and Markets Authority 2017a).

In addition to for-profit providers, independent providers may also have non-profit motivations. Most of the existing literature has explored the differences concerning the quality of their services. The general conclusion is that non-for profit care homes are generally associated with better quality outcomes (see for instance reviews from

[13] Bupa Care Homes, Four Seasons Health Care, Barchester health care and HC-One Ltd.

[14] The CMA estimates that 60-70 beds is the optimal capacity. See Competition and Markets Authority (2017a).

[15] These self-funded fees, however, present substantial variation across English regions. Whereas in the North East these are £670 on average, in the South-East increase up to £1,060 (Competition and Markets Authority 2017a).

Hillmer et al. (2005) or Comondore et al. (2009)). Nonetheless, most research is limited to cross-sectional studies that do not account for potential empirical limitations (Konetzka 2009). More robust evidence suggests that non-profit institutions seem to have a lower propensity to transfer residents to acute wards of health centres (Hirth et al. 2014) and better performance in post-acute care (Grabowski et al. 2013). Some studies have found complementarities and positive spill-overs between the two types of ownership when accounting for endogeneity in the non-profit share (Grabowski and Hirth 2003).

A common argument to justify the better quality of non-profit institutions relies on the existence of asymmetric information in the market. Thus, in a market with a considerable lack of information that makes users uninformed about issues such as the quality of the services, for profit institutions would reduce their quality to maximise their profit. Arrow (1963) firstly justified the existence of non-profit organisations to inform uniformed users. Most recent work has investigated whether adopting a non-profit status responds merely to a quality signal to attract consumers tacking advantage of their lack of information. Jones et al. (2017), for instance, find that an increase in the information available for consumers leads to a reduction in the number of non-profit institutions.

Although the review from Comondore et al. (2009) includes 72 out of 82 studies based on the UK, the most robust evidence addressing endogeneity problems concerns the American market. Studies based on the English market generally find a greater association between quality with non-profit institutions than for-profit (Gage et al. 2009; Barron and West 2017; Forder and Allan 2014). Yet, these studies do not consider potential empirical limitations associated with the share of non-profit institutions. In particular, the selection of patients with worse conditions to non-profit institutions given that they can afford the care.

2.4 Institutions involved in the long-term care

The Care Act in 2014 set the legal framework for long-term care services. The most relevant regulatory reforms consisted of the empowerment in the decision making process of local governments and the creation of the Care Quality Commission (CQC) as the independent regulator. This subsection presents the main institutional characteristics regarding the organisation of long-term care.

2.4.1 Local governments

The structure of local government in England is complex. The current system is based on the reform carried out in 1972 by which there are two main level - *tiers* - to organise the local policy: counties (the upper level) and districts (the lower level). Likewise, there is a third level, the unitary authorities, which combined the levels of policy from districts and counties. Within these three definitions, there are two unique local authorities: City of London and Isles of Scilly, that are considered as "sui generis" despite their lower population in comparison to other unitary authorities (Sandford 2018). The scope of responsibility for each type of local authority is well defined. Counties are responsible for wider policy areas such as education, social care or transport. Districts, on the other hand, are focused on local matters such council tax, housing or planning applications. Despite these distinctions, counties and districts can agree to undertake functions from the other level. In such cases, the responsibility always remains with the council[16]. Finally, some responsibilities are concurrent and may be undertaken by either tier (Sandford 2018).

Local governments are elected every 4 years. Councillors represent wards which are defined according to parish areas. Thus, wards are smaller areas than districts and constitute a key building block for administrative geography in the UK[17]. Indeed, some districts have single-member wards and others have multi-member wards. Electoral

[16] See section IX of the Local Government Act in 1972.
[17] See https://www.ons.gov.uk/methodology/geography/ukgeographies/administrativegeography/england

wards cover the whole UK and as of December 2015 there are 9,196 electoral wards. Although population counts are different from one ward to another, wards cover an average of 5,500 people. The electoral system is the First Past the Post by which voters can elect as many councillors as there are vacant seats (Sandford 2018). The majority of local authorities elect by "thirds" although there are some councils that elect by halves.

The funding of local services comes from different sources. The main sources are the council tax, the business rates, central Government grants and local fees and charges. Council tax and business rates are sources of income generated mainly at local level. Council tax is applied on domestic properties and it is fully retained by local authorities. Each domestic property is allocated to a band according to its sale value. This valuation is carried out by the Valuation Office Agency (VOA) and there are eight different bands. Each band has a different range of values fixed by the Government considering the sale values in 1 April 1991 as reference. Local authorities set their own levels of council tax for each of the bands (Sandford 2018). Alike council tax, business rates are also applied on properties. Yet, these are properties used for business purposes. Local authorities retain 50% (local share) and the central government retains the remaining 50% (the central share). Local authorities are subject to a system of redistribution by which areas with high rate revenues pay a "tariff" in and areas with low rates receive a top-up out (Sandford 2018). The Government aims to introduce a local retention of at least 75% by 2020-21 (Ministry of Housing, Communities & Local Government 2017)[18]. Since 2017, some local authorities have piloted schemes considering a scenario of full retention. Amin-Smith et al. (2018) estimate that these areas will have a financial benefit similar to almost a 2% of the spending power of all councils.

The Revenue Support Grant is the main grant given from the Central Government to local authorities. The funds are not ring-fenced as it occurs with others such as the New Homes Bonus. Therefore, local authorities use the funds from these grants freely. Yet, other grants, such as the Public Health grant, are ring-fenced. The Local Government

[18]See https://publications.parliament.uk/pa/cm201719/cmselect/cmcomloc/552/55202.htm

Finance Settlement establishes the quantities of central government grants for the local authorities. In addition to determining the provisions for tariffs and tops ups from the retention of business rates, it also adjusts the levels of Revenue Support Grants.

Unlike other countries, the responsibilities concerning long-term care depend on local governments. There are 152 local authorities that, operating at the upper tier level commission and in some cases provide long-term care. As introduced above, this power to local governments enlarged with the Care Act of 2014 by which local authorities, in addition to providing and funding care, could also support individuals with their care decisions and the access by providing further information. The Central Government, by means of the Department of Health, is in charge of the legislation and overall policy.

Social care is funded essentially by means of two sources that include: the Revenue Support Grants, allocated by the Ministry of Housing Communities & Local Government (MHCLG), and the council tax. These funds are different from the funds devoted to fund health needs, managed by the NHS, or those to fund the benefits system, managed by the Department for Work and Pensions (DWP) (Wenzel et al. 2018). In any case, social care is the main expense within the local budget. Indeed, although it fell 8% in real terms between 2009-10 and 2016-17, it was more protected in comparison to other local authority services (Simpson 2017)[19].

Despite having the former responsibilities and ensure that markets provide an appropriate level of quality in their respective areas, the government intervention in the market is limited. As discussed in section 2.3.2 market mechanisms rule the provision of services in care and nursing homes and the provision is mostly governed by independent providers to the government which in most cases aim for profits.

[19]The total local authorities' revenue in 2016-17 was £51.56bn of which a 45% was obtained from council tax, a 32% came from central grants and the remaining 23% were retained business rates. The total spending on social services was £45.62 billions and 16.8 were devoted to fund social care services (Amin-Smith et al. 2018).

2.4.2 Care Quality Commission

The CQC is the independent regulator of health and social care services in England. Implemented in 2008 and operating since 2009, it replaced the former Commission for Social Care Inspection (CSCI) set in 2004 and grouped existing regulators at the time. It is a non-departamental public body that supervises cares services. CQC's activities also include the registration (and deregistration) of care providers and confirmation that fundamental standards are met to provide a regulated activity, the protection of long term care users by taking action when minimum quality standards are not met and reporting and publishing their views regarding the state of the health and long term care as well as the findings from the regular inspections carried out in the care homes. These views are reported to the Department of Health (DH). To this extent, the CQC role is not limited to overseeing the long term care sector but also to executing some enforcement power in some cases, e.g. when providers do not deliver quality according to the minimum standards.

2.4.3 Other institutions

Unlike other countries, in England there are several institutions and initiatives that also have some sort of supervisory role for health and social care with a special emphasis on quality issues. The National Institute for Care Excellence (NICE) is responsible for the evaluation of health technologies through evidence-based methods. Therefore, through these evaluations NICE formally establishes minimum standards and guidelines for social care.

Skills for Care is another organisation that works closely with the Department of Health and Healtwatch to provide evidence regarding the labour force in social care. Local governments work with Healthwatch teams to ensure that the views of users of health and social care services are taken into consideration in the design of health and social care policies.

2.5 Quality in long-term care

Quality in long-term care is an important policy issue not only in England but also in other OECD countries (Colombo et al. 2011). The debate about the importance of quality in long-term care service is driven by three main arguments. The first is associated with the concerns regarding the safety of the services due to situations of abuse and/or neglect. The second refers to the need of policy makers to show taxpayers that public money is spent wisely and services are delivered effectively preserving good standards. The third argument consists of the responsiveness of services to meet users' needs. To this extent, the way quality is measured depends notably on the relationship between carers and cared-for and regulators must design the right incentives to ensure suitable levels of quality. A good understanding on the association between carers and cared-for shapes aspects regarding the equity, efficiency and accessibility of the services.

As Malley et al. (2017) argue, there are two main approaches to measure quality. The first, pioneered by Donabedian (1988) focus on the production process and distinguishes between structural inputs and the outcome indicators. The structural inputs mainly correspond to environmental characteristics (staff, premises, etc...) and are not focused on the caring process. The second approach concerns quality dimensions that are determined according to their policy relevance. The current quality system of long-term care in England follows the second approach.

Furthermore, there are a number of instruments to enhance the quality of long-term care. These include regulatory instruments, economic instruments and information instruments. Regulatory instruments determine legislative rules to influence the behaviour of the main actors involved in the process of care. Additionally, these regulatory instruments can be implemented by means of directions, methods for surveillance and/or methods of enforcement. In England there are various directions aimed at influencing different parts of the care process. These directions are mainly

based on outcomes[20]. Surveillance mechanisms are intended to detect compliance with the directions. An example of these mechanisms are the inspections carried out on care homes by the CQC in order to monitor their quality. Finally, enforcement methods are applied when non-compliance is detected and there is risk of harm for users as well as a threat to preserve appropriate quality. For instance, the CQC may undertake enforcement powers when a provider repeatedly delivers inadequate care (Care Quality Commission 2015a).

Economic instruments set incentives or disincentives to influence the behaviour of the actors. The main types of interventions are based on incentives aimed at improving the long-term quality and at promoting competition in terms of quality. These incentives are normally financial and may adopt different forms. There may be quality related subsidises, such as the workforce development subsidies, quality payment schemes, such as the pay for performance systems applied for care homes[21] and quality related public procurement by which the public purchaser can increase competition in quality and prices.

Finally, information instruments are implemented to influence the behaviour of actors by affecting the transfer of knowledge and communication. There are several types of interventions although the most widely used consists of public quality reporting systems[22]. Most of the empirical literature has focused on the latter issue examining the effects of public reporting on the quality and consumer care choice (see Grabowski and Norton (2012) for a review). The main conclusion is that reporting generally has a positive effect on quality but it is modest and inconsistent (Huang and Hirth 2016). Examples of these inconsistency may be Werner et al. (2012) who find a small positive effect between quality reporting and the choice of nursing homes with higher levels of quality and Grabowski and Town (2011) who show no association between the

[20] These directions are complemented with information from National Outcomes Framework (NHS OF). This is a set of indicators developed by the Department of Health and Social Care to monitor the health of adults and children.

[21] See Norton (2018) for a review of these methods in long term care.

[22] There are, however, other systems such as education and knowledge management or the systems based on quality improvement and management tools

reporting of information and the choice of consumers or the quality of care. Other research has studied the interactions between competition, the increase of available information and the increases in quality (Zhao 2016) as well as the effects of quality reporting on prices (Huang and Hirth 2016). All these studies are mainly based on the US market for long-term care. Yet, research consisting of other markets is sparse.

There is a recent strand of the literature that is analysing the impact of new sources of information based on Internet references to quality aspects of long term care. Trigg (2014) introduces the main points associated with the use of online quality reviews in the context of long-term care. Despite some challenges related to the adoption of these sources of information by the current generation of users and providers, the author concludes that online reviews will become more important and suggests the design of review sites that reflect accurately the characteristics of the sector. Along these lines, Konetzka and Perraillon (2016) examine these new sources of information finding that although consumers were receptive, their decision was limited due to other elements such as the specialisation of the services, the location and proximity of the care home to family or the availability of publicly subsidised beds. Hefele et al. (2018) analyse the adoption of Facebook in care homes and the relationship of their reviews with the quality and find no association. Their findings are consistent with previous studies addressing the use of social media in health care (Hawkins et al. 2016; Greaves et al. 2014).

2.5.1 Quality inspection system in England

Since October 2014, care homes are inspected according to a new inspection system monitored by the CQC. The main difference compared to previous systems, is that the new system implemented more systematic inspections driven by five so called key lines of enquiry (KLOEs) that structure the inspections in sets of 5 key questions. These questions are associated with issues to determine to what extent services are safe, effective, caring, responsive to people's needs and well-led. In addition to the assessment of each of these dimensions, the CQC also releases an overall rating. Both

the overall rating and each of the other 5 questions are rated according to four possible categories: outstanding, good, requires improvement and inadequate. The previous system was composed of 28 regulations on 16 outcomes that defined the quality and safety standards but were based on a low and unclear bar (Care Quality Commission 2013). Table 2.1 presents the main differences between both approaches.

An important component of the system is that the inspections are carried out from a people-focused perspective[23] without prior announcement by specialised inspectors and teams of experts. Before, these inspections were conducted by generalist inspectors. The information used to derive the ratings comes from different sources that include quantitative measures, the direct observation from the inspectors and the feedback from both patients, relatives and staff working in the care homes (Barron and West 2017). Also, the frequency of inspections is determined by the rating obtained. Thus, worse ratings lead to more frequent inspections. Having an "inadequate" rating also implies the adoption of special measures, close monitoring and a re-inspection in 6 months (Care Quality Commission 2015a). The level of quality seems to be unaltered during the last two years. In 2018, about 80% of the inspected care homes obtained a good rating. Yet a 20% required improvements or were inadequate. Figure 2.7 shows the local variation in different levels of quality. This figure is similar to the information provided by the CQC for 2016/17 (Care Quality Commission 2017). Within the new quality framework, rather than the CQC who had an active role in care homes' improvement, providers and commissioners are responsible for the quality improvement.

[23]There are other methods, such as the Adult Social Care Outcomes Toolkit (ASCOT), that adopt this people-focused approach. This tool aims to measure the domains of quality of life most affected by social care and is equivalent to the quality-adjusted life year (QALY) in health. Further, it is mostly designed for economic evaluations of long-term care interventions. Netten et al. (2012) provide details of this tool.

2.6 Conclusion

The core goal of this chapter was to present and discuss the main institutional characteristics associated with the long-term care in England. The topics discussed in this chapter will articulate the underlying institutional background of the forthcoming chapters. The first part of the discussion has consisted of introducing the main aspects associated with the demand and supply of long-term care. The demographic trends that England shares with other OECD countries, reveal a likely increase of the demand for long-term care care in the forthcoming decades. At the same time, there is a move from informal and unpaid provision to more institutionalised care delivered mainly by care homes. Ensure an appropriate long-term care provision will depend on the capacity of maintaining the current levels of provision whilst improving the efficiency of the system and ensuring the containment of the costs. An alternative to reach this goal may imply increasing the care provided in patients' homes. England has carried out some initiatives pointing at that direction. At the same time, another option may be the design of better incentives for undertaking informal care.

The chapter has also reviewed the main features of the institutionalised provision of long-term care. The market is characterised by independent providers that in most cases are driven by profit purposes. Yet, there are substantial differences between the types of providers. First, regarding the dimension of the providers, an important part of the market is dominated by big providers that share about a fifth of the market. These providers have an important capacity and a well-established presence over the country. The remaining share of the market is dominated by familiar businesses composed by a small facilities. Regardless of the type of provider, both types face two sorts of provider according to their funding scheme. Unlike other care such as health care, patients with long-term care needs only receive public support if, after assessing their financial means, are below certain thresholds that demonstrate their financial incapacity to afford their long-term care. The chapter has discussed the main requirements concerning these schemes and the market configuration for those patients receiving total or partial public support. For these patients, the market operates as

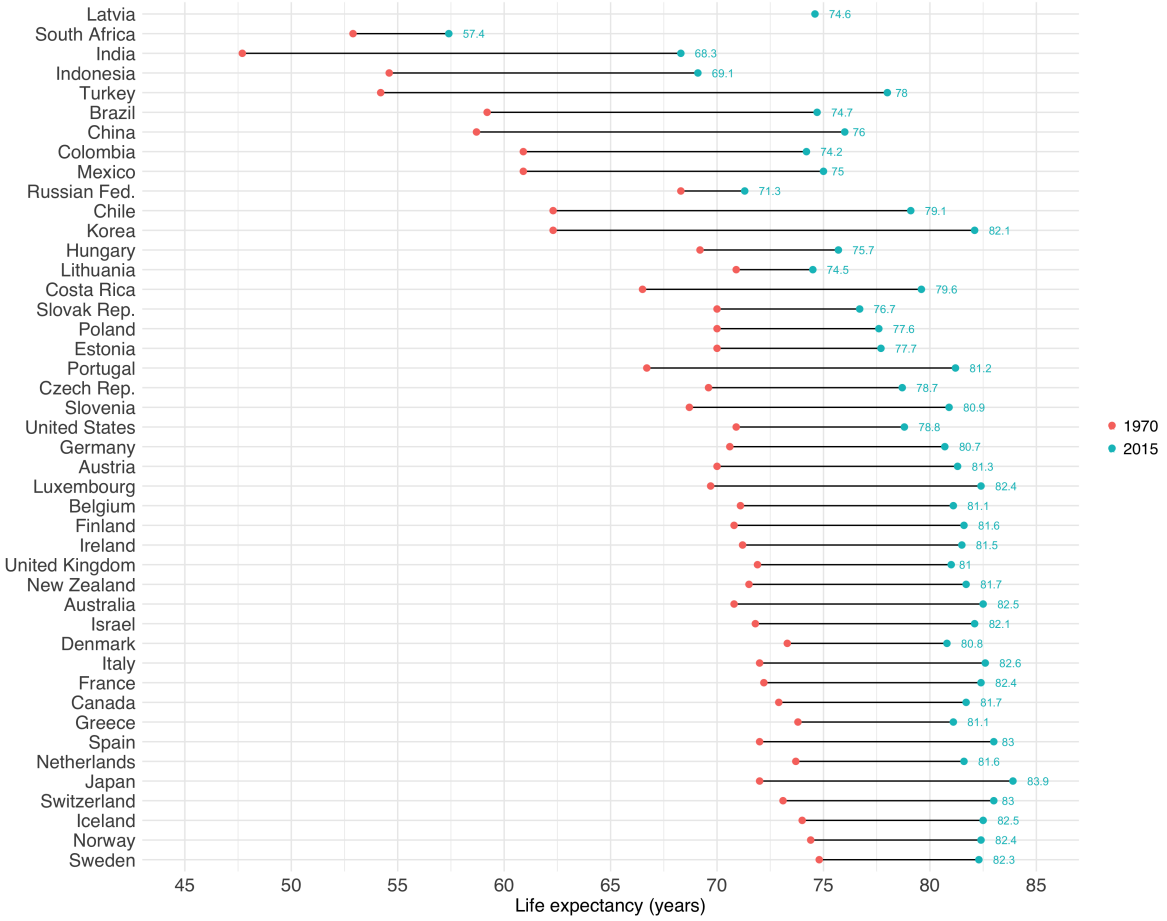
a quasi-market where funding is public but provision is private. The second main difference among providers corresponds to their motivation. Whilst some providers have a for-profit motivation others are non-for profit. The chapter has addressed the literature debates with regards the differences in quality between the two types of providers.

Next, the chapter has addressed the institutional elements associated with long-term care. Unlike health care, managed by the central government, long-term care is managed by local authorities and the organisation of local government in England is characterised by a substantial complexity. The chapter has presented the main aspects associated with the key institutions involved in long-term care.

The last part of the chapter has discussed a core theme of this thesis: the quality of long-term care. Taking into account a general perspective, the chapter has reviewed the existing paradigms to measure quality in care homes. Then, it has turned the attention into the English framework and presented the main characteristics of the current quality system applied to residential care homes in England.

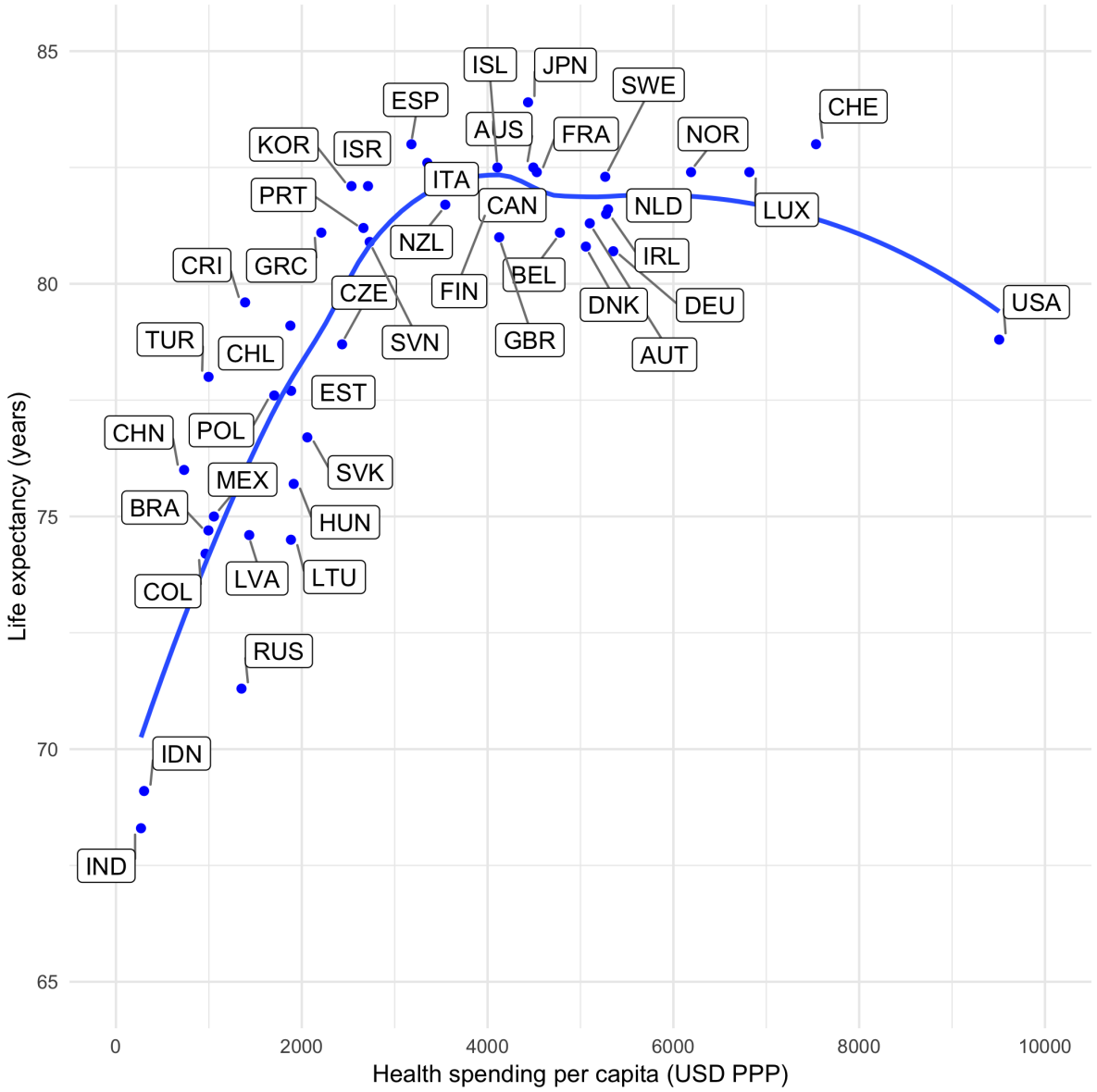
2.7 Figures

Figure 2.1: Life expectancy OECD countries (1970 - 2015)



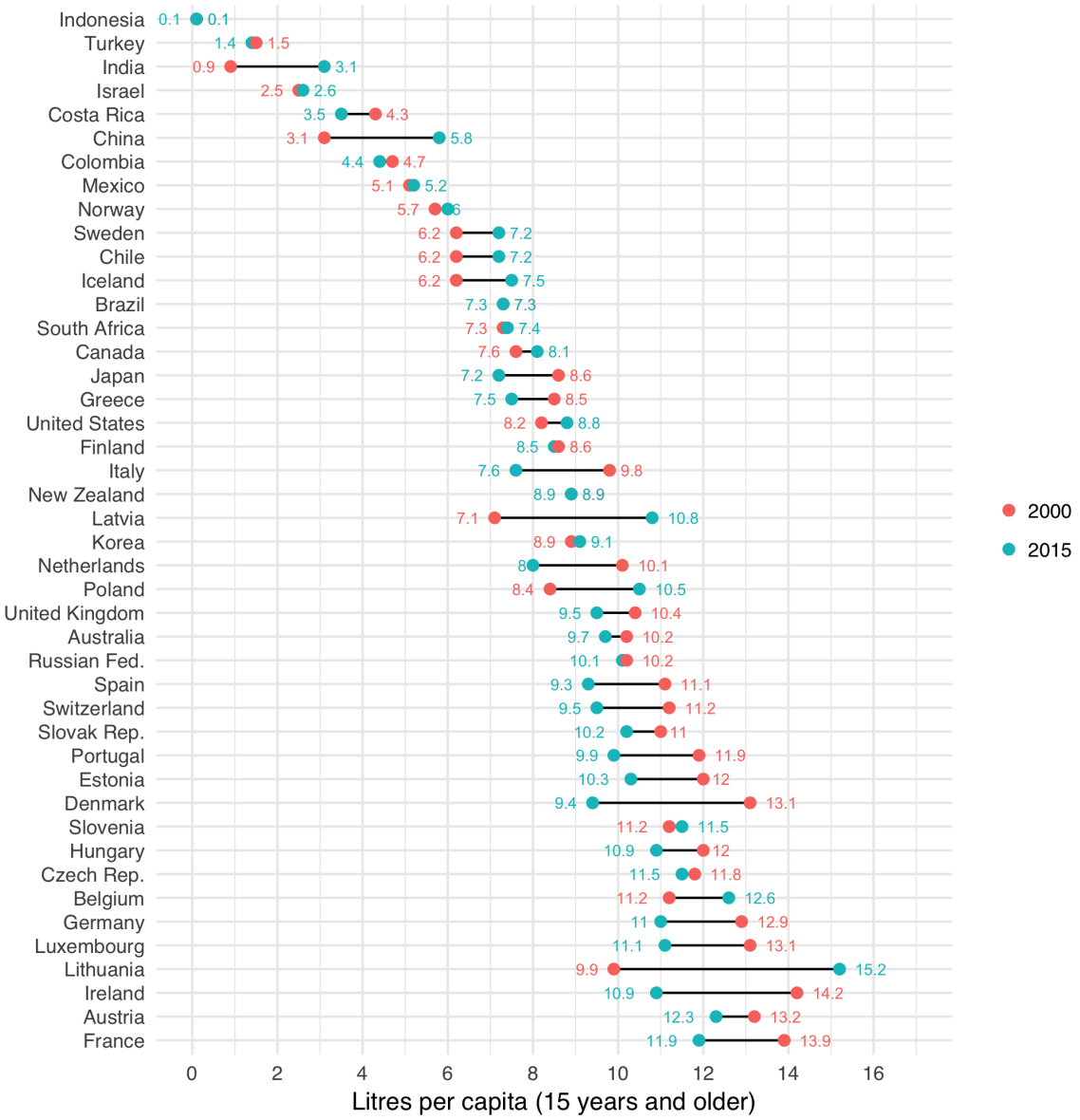
Note: Organisation for Economic Co-operation and Development Health Statistics 2017.

Figure 2.2: Life expectancy at birth and health spending per capita OECD countries (2015)



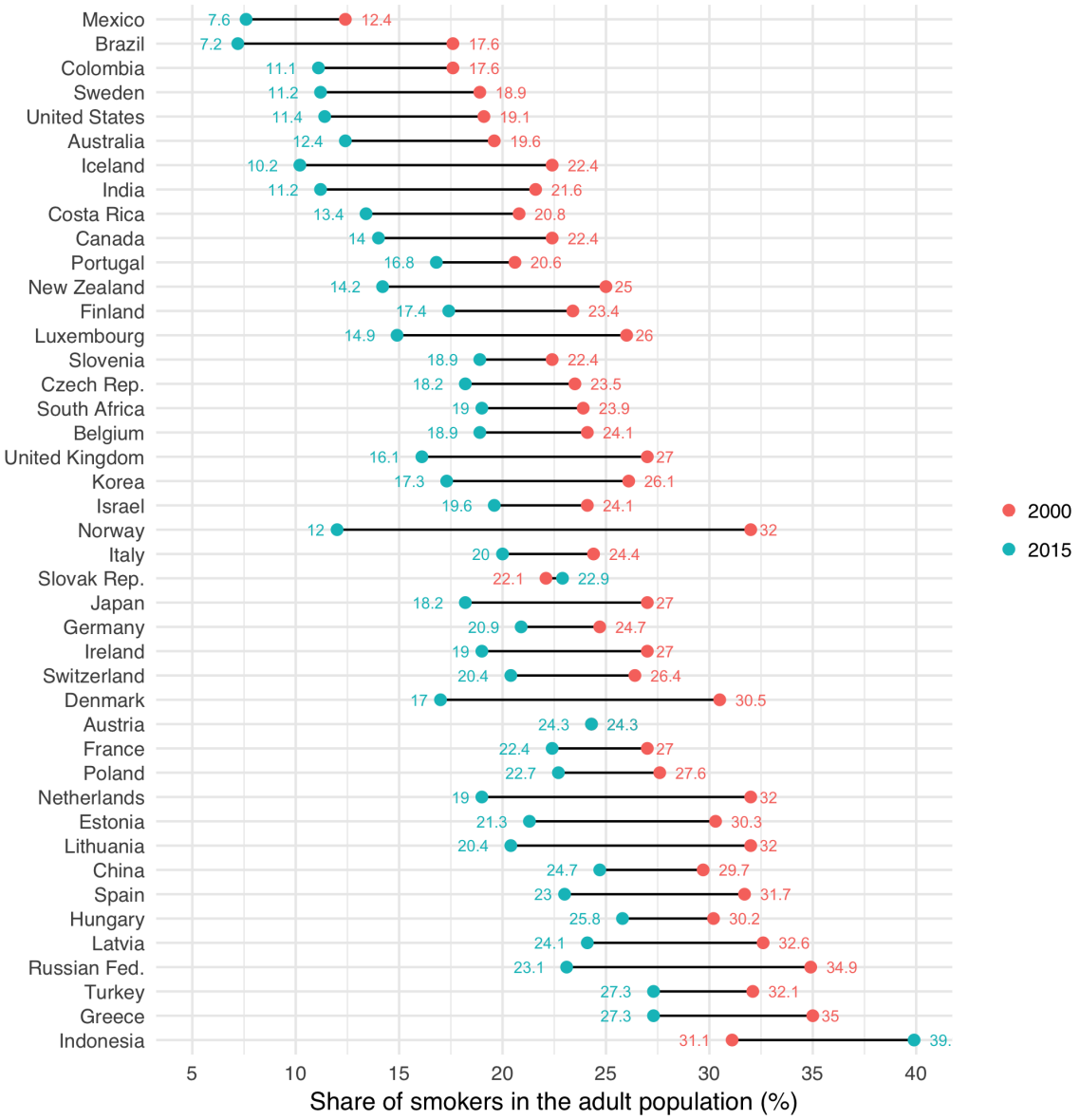
Note: Organisation for Economic Co-operation and Development Health Statistics 2017.

Figure 2.3: Alcohol consumption adults OECD countries (2000 - 2015)



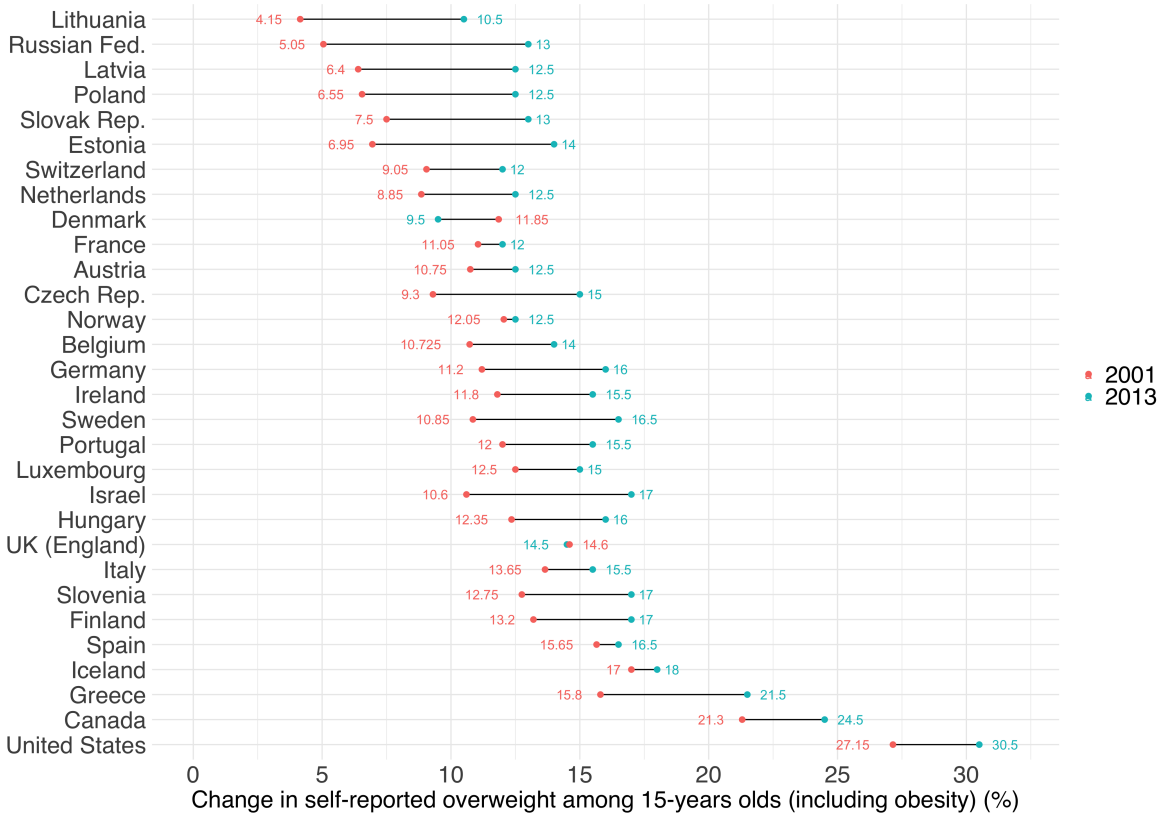
Note: Organisation for Economic Co-operation and Development Health Statistics 2017.

Figure 2.4: Smoking in adults OECD countries (2000 - 2015)



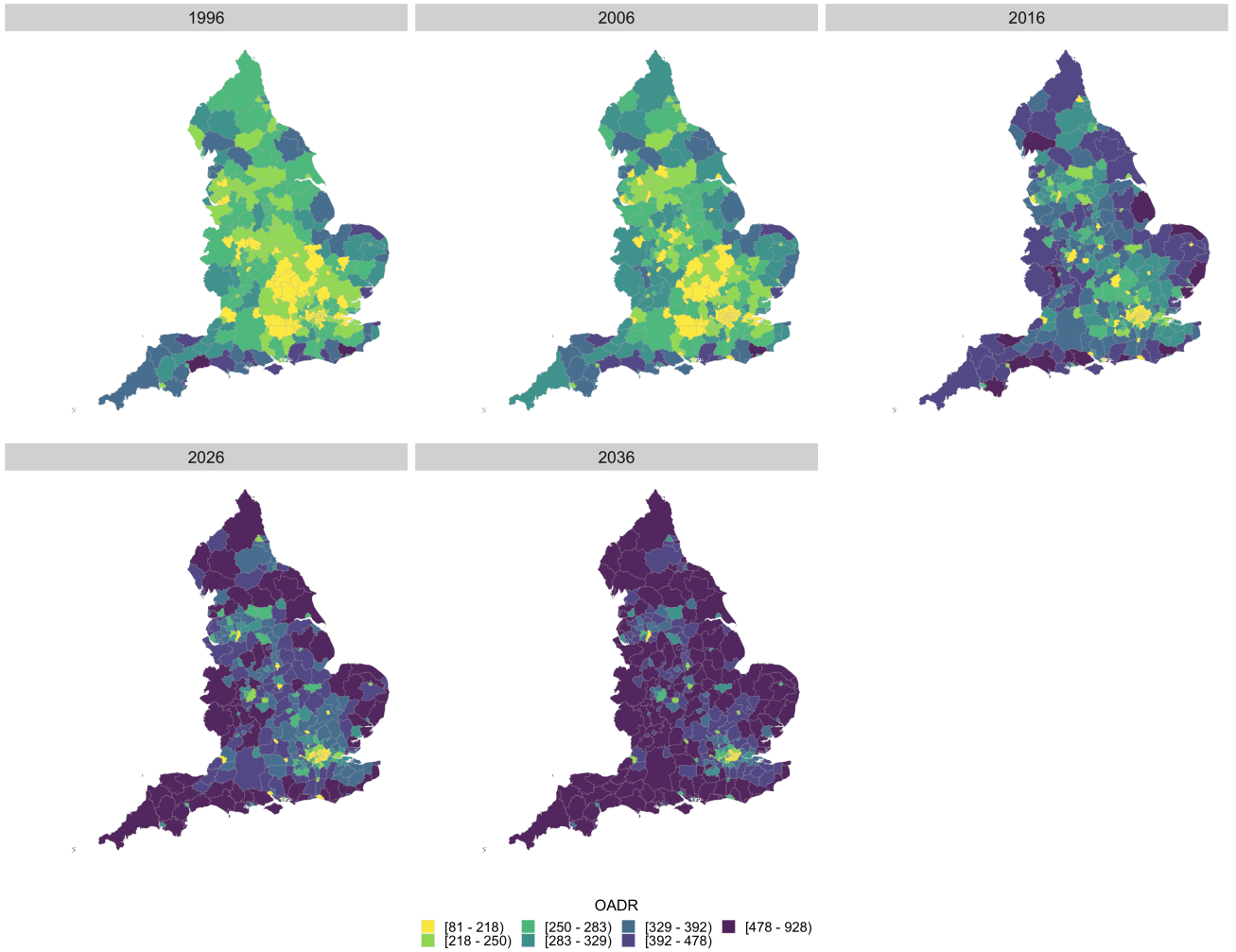
Note: Organisation for Economic Co-operation and Development Health Statistics 2017.

Figure 2.5: Overweight and obesity in 15-years olds OECD countries (2001 - 2013)



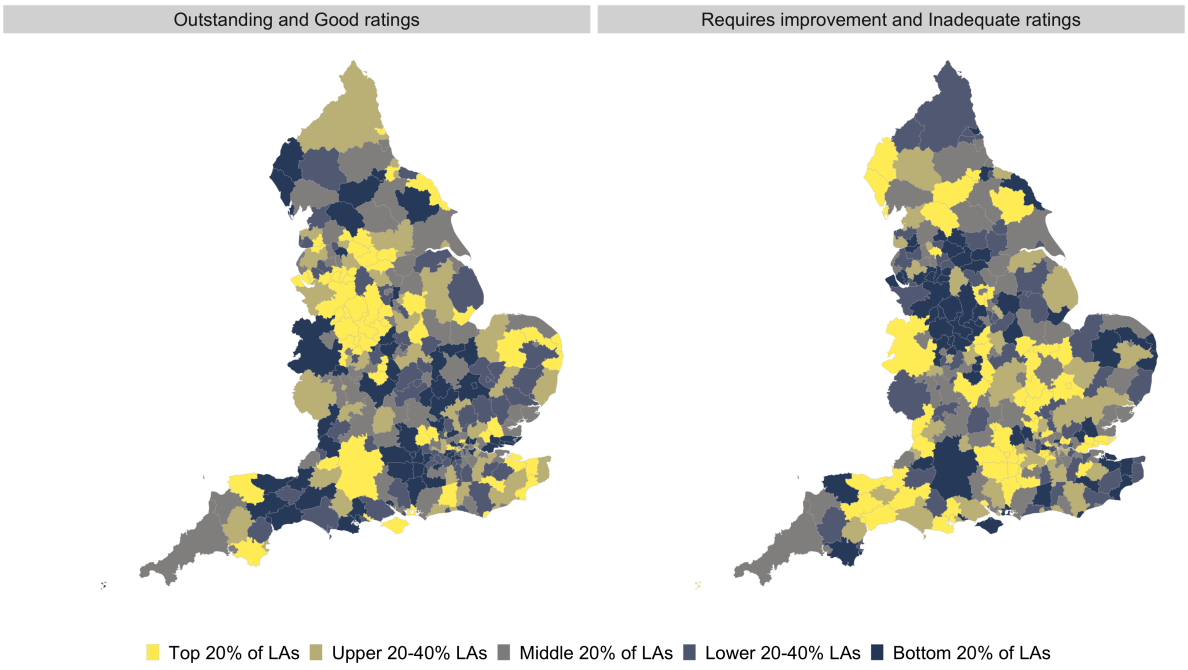
Note: Organisation for Economic Co-operation and Development Health Statistics 2017.

Figure 2.6: Old age dependency ratio 1996 - 2036



Note: Office of National Statistics. Old age dependency ratio represents the number of people who are 65 years old or older per 1000 adult population. Data from 2016 onwards are projections.

Figure 2.7: Quality inspections



Note: Care Quality Commission care directory of registered services.

2.8 Tables

Table 2.1: Main differences between care home quality approaches

Former quality framework	Current quality framework
* Focus on Yes/No "compliance" * A low and unclear bar	* Professional, intelligence-based judgements * Ratings - clear reports that talk about safe, effective caring, responsive and well led-care
* 28 regulations, 16 outcomes * CQC as part of the system with responsibility for improvement	* Five key questions * On the side of people who use services * Providers and commissioners clearly responsible for improvement
* Generalist inspectors	* Specialists, with teams of experts * Longer, thorough and people-focused inspections
* Corporate body and registered manager held to account for the quality of care	* Individuals at Board level also held to account for the quality of care

Note: *"Social care: Recent changes to the CQC's regulation of adult residential care (care homes)"*, Jarret (2015)

Chapter 3

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

3.1 Introduction

Between 1997 and 2016, whilst the median price of residential properties in England increased by almost 260%, experiencing the fastest growth in real prices of all OECD countries, the median individual earnings increased by 68% (Henretty 2017). The main consequence of this process has been an affordability crisis that has affected particularly young and first time home buyers (Hilber 2017; Hilber and Vermeulen 2016). The other side of the coin concerns the elderly homeowners who bought house cheaply and have benefited from the subsequent increases and accumulation in their housing wealth (Attanasio and Weber 1994; Attanasio et al. 2009).

Long-term care offers an ideal setting to analyse the effects associated with the variation of house prices. Housing wealth is a key determinant of long-term care choices (Davidoff 2010)[24] since it constitutes a core source for funding future needs (Costa-Font et al. 2018). Analysing the relationship between house prices and long-term care is particularly relevant for the case of England where the demand for long-term care is growing due to the ageing in the population and the shift from informal care within the (extended) family towards paid nursing and residential care homes (Kaschowitz and Brandt 2017; Groenou and De Boer 2016).

This paper studies how house prices affect the local provision of care homes. To do so, it exploits the variation of house prices over time, determined by the property

[24]There is an extensive literature examining the changes of house prices in a range of decisions taken by the household such as labour supply (Disney and Gathergood 2018; Begley and Chan 2018), education (Lovenheim 2011; Lovenheim and Reynolds 2013), health (Fichera and Gathergood 2016), divorce (Farnham et al. 2011) or fertility (Lovenheim and Mumford 2013; Dettling and Kearney 2014)

transactions carried out in England, and the changes in the market structure of English care home. The direction of this effect is a priori ambiguous. Higher house prices may have positive effects on existing homeowners who accumulate more housing wealth to fund their present and future long-term care needs (Venti and Wise 1990; Darton et al. 2010; Costa-Font et al. 2018). Consequently, care home providers may be incentivised to deliver services in these areas. On the other hand, higher house prices may also increase the development costs for care home providers. In this situation, providers could lower the supply of care homes for a given demand and consequently reduce the long-term care choices for people living in these areas. If this is the case, the elderly, in spite of benefiting from increases in their housing wealth, may also be harmed by the shortage, delay in the access to and/or relocation of a service that they are likely to demand. Therefore, the overall effect of higher house prices on the provision of social care depends on the relative size of the former two effects.

Examining how house prices affect the provision of long-term care is an empirical question that poses challenges. For instance, a potential concern, normally considered in hedonic price models, is that there are many environmental variables that cannot be observed or measured but which may affect the variables of interest (Rosenthal 2003). In the case of this paper, long-term care providers may choose local markets based on unobservable variables that also affect the house prices. If this is the case, the correlations between house prices and the rate of care homes may not be interpreted causally. To overcome this problem, we follow the identification strategy proposed by Hilber and Vermeulen (2016) that exploits the exogenous variation of English local authorities regarding the adoption of a planning reform, the vote share and the historical population density to analyse the effect of regulatory constraints on the sensitivity of house prices to changes in the demand. In our case, we use the former set of instruments to eliminate endogenity concerns in the house prices and estimate their effects on the provision of long-term care.

We use the former identification on a sample of English local authorities that combines information on care homes from the Care Quality Commission (CQC), the

regulator of long-term care services in England, and data on property transactions from the Land Registry. We find that higher house prices lead to fewer and smaller care homes. Moreover, we also find some evidence of quality upgrading. Particularly, areas where house prices are higher have more care homes rated as "outstanding" and fewer that require improvements or are inadequate. These results are consistent with the previous international evidence for the case of nursing homes and assisted living facilities (McMillen and Powers 2017; Stevenson and Grabowski 2010).

The contribution of this study follows two main directions. Firstly, it complements previous work on the long-term care market in England. By focusing on the housing market, this paper provides the first empirical evidence for a causal link between house prices and long-term care provision. Former empirical research has used house prices to define the composition of the market when examining the effects of competition in care home prices and quality. Forder and Allan (2014), for instance, find that house prices were positively associated with care home prices and to a lesser extent with quality. Yet, since the main focus is on competition as measured by a concentration index, this study does not address explicitly potential endogeneity concerns associated with house prices.

Secondly, this paper sheds light on the interactions between house prices and quality of residential long-term care services. As other studies analysing the quality of long-term care services in England (see for example Forder and Allan (2014) or Barron and West (2017)), our quality measure is based on quality ratings of the overall care home performance. To this regard, this study diverges from previous research that has measured quality on the basis of inputs of the process such as the number of rooms or staff, and/or on some type of health outcome such as mortality rates. By using a rating measure we overcome problems of mixed evidence depending on the quality measure chosen[25] and the insensitivity specially affecting some input measures (Yang et al. 2017). Unlike previous work using quality ratings on the English long-term care market, our

[25] For example, Grabowski (2001) finds mixed evidence on the effects of Medicaid reimbursements on the quality of nursing homes depending on the quality measure used.

study is based on the most recent quality regulatory framework implemented by CQC in 2014.

The provision of long-term care in England has been analysed by a number of authors. Thus, our paper is close to Machin et al. (2003) who provide 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. Along the same lines, Giupponi and Machin (2018) study a more recent reform consisting of an increase of the national minimum wage introduced in 2015. Their findings suggest that this reform has not significantly affected the entry of care homes in the market, nor in the closures. Regarding the former, there is some research exploring the causes that lead to care home closures. Netten et al. (2003) and Netten et al. (2005) find that closures may be associated with the lower prices set in the care homes. Similarly, Allan and Forder (2015) show that poorer quality and more competitive markets are elements that increase the probability of market exits.

The remainder of the chapter is organised as follows. Section 4.2 provides background information on the institutional setup and discusses the organisation of local planning process and long term care in England. Section 5.4 presents the characteristics of the data and section 3.4 describes the empirical strategy. Section 5.5 discusses the results and section 5.6 concludes.

3.2 Institutional background

In England, urban planning and long-term care are organised on the level of local government. Local authorities 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. Other authorities are unitary and combine both tiers. The local availability of care homes and the house prices present wide spatial disparities across English districts (see Figure 3.1)

3.2.1 Urban planning

Districts design and implement planning policies according to the National Planning framework. An important constraint on the housing supply, leading to increases in house prices, is the design of local planning policies (Kok et al. 2014; Jackson 2016; Davis et al. 2017). Although some types of development have permitted development rights, most development projects require a planning permission. Districts normally manage the decisions regarding the applications. The decisions are taken after considering the feedback from a 21 day period of public consultation. Apart from the merits of the application, the considerations during this period concern mainly the use and development of the land. Depending on the type of development project, districts have different periods to make a decision. In the case of minor applications, districts have up to 8 weeks to make a decision. Alternatively, for cases of major development[26] local authorities can take up to 13 weeks to make a decision. The latter limit was implemented by the Labour Government in 2002 to speed up the planning process (Hilber and Vermeulen 2016). As we shall discuss further in section 3.4, one of the instruments used in our empirical strategy to identify the effect of house prices is based on this reform. Once the planning permission is granted, the development of the project must start within three years.

English planning regulations are particularly restrictive compared to other countries (Cheshire 2009; Hilber 2015) and in some cases lead to incentives for existing homeowners to promote "not in my backyard" policies that restrict local development and consequently the supply of local housing. These tighter regulations imply increases in the land value of those areas already developed and costs for owners in less developed areas (Hilber and Robert-Nicoud 2013). The effects of planning regulations have been also studied in other sectors such as retail (see for example Cheshire et al. (2015), Griffith and Harmgart (2008), Haskel and Sadun (2012), Sadun (2015) for the UK, Bertrand and Kramarz (2002) for France Schivardi and Viviano (2011) or Sanchez-Vidal

[26] Minor development projecst include householder cases and major development involve major housing and or business sites.

(2016) for Spain)

3.2.2 Long term care

There are 152 local authorities managing long-term care at the upper - council level[27]. Their main responsibility consists of commissioning (i.e., the purchase) care services on behalf of those clients eligible for public support. The provision of long-term care operates according to market mechanisms where the *for profit* private sector constitutes the main provider. According to figures from the Competition and Markets Authority (CMA) for 2017, 83% of the total beds belonged to a private provider (for profit) compared with 4% provided by the public sector. The voluntary sector provides the remaining 18% of the beds available (Competition and Markets Authority 2017a).

There are 19 private and 6 voluntary providers that have a combined market share of about 30% of the beds available. Within these, 4 providers are big chains with a combined market share of 15% of the beds available. Smaller providers that individually provide no more than 0.4% of the beds each, serve the remaining 70% of the market share. The resulting market is considered to be competitive, but also regionally fragmented with the South East having more than 1,000 registered compared to the 360 in the North East.

The composition of long-term care recipients in each local authority is a key factor of the regional discrepancies in the market. Care homes may have private clients who purchase and fund their care individually, based on their willingness to pay for different types of services, as well as clients partially or fully funded by the local authorities. The eligibility and degree of this public support consists of a means test that assesses the recipient financial capacity. The market for this type of client is a quasi-market where local authorities purchase care services from private providers on behalf of the clients (Le Grand 1991). Barron and West (2017) find that care homes operating in these markets are, on average, of higher quality than those operated by

[27] These were implemented with the Social Care Act in 2014 and replaced the former Primary Care Trusts for the management of public health issues.

for profit providers. Care homes normally have a higher proportion of publicly funded clients than 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. It is possible that such buying power, reduces the fees paid by the local authorities for the same services that private payers receive, resulting in a potential cross subsidisation of privately funded clients to publicly funded clients[28].

3.3 Data

3.3.1 Care home variables

In our analysis we observe 315 local authorities at district level for 4 annual periods from January 2014 to December 2017. We collapse monthly information from the directories of active, inactive and rated care homes released by the CQC. Our initial sample is composed by 3,270 records corresponding to 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. Tokunaga and Hashimoto (2013) use a similar variable for analysing the entry of private providers in the Japanese long-term care market. We assume that a care home is active once it is registered and we drop those registrations that occur due to organisational reasons, such as changes in the address or take overs from a different provider. Geurts and Van Biesebroeck (2016) show that neglecting this issue when considering this type of data, may lead to measurement errors and incorrect conclusions about the performance and dynamics of the firm. In particular these spurious entries and exits in the market may lead to overstimations of

[28]Several authors have documented this situation for the English long-term care market (Forder and Allan 2014; Hancock and Hviid 2010; Office of Fair Trading 2005). Other studies have also such a situation for the US market (Grabowski 2004; Mukamel and Spector 2002).

the firm dynamics and employment. The population data correspond to the projections of the Office of National Statistics corresponding to mid-year estimates as of 30th of June for the years 2014 to 2016.

We also use the date of registration to define the entry rates (E). Particularly, we adopt an ecological approach by which we consider the number of new registered care homes (I_t) relative to the number of incumbents at the beginning of each period (I_{t-1}) as follows: $E = \frac{I_t}{I_{t-1}}$. This is a relative measure that allows us to compare the process of entry between markets of different sizes (Audretsch and Fritsch 1994). Further, we use 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 commissioning social care services to generate two additional outcomes associated with the capacity of the care home, namely the number of newly registered beds in a period and 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. This new system implied more systematic and structured inspections conducted without prior announcement. Compared to the old system, evaluations explicitly consider five quality components of the services that include the safety, effectivity, level of care and response to people's needs, as well as the management and leadership of the services. These dimensions are complemented with an overall evaluation of the services that we use for our analysis. Quality assessments are rated 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).

3.3.2 House prices and instruments

We obtain information on property prices from the price paid dataset released on a monthly basis by the Land Registry. This dataset registers all the transactions involving properties 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 property was under leasehold or freehold. We aggregate this information on the same level as the care home and obtain the average price for each year. We apply the geometric mean which is the method adopted by the Land Registry to correct the potential skewness from high property values.

For identifying the effect of house prices we use information concerning historical planning decisions at local level. This information comes from the data of Hilber and Vermeulen (2016) and it is referred to local authorities at district level for the period from 1974 to 2008. We consider the information related to the instruments used in this paper. Concretely, we use information on the time variation in the acceptance period for the planning applications outlined in section 3.2.1, the share of Labour voters and the historical population density. We discuss the rationale for these instruments in further detail in section 3.4.

The sample presents some caveats. First, it includes only those local authorities that did not undergo any changes after the reform in the English Local Government in 2009 by which some local authorities changed their status becoming single unitary authorities or were split into several local authorities[29]. Second, the analysis begins in 2014 due to the availability of the information of some outcomes. Data in the directory of active care homes contain registrations of care homes since 2010, the year when it became a legal requirement. The majority of the registrations (16,054) were carried out during 2010 and the first two months of 2011. In additional analyses shown below, we test the validity of the results on some outcomes considering the period from March 2011 to December 2017 and March 2011 to December 2013.

[29]Cheshire council split into Cheshire East and Cheshire West and Chester and Bedforshire council became Bedford borough and Central Bedforshire.

3.4 Empirical strategy

We estimate regressions that follow the general form

$$Y_{irt} = \alpha_r + \theta_t + \beta_{prices} logP_{irt} + \lambda X_{irt} + \epsilon_{irt} \tag{3.1}$$

where Y is the respective outcome variable i.e., proportion of care homes per 1000 population over 65, care homes entry rates, number of newly registered beds and average size of entrant care home, for a local authority i in region r time period t. P 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 the local authority region and for the time period. The rationale of these variables is to control for all those factors, observed and unobserved, that are constant within region and time.

We are interested in estimating β_{prices}. OLS estimates of β_{prices} in equation 3.1 are likely to be biased as there may be unobserved factors, as for instance the general wealth in an area, that may influence both house prices and the provision of care homes. 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. Potentially, we could address this problem controlling for the index of multiple deprivation (IMD). However, it is likely that the IMD's link to the house prices could exacerbate the endogeneity concerns. To tackle with these concerns, we complement Equation 3.1 with the following first stage regression.

$$logP_{irt} = \gamma_r + \kappa_t + \delta Z_{irt} + \eta X_{irt} + \epsilon_{irt} \tag{3.2}$$

where Z is a variable associated with instruments for the house prices. In particular,

we obtain a source of exogenous variation in the house prices, following the 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 to assess the response of house prices to changes in the demand. They find that tighter supply constraints, such as less available land and more restrictive planning regulations, lead to increases in the prices. Concretely, in areas with more regulatory constraints, demand changes given by changes in local earnings lead to substantial positive effects on house prices. The authors argue 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 or the developer attitudes once they know the level of restrictiveness in the planning local authority. Whilst averaged values could mitigate the former, dealing with developer attitudes is more challenging and could effectively result in an underestimation of the real level of tightness in the planning authority. To overcome these limitations they propose three instruments that we shall describe in detail below.

Figure 3.2 shows graphically the rationale of our identification strategy. Unlike Hilber and Vermeulen (2016), who are interested in the effect supply constraints on house prices, we aim to identify the effect of house prices on several variables associated with the provision and quality of care homes. In order to do so, we use the set of instrumental variables (I) that Hilber and Vermeulen (2016) show in both their first and second stage estimates is valid to address the endogeneity produced by confounding variables (u) when establishing the causal link between the supply constraints (S) and the house prices (P) (represented by the solid arrows in figure 3.2). In the case of this paper, the effect of house prices on care homes variables (C) may be confounded by unobserved variables (ε) similar to u. To tackle with ε and effectively identify the effect of P on C (shown by the dashed arrows in figure 3.2) we use the set of instruments I.

We can do this because Hilber and Vermeulen (2016) 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 of local authorities at that we have outlined in section 3.2.1. Set in 2002, this reform aimed to avoid delays of major projects and included an explicit target for their conclusion. Local authorities had incentives to meet 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 rationale is that in order to meet the target, restrictive local authorities, which were more prone to delay projects before the reform, had to change their behaviour after the reform compared to more permissive local authorities. A potential criticism of this instrument is that this regulation could affect also the development of care homes. Thus, local authorities with greater differences in their delay rates would be those more restrictive and in principle would reject more planning projects - including those involving care homes. Figure 3.3 shows the weak relationship ($\rho = 0.0061$) between the average delay rates and the number of care homes per 1000 people older than 65 for each local authority.

Two reasons may explain this low association. First, major projects and more generally the design of planning regulations, mostly refer to houses. Care homes are normally considered within a category that integrates care facilities. The applications are not tested with the housing development plans and conversely may be approved despite the limits imposed by future settlements (King 2017). Second, the development of care homes planning also involves local authorities at different levels. In two-tier authorities, the aims of local authorities with responsibilities in long term care for meeting the demands of long term care for the old population may clash with the strategy of local planning authorities which decide about the development of care homes. Most local plans that define the planning framework fail at addressing the needs for the provision of care homes or similar facilities such as retirement houses[30].

The second instrument is the vote share of the Labour party in the General Election

[30] In a study conducted over the planning documents of all local authorities in England, about a 66% did not have a explicit policy for the elderly or allocated sites devoted to the development of care homes whereas only a 10% had both (Branson 2017). Also, some argue the lack of recognition of old population growth in Local Plans (Campbell 2015).

of 1983 at the local district level and links local planning regulations to local political power. In addition to Hilber and Vermeulen (2016), this strategy has been used in the literature before (Bertrand and Kramarz 2002; Sadun 2015). The 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 affordable homes and additional jobs. Furthermore, they were unlikely to own (more expensive) houses that could depreciate.

Using data from a general election ensures that very localised concerns, such as those related to housing, do not play a dominant role in voters' decisions. We additionally include a contemporaneous Labour vote share (based on the general election in June 2015) to control for changes in the demographic composition of areas that may lead to a more Labour-friendly population and consequently alter the voting behaviour and 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 also regard physical constraints as another mechanism that may restrict the supply of houses. The share of developed land can be endogenous given that local authorities may discretionarily determine it. To correct for this problem, they use the population density in 1911 under the rationale that land is more expensive in historically more densely populated areas.

A final concern is that the location decisions of the elderly may be associated with the instruments. 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 care home choices are normally driven by the proximity to the original residence of the client (Zwanziger et al. 2002; Shugarman and Brown 2006).

Table 3.1 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.

There is a surprisingly low number of inspected care homes rated as outstanding per population over 65 (0.01). Conversely, the average number of care homes that are rated either inadequate or require improvement are more than 20%. Likewise, regarding the dynamics of the market, we can see that entry rates as defined in section 3.3.1 vary substantially across the sample with an average of 5% and some local authorities reaching values as high as 40%. The average size of 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.

Table 3.2 shows the results corresponding to the first stage statistics for our estimation combining different sets of instruments. Columns 1 to 3 present estimates using each instrument described above individually. Column (4) considers the whole set of instruments and represents our preferred specification. Given that the variables used as instruments do not vary over time, Hilber and Vermeulen (2016) interact the instruments with a time varying variable, the annual local earnings from 1974 to 2008, to instrument for the refusal rate, their measure of planning constraints, and use the predictions in their second stage to estimate the house prices. The period of analysis considered in this paper differs from Hilber and Vermeulen (2016) and consequently there is no information avaible in the dataset. To tackle with this problem, we include time fixed effects to produce variations over time on the resulting predicted house prices. Otherwise, the estimates would not explain the effects of house prices on care homes provision.

Also, we include fixed effects at regional level. 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 with collinearity. In particular, some of the dummy variables used as controls become constant when grouped at the local authority level. Yet, there are some important aspects, such as the productivity of care homes, that

differ at regional level and that are difficult to capture using observed data. Some works have proposed approaches to compare changes in productivity of social care. For instance, Yang et al. (2017) show discrepancies of regional productivity growth for social care during the period of 2010-12.

Like Hilber and Vermeulen (2016), our estimates suggest that the relaxation of planning constraints lowers house prices, while higher (historical) population densities increase them. The results also confirm the negative relationship between Labour voters and house prices presented before. The bottom of Table 3.2 presents Sanderson-Windmeijer (2016) multivariate F-tests for the excluded instruments. These tests overcome the problem that simple F-tests have in the case of multiple instruments which can be misleading as they could mask a combination of strong and weak instruments. Results for our preferred specification are displayed in Column 4 and indicate the absence of weak identification problems for all our endogenous regressors. In particular, the F statistics are above 10 which is the value suggested by Staiger and Stock (1997)[31] as acceptable to reject the null hypothesis of weak instruments.

3.5 Results

Table 3.3 looks at the link between contemporaneous house prices and the number of care homes per 1000 population over 65, as well as the rate of market entry. In both panels, the first column reports OLS estimates. The remaining columns present results considering all the instruments[32] (column 4 in table 3.2) and different sets of controls. Our estimates imply that higher house prices decrease the number of care homes and the entries into the market. In our preferred specification, including time and regional controls, an increase of a 10% in the level of prices entails a reduction of 0.06 care homes per 1000 population over 65. In terms of standard deviations, our results suggest that a 1% increase in the log of the house prices lowers the number of

[31] Stock and Yogo (2005) propose a critical value of 22.30 for the case of three instruments and one endogenous variable. Our preferred estimate in Column 4 of Table 3.2 is also above that level.
[32] Appendix 7.1 presents results with alternative specifications based on different sets of instruments.

care homes by 107% of a standard deviation. These findings suggest that the effect of higher production costs derived from higher house prices dominates any eventual demand effect operating through potential clients becoming wealthier.

As we can see in the right panel in Table 3.3, house prices also affect negatively the entry rates of care homes. Yet this effect is not significant under our preferred specification. It is plausible that the decision of entry is based on historical information on the housing market. Furthermore, the dates of care home registration and the purchase of the property may differ. Table 3.4 explores these issues and shows the effects of lagged house prices 1, 2 and 3 years respectively, on the number of care homes and entry. These lags fit the timeframe required for setting up and opening a care home in England which in addition to the construction of the building, involves the application for a "statement of purpose" and the confirmation of a registration. The effects of lagged prices are similar to the findings presented in Table 3.3, These findings therefore indicate that different time frames do not affect our analysis.

The negative signs in the variables used as proxies of provision and market entry suggest that the provider's decision of entry to local markets may respond mainly to financial incentives that determine the cost of development. 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, there may be competition between care home developers and house builders to get the available land. Since house builders have greater profit margins, they may be able to pay higher prices for a site. Finally, public finance programmes at local and national level may disincentivise and jeopardise the development of care homes. For instance, local programmes such as the Community Infrastructure Levy charge for additional spaces of a care home that are not subject to rental revenues (Campbell 2015). Also, national grants such as the New Homes Bonus support local councils for building new houses in their area.

3.5.1 Alternative mechanisms

In Table 3.5 we present results of the effect of house prices on the care homes capacity measured by the total number of new beds and the average size of care homes registered in the local authority. Higher house prices lead to the registration of fewer beds and smaller care homes. A 10% increase in the house prices implies a reduction of about 1 new bed registered in the local authority per year. In terms of the standard deviations, a 1% increase in house prices implies a reduction in the average size of the newly registered care home of about a 103% of a standard deviation. These results imply that older populations living in areas where house prices are high would face a restriction in the long-term care choices available to them based on fewer beds available for them.

Yet, 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 quality variations because of different care home sizes, house prices may influence the quality level in the care home. Evidence suggests that care homes rely on self-funded clients to cross-subsidize publicly-funded clients and preserve their financial viability (Humphries et al. 2016). Therefore, areas with more clients that self-fund their care should be more attractive for long-term care providers. Further, as price takers, self-funded clients can choose which care home they use and prefer better care homes. 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[33].

Table 3.6 reports the results of the effect of house prices on the number of care homes per old population by quality rating. The information displayed is based on care

[33]This effect would be similar to the effect found with other institutions such as schools. See Black and Machin (2011) for a review.

homes rated as outstanding, require improvement or inadequate. IV estimates reveal a positive effect of the house prices on the proportion of outstanding care homes and a negative effect on those rated badly. Specifically, a 1% increase in house prices leads to an increase in the number of outstanding care homes 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 greater proportion of care homes that are inadequate may explain why their effect is greater. In any case, the signs of these estimates for care homes rated as outstanding, require improvement and inadequate, show the expected sign. Therefore, the findings are consistent with the argument that care homes would be upgrading and improving their quality to capture asset-rich private clients. Yet, these results should be read carefully for the case of care homes rated as outstanding given their small proportion (around 1% of the whole sample of inspected care homes).

There may be concerns associated with the external validity of our results given the three-year period that composes our main sample of analysis. We examine the validity of our results considering samples with diffrent sizes for those outcomes where we have additional information. Particularly, the number of care homes, the entry rates, the newly registered beds and the average size. We use a sample that includes the period 2011-17 covering the years since the registration in the CQC was compulsory and prior to the establishment of the quality rating. Further, we also consider a sample containing only the years before the quality system was established (2011-13). The specifications include both time and region fixed effects and results are reported in Table 3.7. Our findings are consistent with those shown in previous tables, although they generally increase in magnitude, especially for the sample considering the period before 2014.

3.6 Discussion and conclusion

This study adds to the literature on long-term care by investigating the causal link between house prices and the provision long-term care in England. Our findings suggest that high house prices have a hitherto unexplored social cost that implies a reduction in the provision of local long-term care. Likewise, we find a negative effect of the prices on the number of new registered beds and the average size of care homes. Therefore, areas where higher house prices have fewer care homes that are also smaller. These results provide evidence to inform future challenges faced by local authorities to meet the long-term care needs of their populations and particularly relevant given the analyses that estimate the need of 70,000 extra residential beds for 2025 in England (Kingston et al. 2017).

A potential implication of these results is that high house prices are not as uniformly beneficial to older homeowners as often implied in public debates. That being said, despite the small proportion of care homes rated as outstanding, we do find evidence that higher house prices go hand in hand with better quality rated care homes. Similarly, house price are negatively linked to care homes with poorer ratings. These results thus suggest that care home providers might be motivated by a desire to attract asset-rich private clients. These findings are consistent with evidence found for other countries such as the US. McMillen and Powers (2017) show the prevalence of nursing care homes to locate in areas with older and wealthier people and Stevenson and Grabowski (2010) find similar results for the case of assisted living facilities. An alternative potential implication derived from the increases in housing wealth that we do not explore in this paper, is that the demand of residential care could be substituted by alternative formulas of care. Costa-Font et al. (2018) find that increases in wealth do not increase the demand of residential care but rather lead to greater demand more personalised care as home care or informal care. In such cases, residential care would be considered as an inferior good. This paper lacks information regarding the types of demand that populate the care homes and alternative ways of formal provision such as home care or even informal care. Considering these elements, in combination with

information on residential care, may define one avenue for future studies.

Our findings also support the idea that financial incentives are a key driver of care homes development. High house prices suggest that projects with alternative developments to care homes, such as building domestic houses, constitute a more attractive option for developers' investment. This is because of two core reasons. Housing development entails fewer opportunity costs and higher profit margins that lead to better bargaining power for accessing to available developable land. Likewise, the development of care homes is associated with fewer fiscal incentives, both at local and national level. Regarding this, our findings illustrate important interactions between various areas, that are responsibility of different local authorities. Our results can contribute to policy reforms that involve the housing market and aim to increase local government funding. For instance, the introduction of new national grants, such as the New Homes Bonus in 2011, has encouraged the development of new residential properties. Although these development projects could potentially compromise the provision of long-term care, the funding derived from these grants might alleviate the current funding needs in long-term care. Disentangling these relationships, given the context of constant reforms in the local public finance, may be another area for future research.

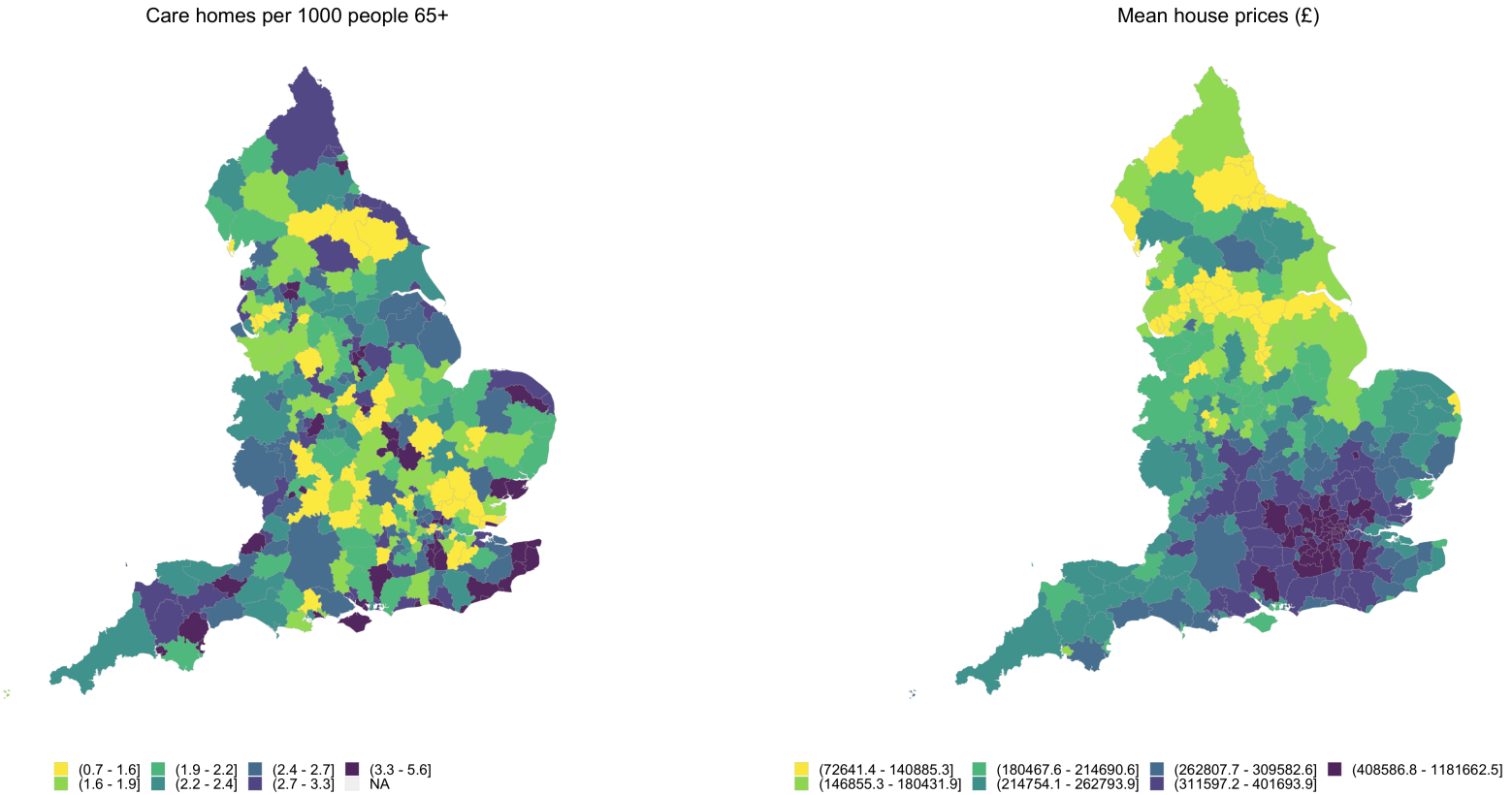
We should read these findings alongside the funding schemes for long-term care where the value of the properties plays a key role, especially for those people residing in care homes. In these cases, the value of the property is included for the assessment of the means test that determines the public support by the local authorities. Likewise, the value of the property is considered for assuming the cost of deferred payments for 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 source of local revenue and is partially used for meeting the needs of local

governments in terms of long-term care. Despite the fact that 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.

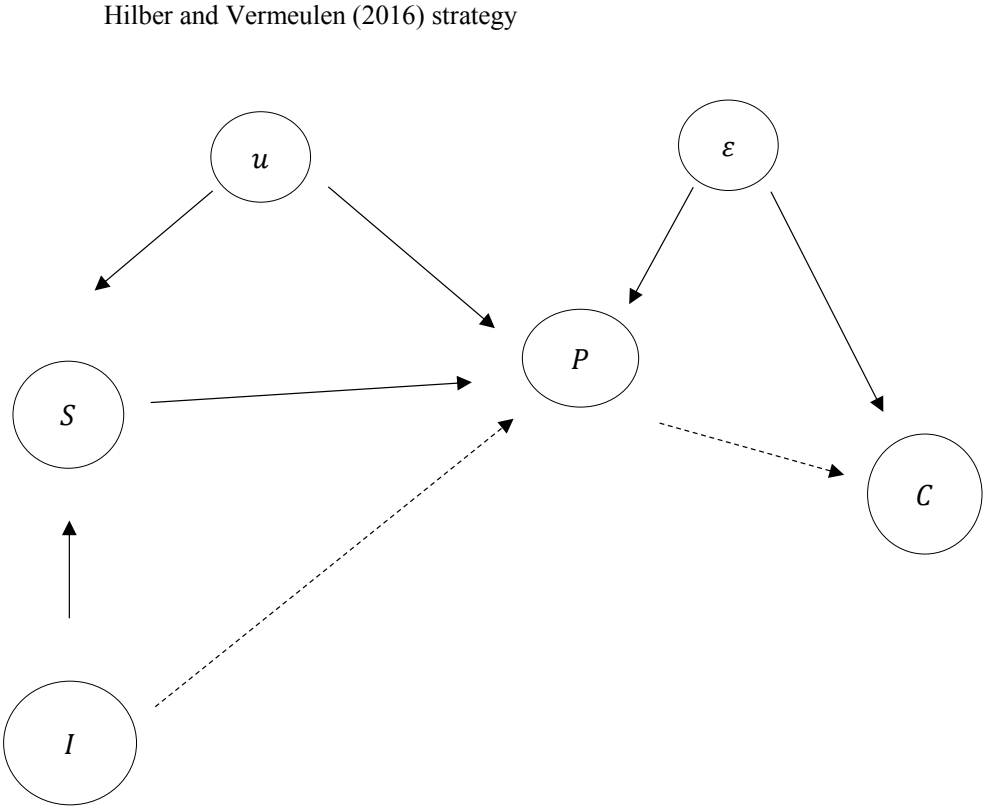
3.7 Figures

Figure 3.1: Distribution of care homes and house prices



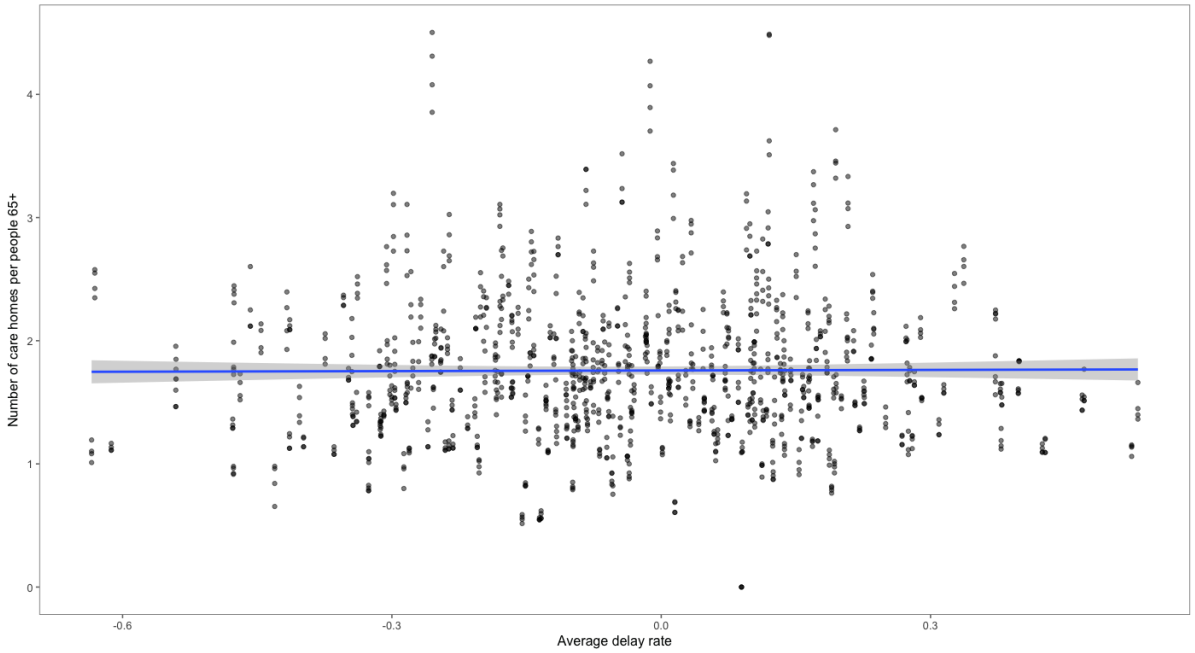
Note: Distribution of care homes per 1000 population 65 years old and mean house prices. English districts for 2016.

Figure 3.2: Causal links between instruments



Note: This figure shows the rationale for the causal links in the identification strategy. Hilber and Vermeulen (2016) use a set of instruments I to control for confounding unobserved variables u and identify the effect of supply constraints S on house prices P. Similarly, the effect of house prices on care home variables C may be confounded by unobserved variables ε similar to u. To control for this influence, we use the set I to identify the effect of P on C.

Figure 3.3: Care homes and delay rates



Note: This figure shows association between the number of care homes per pople older than 65 and the average rate of delay. Figure is based on observations of English districts from 2014 to 2017.

3.8 Tables

Table 3.1: Summary statistics

	Mean	S.d	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 (# beds)	26.64	24.92	0	156
Care homes quality (outstanding)	0.01	0.02	0	0.16
Care homes quality (requires improvement)	0.2	0.18	0	1.7
Care homes quality (inadequate)	0.02	0.04	0	0.34
Average house price (£)	247,835	134,049	71,65	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			

Note: CQC, DWP and Census.

Table 3.2: First stage results

	Average house prices (log)			
	(1)	(2)	(3)	(4)
Change delay rate	-0.135**			-0.0919***
	(0.0678)			(0.0294)
Historical share of Labour votes		-0.941***		-1.088***
		(0.276)		(0.135)
Historical density population			3.64e-05***	4.47e-05***
			(8.66e-06)	(3.10e-06)
Time FE	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes
Observations	1260	1260	1260	126 0
Number of local authorities	315	315	315	315
Sanderson-Windmeijer F test of excluded instruments	3.97**	49.2***	17.64***	36.67***

Note: CQC, DWP and Census. Robust standard errors at the LSOA level are in parentheses. Table provides estimates of the first stage equation 3.2 where the dependent variable is average of the logged house prices in the local area. Controls consist of the share of old population, contemporaneous share of Labour votes and region and year fixed effects. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$.

Table 3.3: 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***	-0.107	-0.622***	-0.00385	-0.0103**	-0.00652
	(0.118)	(0.0898)	(0.178)	(0.00478)	(0.00406)	(0.00868)
Estimation	OLS	IV	IV	OLS	IV	IV
Time FE		Yes	Yes		Yes	Yes
Region FE		No	Yes		No	Yes
Observations	1260	1260	1260	1260	1260	1260
Local Authorities	315	315	315	315	315	315
R-squared	0.209	0.043	0.204	0.021	0.014	0.048

Note: CQC, DWP and Census.. Robust standard errors at the LSOA level are in parentheses. Table provides estimates of the second stage equation 3.1 where the dependent variable is number of care homes per 1000 population 65 or older and the care homes entry rates. Controls consist of the share of old population, contemporaneous share of Labour votes and region and year fixed effects. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$.

Table 3.4: 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***			-0.00652		
	(0.174)			(0.00865)		
Average 2-year lag house prices (log)		-0.631***			-0.00659	
		(0.173)			(0.00870)	
Average 3-year lag house prices (log)			-0.642***			-0.00663
			(0.177)			(0.00884)
Estimation	OLS	IV	IV	OLS	IV	IV
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	1260	1260	1260	1260	1260	1260
Local Authorities	315	315	315	315	315	315
R-squared	0.204	0.202	0.201	0.020	0.020	0.021

Note: CQC, DWP and Census. Robust standard errors at the LSOA level are in parentheses. Table provides estimates of the second stage equation 3.1 where the dependent variable is number of care homes per 1000 population 65 or older and the care homes entry rates. Controls are the share of old population, contemporaneous share of Labour votes, region and year fixed effects. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$

Table 3.5: Effect of house prices on care homes capacity

	New registered beds			Care home average size		
	(1)	(2)	(3)	(4)	(5)	(6)
Average house prices (log)	-38.08***	-65.47***	-98.42***	0.0839	-5.893***	-9.259**
	(9.407)	(11.29)	(21.95)	(2.673)	(2.028)	(4.228)
Estimation	OLS	IV	IV	OLS	IV	IV
Time FE		Yes	Yes		Yes	Yes
Region FE		No	Yes		No	Yes
Observations	1260	1260	1260	1260	1260	1260
Local Authorities	315	315	315	315	315	315
R-squared	0.121	0.087	0.094	0.058	0.036	0.048

Note: CQC, DWP and Census. Robust standard errors at the LSOA level are in parentheses. Table provides estimates of the second stage equation 3.1 where the dependent variables are newly registered beds in the local authority and the average size of new registered care home measured by the number of beds. Controls are the share of old population, contemporaneous share of Labour votes, region and year fixed effects. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$

Table 3.6: 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	0.00432***	0.00675**	-0.115***	-0.0310**	-0.0825***	-0.0197***	-0.0111***	-0.0227***
	(0.00185)	(0.00130)	(0.00300)	(0.0217)	(0.0136)	(0.0303)	(0.00446)	(0.00284)	(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: CQC, DWP and Census. Robust standard errors at the LSOA level are in parentheses. Table provides estimates of the second stage equation 3.1 where the dependent variable is the share of care homes with an outstanding rating, requires improvement or inadequate. Controls are the share of old population, contemporaneous share of Labour votes, region and year fixed effects. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$

Table 3.7: Effects of house prices on several 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: CQC, DWP and Census. Robust standard errors at the LSOA level are in parentheses. Table provides estimates of the second stage equation 3.1 where the dependent variables are is number of care homes per 1000 population 65 or older, the care homes entry rates, the number of beds in the local authority and the average size of the new registered care homes. Controls are the share of old population, contemporaneous share of Labour votes, region and year fixed effects. $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$

Chapter 4

Local budgets and care homes quality in England: a duration analysis

4.1 Introduction

Long term care services are an important policy concern in developed economies. Increasing proportions of ageing populations combined with new family structures, are leading to a greater demand for these services under some sort of paid provision in care homes or with support at home. In England, local governments are responsible for long-term care services by supporting in the choice of the care home and purchasing, *commissioning*, services on behalf of individuals with long term care needs and insufficient financial capacity to afford them. Since 2010, the combination of austerity and a greater localisation of resources in local public finances has led to a reduction in central Government funding of about 49.1% in real terms for the period 2010-11 to 2017-18 (National Audit Office 2018a).

Despite the reduction in local budgets, long term care services have been relatively more protected than other services during this period, increasing their relative share within the local governments core spending (Phillips and Sampson 2018)[34]. Some issues such as the meeting of people's needs and the fees paid by local authorities have, nonetheless, experienced the effects of these constraints. Regarding the extent people's needs are met, several authors have shown an association between local public constraints and the rise in the levels of unmet need since 2011 (Marmot et al. 2014; Vlachantoni et al. 2011). More recently, AGEUK (2017) have estimated in 1.2 million people who were not receiving suitable support for activities of daily living in

[34]These authors suggest that long term care has increased its share of local authority service spending from 34% in 2009-10 to 41% in 2017-18.

2017[35]. Furthermore, despite increasing their share on local authority spending, social care budgets which are mainly devoted to fund long-term care services, have reduced. These reductions have produced a downward pressure on the prices paid by local authorities threatening market sustainability and patients outcomes (Allan 2015).

In a market dominated by private care homes, local authorities have little discretion to reduce the number of places offered in care homes so an alternative consequence of the austerity cuts may be a reduction in the quality. This chapter addresses this question by analysing variations in local spending power. Quality is a key element for the organisation of long-term care and has been a recurring topic in the policy agenda (Malley 2010). Given its links with other relevant services, such as housing or health, a good provision and quality of long term are associated with a good society (Association of Directors of Adult Social Services 2015). Despite its importance, there is still little understanding on how changes in local public finances may affect the quality of services (Humphries et al. 2016). We aim to shed light on this issue by assessing the effects of local spending power on care homes' probability of improving or deteriorating in their quality.

We combine different administrative sources to construct a dataset with information on care homes quality inspections and changes in the spending power of the districts where they are located. The sample analyses all registered care homes in England for the period of 2014-18. To characterise the effects of changes in local spending power on the quality modifications, we fit semi-parametric hazard models and control for the influence of unobserved heterogeneity. Considering a certain initial qualiy rating in a care home, the analysis intends to examine the time duration, measured in days, until the care home transitions to a different quality rating.

Unlike other studies that have analysed the quality of care homes using variables based on health conditions or mortality rates (see for example Grabowski and Castle (2004) or Watkins et al. (2017)), our quality variable is based on a quality rating obtained

[35]Some argue that there are other elements that could also explain these figures such the choice of individuals to not acccess to the services (Competition and Markets Authority 2017a)

from the periodic inspections carried out by the Care Quality Commission (CQC), the regulator of health and social care in England. This measure provides a more comprehensive view of the quality in the care homes. Hence, in addition to issues concerning the safety of the services, this rating addresses aspects such as the care received or the management of the premises. To this extent we follow studies as Forder and Allan (2014) and Zhao (2016) or Barron and West (2017) that use similar measures.

To preview our results, we find that care homes located in areas with higher constraints have lower propensity to be inspected and are less likely to improve their overall quality rating. Yet, care homes in local authorities with increased funding capacity do not necessarily improve their quality. Indeed, we find evidence on quality deterioration as a result of positive changes in the spending power. We perform the analysis over different quality dimensions and find that characteristics based on staff and management of the care home are important drivers of the former result.

In addition to using a different measure of quality, this study provides further contributions to the literature on care homes quality. We enlarge the set of studies that have analysed the quality of care homes in England by looking at the effect of local public finance on the quality of care homes. Watkins et al. (2017), in a similar exercise, find a positive relationship between local funding constraints and reductions in of long term care quality explained by increases on the mortality rates. Our study departs from the former in two ways. First, instead of aggregate data, our study design is based on a sample of care homes followed over time to study the transition on their quality rating. Furthermore, we aim to identify the effect of changes in spending power by ruling out the effect of potential unobserved factors that may influence this association.

In the health economics literature, duration models have been normally used to model cases of time to death, time to starting using a drug or time to quitting (Jones et al. 2013). For the specific case of long term care, this modelling approach has been used to analyse factors affecting the length of stay in the care home (Liu et al. 1991; Forder and Fernandez 2011) or the differences in quality by ownership type because of the degree of asymmetric information (Chou 2002). Fernandez et al. (2018) specify a

duration model to examine the integration between health and social care services by studying the effect of hospital and local authorities relationships on the post-operative lengths of stay. Yet, the analysis on the transitions between quality ratings is an issue that remains underexplored.

The remainder of the paper is organised as follows. Section 4.2 provides background information on the institutional setup and discusses the organisation of local authorities and long term care in England. Section 5.4 presents the empirical approach and data sources used. Section 5.5 discusses the results and section 5.6 concludes.

4.2 Institutional background

This section presents several elements associated with the organisation and public finance of local governments in England. Also it outlines the main characteristics of the long term care sector and the core aspects of the quality rating system implemented in October 2014.

4.2.1 Local governments, organisation and funding

English local authorities are organised on the basis of two levels or *tiers*. The higher level is represented by the county councils and the lower level is represented by the district councils. Each tier has decisional power over different local policies. Thereby, whilst county councils are in charge of issues such as public health, district councils manage issues more locally as for instance planning policies. At the same time, there are unitary authorities, which are an alternative administrative structure that combines both tiers in a single level. Counties and districts may be divided according to the population living in an area. These distinctions include metropolitan local authorities that cover a range of population between 1.2 and 2.8 million and non metropolitan or "shire" local authorities which cover smaller populations between 300,000 to 1.4 million.

Local authorities are a big part of the public budget. About a quarter of the public

resources in England pays for local needs. The funding structure is complex and combines funds obtained from central grants and business rates, which are operated at national level, as well as local resources based on the property tax (council tax). The spending power represents the funding capacity of each local authoritiy to cover its needs. Until 2010, national grants were allocated according to the needs of local authorities and their capacity to obtain revenues. The underlying rationale of this allocation formula was to address the potential inequalities derived from different spending needs and tax bases across the local authorities. This strategy, however, was not without limitations. As Smith et al. (2016) detail, it could lead to a lack of incentives for local authorities for raising their tax bases and/or containing their spending needs. Also, it could pose risks to some local authorities given that a substantial part of their funding is directly managed by the central government.

To provide local governments with tools to overcome the potential financial desincentives, since 2010 there has been a trend to *localise* funds. This strategy, formalised with the 2011 Localism Act, intended to give local authorities more discretionary powers in financial issues. Essentially it was articulated in three main reforms. First, a change in the model for the allocation of central grant funds. Prior to the reform, resources were allocated according to four blocks that determined the relative needs and resources of the local authorities as well as a maximum cap and a minimum floor to scale grant cuts and increases respectively. To achieve equalisation across local authorities, the weights associated with each block were updated yearly according the fiscal situation of the local authority. Local authorities with more relative needs and fewer capacity to raise funds received more funds and vice versa. After the reform, there fixed weights to the blocks and the allocation formula could not be adjusted anymore depending on the needs and financial resources and performance of the local authorities. Second, local authorities could retain partially business rates. This change modified the previous model based on a complete retention at national level. The third main reform consisted of the introduction of the New Homes Bonus. Under this scheme, planning authorities received payments for the development of new houses

in return for additional revenues.

The main consequence of these reforms, especially the changes in the allocation of central grants, was a reduction of the spending power. The National Audit Office has estimated this reduction to be about 30% in real terms for the period 2010-11 to 2017-18 (National Audit Office 2018a)[36]. As shown in Figure 4.1, this trend can be seen regardless of the type of local authority. The peak in 2014-15 and the subsequent decline in the spending power could be associated with the change in the localisation of the council benefit. This change implied the abolition of the council tax benefit by which the central government paid local governments, total or partially, the council tax corresponding to poorer people. This reform modified local authorities incentives to reduce their support for other needs (Smith et al. 2016).

4.2.2 Quality of the long term care in England

There are 152 local authorities operating at the upper - county level that manage and commission formal long term care. This type of care comprises services that entail support on healthcare and activities of daily living and in England is mainly provided in residential or nursing care homes. Yet, there are other alternatives for formal care, such as paid care at home (e.g. home care). This paper focuses on the care home market which is composed mainly of private for profit providers (about a 85% - 90% (Forder and Allan 2011; Jarret 2018)). Within this group, there are basically two main types of providers small providers with a single care home or several care homes, and large chains with a number of care homes operating in several parts of the country. The latter account for about a 30% of the whole market in terms of the number of beds (Jarret 2018)

Care homes are populated with two types of clients according to their payment arrangements. Care homes have self-funded clients who are able to pay for their own

[36]This report also provides further estimates regarding long term care services. Local authorities have reduced a 3% their spending on social care in real terms. Moreover, a 10.6% of local authorites with long term care responsibilities would have the equivalent of less than three years' worth reserces left if they continued to use their reserves at the rate of 2016-17.

care and also have public-funded clients who cannot afford their own care and receive some sort of support on the basis of a means test. Self-funded residents normally pay higher prices compared to public-funded clients for the same service (Forder 2007) and also have longer stays (Forder and Fernandez 2011). A key reason to explain this gap in the fees paid by the two types of clients, consists of the market power of local authorities when negotiating contracts for publicly-funded residents. Allan et al. (2017) discuss the implications of such power and the reliance of providers on self-funded residents on which they execute certain market power setting higher prices to cross-subsidise the lower fees of publicly-funded residents[37].

The quality of care homes is assessed by the CQC according to the rating system implemented in October 2014. This system monitors care homes through systematic inspections that are carried out on the basis of key lines of enquiry (KLOEs) structured in sets of 5 key questions. These questions are associated with a number of elements to determine to what extent services are safe, effective, caring, responsive to people's needs and well led. In addition to the assessment of each dimension, the CQC also releases an overall rating. Both the overall rating and each of the other 5 questions are rated according to four possible categories: *outstanding*, *good*, *requires improvement* and *inadequate*.

An important component of the system is that the inspections are carried out without prior announcement. Moreover, the frequency of inspections is determined by the rating obtained. Thus, worse ratings lead to more frequent inspections. Obtaining an "inadequate" rating implies the adoption of special measures, close monitoring and a re-inspection in 6 months (Care Quality Commission 2015a). The information used to derive the ratings is obtained from different sources that include quantitative measures, the direct observation from the inspectors and the feedback from both patients, relatives and staff working in the care homes (Barron and West 2017).

[37] In areas where the market power of local authorities is high, Allan et al. (2017) estimate a gap of about £40 a week. The quality also has a positive effect on the fees gap although it is small. Hence, in local authorities with a 75% of care homes rated outstanding the fees gap is over £23 higher than in local authorities with only 25% of outstanding care homes.

These different dimensions are equally important for the computation of the overall rating. The inspections set as a reference the characteristics of a *good* service and then the ratings consider the difference of the service with respect to these good characteristics. However, as the CQC states, "the characteristics are not a checklist and are not exhaustive". Rather, they are meant to provide guidance in relationship to the five key questions (Care Quality Commission 2015b)[38]. There are, however, several general principles referred to each rating in each quality dimension that help to clarify potential combinations of questions and ratings that are hard to evaluate[39].

4.3 Empirical framework

4.3.1 A duration model

This section presents the empirical framework for examining the impact of the variations in local budgets on the frequency between inspections and the probability of decreasing or increasing the quality rating. The underlying rationale in both questions consists of understand the time spent in a particular state and the transition to a different state as a result of variations in the spending power. In this study, states are defined by the inspections carried out in a care home and its quality rating before and after the change in the spending power. The duration then is expressed in terms of the time, measured in days, between different states. To address these changes in durations we use a semi-parametric hazard model.

We define the hazard rate $\lambda(t)$ as the rate at which the duration in a given state is completed at some time t. The hazard function may be interpreted as the probability of leaving the state conditional on remaining in it - *survive*. Hence, if T is the cumulative distribution function of the spells in a state then the hazard function can be defined as

[38] Appendix 7.2 presents details on the questions concerning each dimension.
[39] For more information see: http://www.cqc.org.uk/sites/default/files/20150327_asc_residential_provider_handbook_appendices_march_15_update_01.pdf

$$\lambda(t) = \lim_{\triangle t \to 0} \frac{Pr[t \leq T < t + \triangle t | T \geq t]}{\triangle t} \tag{4.1}$$

If we represent the probability density function of T as f, so that $f(t) = \frac{dT}{dt}$, we can represent the hazard function as $\lambda(t) = \frac{f(t)}{1-F(t)}$ where $1 - F(t)$ is the survival function $S(t) = Pr[T > t]$. To examine the relationship between the survival distribution and some covariates we define a semi-parametric hazard model using the specification proposed initially by (Cox 1972)[40]

$$\lambda_i(t) = \lambda_0(t) exp(X_i \beta) \tag{4.2}$$

In Equation 4.2 the hazard function is defined in terms of a base-line hazard function $\lambda_0(t)$ and a set of covariates X that can vary with time or not. Unlike parametric models, the baseline hazard function is not specified. This specification is normally used due to its greater flexibility in comparison to parametric forms. Furthermore, it easily accomodates time varying variables and explicitly captures the duration (*spell*) between states and the censorship of some spells in the data (Van den Berg 2001). Applying these considerations to our particular case, we estimate models on the basis of the following general equation

$$\lambda_i(t) = \lambda_0(t) exp(\theta SP_{lt} + \beta X_{lt} + \delta C_{it} + \gamma D_t) \tag{4.3}$$

where $\lambda_i(t)$ represents the hazard of care home i of experiencing the two main outcomes of interest: being inspected and improve (or deteriorate) its quality rating. The key regressor for the analysis is SP. It operates as a categorical variable[41] that

[40] The estimates are calculated in R using the *coxph* function of the survival package (Therneau and Lumley 2017).
[41] Section 4.3.2 discusses further the construction of this variable.

reflects changes in the spending power of local authority l during the period t. In particular, since we are in interested in examining changes in the spending power, the analysis will use different specifications to analyse positive and negative changes respectively. Hence, depending on the specification, SP equals 1 to show a positive or negative change in the spending power and 0 otherwise. X and C are vectors of controls for the local authority and the care home respectively. Furthermore, Equation 4.3 includes dummy variables for years and local authorities to control for unobserved trends that can cause potential spurious correlations between the changes in the spending power and the number of inspections[42]. Next subsection provides further details on the data used

4.3.2 Data

We construct our sample of analysis with data from several administrative sources. We analyse care homes over the period between October 2014, month when the quality rating system was implented, and June 2018.

Data containing care homes' quality are obtained from the CQC ratings dataset. The data are reported on a monthly basis and present information on the latest quality inspection and rating obtained for the whole set of care homes. The dataset also includes information on the location, the size of the care home (in terms of the number of beds), the provider that owns the location and the local authority responsible for the long term care service. This dataset, however, does not include information regarding the current status of a care home (i.e. whether the care home is active or inactive). Therefore, some quality ratings may refer to care homes that are deregistered and no longer active in the market. To have a complete idea of the dynamics followed by the care homes, we complement this dataset with the date of deregistration for those care homes that become inactive at some point of the period of analysis. This information is obtained from the directory of de-activated locations also released monthly by the

[42]These results are estimated using R and the function *plm* of the plm package (Croissant and Millo 2008)

CQC.

Our sample consists of more than 17,265 residential care homes. We remove from the analysis those care homes that display inconsistent information such as different ratings for the same category in the same date. As outlined in the introduction, in addition to the inspections, we are particularly interested in two main types of transitions from these inspections namely the deterioration and improvement of quality. A quality deterioration entails a decrease in the rating - moving to "Inadequate" or "Requires Improvement" from "Good" or "Outstanding". Furthemore, we do not consider as quality deterioration those events that comprise a deregistration of a care home and consequently an exit from the market[43]. There may be an association between deregistrations and quality deteriortations. In Appendix 7.2 we examine the main results considering samples eliminating the deregistrations.

Figure 4.3 presents information on several aspects associated with the overall quality of the care homes. More than 60% of the care homes in the sample (10,393 care homes) are inspected more than once. Also, the majority of them have a good rating (about a 65%) that is maintained over succesive inspections. Furthermore, 30% obtain an initial bad rating (either "Requires Improvement" or "Inadequate"). These care homes tend to be inspected more than once and about half of them maintain a bad rating systematically. In particular, those care homes that start with an inadequate rating[44].

The duration of the spells also includes time variations for covariates that are relevant for the transitions of inspections and quality ratings respectively. Thus, in addition to the dates of inspection, the spells include the dates when the spending power varies which correspond to the beginning of the fiscal year. As outlined in section 4.2, we measure the funding capacity of local authortities over time using annual percentage change in the revenue spending power over the period of study. By using this measure, our paper diverges from other studies that have addressed similar questions but

[43] Allan and Forder (2015) show that bad quality is a clear determinant of care homes closures. Our sample is consistent with this relationship and a 45% of the 2,340 care homes that exit the market, begin with an Inadequate or Requires Improvement rating.

[44] Appendix 7.2 provides similar figures for other quality dimensions.

instead have employed some variable associated with the expenditure of the local authorities (see for example Watkins et al. (2017) or Paton and Wright (2017)).

The spending power is a more comprehensive variable than the expenditure. In addition to indicate the expenditures carried out by a local authority, it also shows the potential that a local authority has to obtain different sources of revenue. We obtain the information relative to the spending power from the Government Finance Settlement released annually by the Department of Local Government and Communities. The years considered are the fiscal years (e.g. starting in April). The analyis uses data for fiscal years that include the period from 2013-14 to 2017-18. We are mainly interested in understanding changes in the spending power that have a substantial magnitude. In order to capture such changes, we dichotomise the changes in spending power according to the quintiles of its distribution. Thus, a negative change corresponds to the first quintile of the distribution and implies fewer money available to make decisions in the local authority. Values within this quintile, have a value 1 in the variable SP defined in equation 4.3 and are used in the specifications that model negative changes in the spending power. Similarly, a positive change is given by the fifth quintile and implies greater funding capacity. Values within this quintile have value 1 in the variable SP in equation 4.3 and are used for those specifications modelling positive changes in the spending power. Considering the former definitions, figure 4.2 plots the percentage change of the spending power over time for the set of English districts.

Further, we use a number of controls defined both at the care home and the local authority level. We control for the dimension of the care home by constructing a variable that categorises the size according to the number of beds. Thus, we define several categories: *small*, *medium* and *big* that indicate whether the care home has less than 10, between 10 and 50 or more than 50 beds respectively. We also include an additional variable that determines those care homes that have dementia patients as main users. It has been shown that caring for this type of patients is more difficult and is negatively associated with the quality of the services (Barron and West 2017).

We also control for the composition of the local population. Apart from reflecting the needs of the local authority, the composition of the local population may also proxy for the type of payers that can pay for a certain quality and level of care. The variables that we consider as indicative of the local population include the share of population older than 65, the share of job seekers and the share of pension credit claimants over the adult population. These data are collected at district level and are provided by the Department of Work and Pensions. We also control for the level of deprivation using the average derprivation score which is released at district level by the Department for Communities and Local Government in 2015. A higher score represents a higher level of deprivation. Finally we also control for the type of local authority. The share of growth in the business rates that is retained varies depending on the type of local authority introduced in section 4.2.1. Metropolitan and unitary authorities retain almost 50% of the growth in the business rates whereas in areas with a two tier structure (e.g. shire), districts retain a 40% and counties up to 10% (Smith et al. 2016). Finally, we control for the deprivation in the district by including a variable with the proportion of LSOA[45] in the 10% most deprived.

Table 4.1 shows the descriptive statistics for our estimation samples. The samples are based on split spells that represent time variations for the variables described above and are referred to each quality category included in the inspections. The categories that present more spells are the "Overall" and "Effective" (both with 75,820 spells). In addition, in the lower panel we can see that quality dimension referred to management (e.g. whether services are well-led) is the one with the most spells of quality deterioration (1700). Whereas the dimension associated with the safety of services is the dimension with more events of quality improvement (3167) followed by the overall (3083).

[45]The Lower Layer Super Output Area (LSOA) is the smallest geographical unit in England with a mean population of 1500. These are designed to report small area statistics and are about 32,000 LSOAs in England.

4.3.3 Unobserved heterogeneity

Under the specification in 4.3, all care homes with the same observable characteristics and located in the same districts are assumed to face the same risk associated with their hazard of being inspected and improving (deteriorating) their quality. Nonetheless there are likely to be unobserved factors that affect the hazard rates of particular care homes than others. For instance, certain care homes may have higher (lower) turnover rates or higher levels of (dis-)satisfaction among the staff that may lead to make them more likely to improve - or inversely deteriorate their quality in comparison to other care homes in the market. Neglecting these different frailties may lead to select only samples of the care homes whose quality status remains unaltered and consequently impose bias in the estimation (Abbring and Van Den Berg 2007; Lancaster 1992). Nevertheless, it needs to be clear that unlike linear models, the bias from omitted characteristics not captured by observed covariates in hazard models may remain even when these characteristics are uncorrelated with the observed explanatory variables (Rodriguez 1994; Rodriguez 2005).

In addition to specific characteristics, our data also present some clustered structure. Some care homes are located in the same local authority that follows the same procedures to commission sevices. We incorporate this and the former frailties by including a random effect, α_j, in equation 4.2. The idea of this random effect is to capture the effects of variables that are omitted and independent to the variables that we include in our model. We set random effect at this level since the main variable of interest, the spending power, is controlled and varies at the local authorities level. Therefore, unobserved characteristics at the level of the care home are unlikely to confound the effect of the spending power in this specification. Also, this random effect α imposes homogeneity within the elements in the cluster j. To assess the robustness of the results, we also include random effects at the level of the provider given that some care homes share provider with the same business model. Equation 4.2 is therefore re-specified as a mixed proportional hazard model

$$\lambda_i(t) = \lambda_0(t)exp(X_i\beta + \alpha_j) = exp(\alpha_j)exp(X_j\beta) \tag{4.4}$$

where the random effect can be considered as a random intercept that modifies the linear predictor (Austin 2017). An important issue is to determine the distribution of the elements of the shared frailty. A common assumption is to consider that they are distributed as gamma density normally because of its tractability (Abbring and Van Den Berg 2007)[46]. Heckman and Singer (1984) suggest a method for computing the parameters and the distribution function of the unobservable variables based on non parametric maximum likelihood (NPMLE). This method, which is based on the calculation of mass points, although it is more flexible and does not impose a functional form on the distribution, uses a functional form in the hazard baseline function. In addition, given that the mass points are calculated with the uncensored observations, it is not recommended in cases of high level of censorship (Huh and Sickles 1994). In our sample, around 90% of the observations are censored.

An alternative approach to tackle the unobserved heterogeneity would be to consider the cluster specific effect α as fixed. Yet, imposing fixed effects would involve an important point. Specifically, the estimation of fixed effects would consider only clusters that have the failures of interest - in our case represented by quality deteriorations and quality improvements. This is not a suitable solution given the characteristics of the sample with high levels of censorship (e.g. unaltered transitions). Hence, despite addressing problems associated with unobserved heterogeneity at the cluster level, they do not estimate effects of included variables that are time invariant. Random effects, on the other hand, estimate effects of observed variables at all levels and capture the effects of unobserved cluster characteristics that are uncorrelated with unobserved covariates (Rodriguez 2005).

[46]The estimates considering the gamma distribution are computed using R with the *coxme* function in the coxme package (Therneau 2015).

4.4 Results

4.4.1 Local budgets and quality inspections

We begin analysing the effects of changes in the spending power on the number of quality inspections carried out in the local authority. The rationale for this analysis is twofold. First, we aim to examine the extent to which changes in spending power influence the supervisory role of the CQC concerning the quality of care homes. Second, since the number of inspections is directly associated with the changes in the quality (i.e. a care home only changes its quality if it is inspected), fewer inspections lead necessarily to fewer changes regardless of the underlying quality.

Table A4.1 provides estimates of negative changes in the spending power on the frequency of inspections in the district where the care is home located. Columns 1, 2 and 3 correspond to the specifications of the semi-parametric model introduced by Equations 4.3 and 4.4 respectively. The specifications in columns 2 and 3 present mixed models that apply random effects at the level of the provider of the care home and the district. It needs to be clear that all specifications consider the number of inspections carried out in the local authority as the failure of the model regardless of whether they yielded a bad or a good rating. Likewise, in all cases, the unit of analysis is the care home.

Table A4.1 shows that negative changes in the local public spending power reduce the hazard of inspection in the care homes. In particular, negative changes reduce the hazard of being inspected by 10% (exp = 0.9). These results are consistent after correcting for unobserved heterogeneity and even reduce the hazard to 14% (exp = 0.86) in the case of the mixed model with random effects at district level. These estimates suggest that negative changes in the spending power are associated with a lower frequency of inspections by the CQC. This situation is similar to other community services such as district nursing. In an analysis of the effects of financial pressures in the National Health Service (NHS), Robertson et al. (2017) argue that these services, which work closely with care homes and other providers of long-term care, have a

limited oversight. This lack of supervision has aggravated the challenges faced by these services including an increasing demand, a block contracting system and rising shortages in the workforce that increase the gap between demand and capacity.

4.4.2 Local budgets and overall quality ratings

Table 4.3 reports the results on the effects of changes in the spending power on deterioration and improvement of the overall quality rating. As outlined in section 5.3, we express positive and negative changes in terms of substantial changes. Therefore, negative and positive changes are indicated by the first and last quintile of the distribution of changes in the spending power. Given that depending on their initial rating certain care homes can only change in one direction (i.e. deterioration if initial rating is outstanding or improvement if initial rating is inadequate) we present the results in terms of two subsamples according to their initial rating. In particular, a sample with care homes that obtain an initial bad rating (5,730 care homes) and a sample with care homes that begin with a good rating (11,535 care homes).

The upper panel of Table 4.3 shows the effects of negative changes in the spending power. Looking at the right-hand table, results suggest that a negative change in the spending power leads to significant decreases in the hazard of quality improvement. This implies that, holding other variables constant, care homes in areas with negative changes in the spending power have a lower propensity to improve their quality. Concretely, the hazard of the care homes with an initial bad rating is reduced by 9% (exp = 0.91). The value of the estimates, which are significant at the 10% level of significance, are similar for the specifications of the Cox model and the mixed models with random effects at the level of the provider and the local authority.

A potential explanation for these results may be that reductions in the spending power lead to decreases in the fees paid by local authorities for long-term care. If this is the case, then the gap between the fees paid by self-funded and publicly supported residents is likely to increase and care providers will be unable to maintain or increase the levels of quality. The increase in the gap between private and public fees could affect

and deteriorate the conditions for the staff and reduce the quality (Allan and Vadean 2017). As shown in the left-hand side table, negative changes in the spending power also reveal negative hazards in the quality deterioration. In particular, the hazard of deteriorating quality is about 10% less in those care homes that have a negative change in the spending power. These results, which are similar for all specifications, are not statistically significant. This may indicate that in cases of negative changes in the spending power, care homes shift their activity towards self-funded clients who are incentivised to pay for quality.

The lower panel of Table 4.3 regarding the effect of positive changes in the spending power. In the left hand side table, we observe a significant positive effect of the increases of spending power on the hazard of quality deterioration. This finding suggests that care homes located in local authorities where there are positive changes in the spending power have 24% higher risk of experiencing a quality deterioration. At the same time, care homes in local authorities with positive changes are less likely to improve their quality (about a 4%) although this effect is not significant regardless of the specification.

Several explanations could explain the former result. First, greater funding power may imply a greater number of publicly funded clients. This may imply increased demand for long term care services. In this case, the quality of the services may decrease if the capacity – especially staff in care homes, remains constant. In addition, more clients may imply a greater bargaining power from the local authorities when they are negotiating contracts with care providers. Local authorities may then negotiate fees below the costs for publicly supported clients and increase the current gap of prices between private and public clients[47]. These decreases in the price-cost margin could be translated into decreases of quality. Given the characteristics of the choice of a care home, some have argued that in cases where there is not enough supply, care homes may not have the incentive to provide a level of quality beyond the minimum standards (Laughlin et al. 2007). Another argument, typically found in the

[47] Allan et al. (2017) measure this gap and set it in an average £40 a week.

hospitals' literature, is associated with the choice of hospitals according to their quality. Gravelle et al. (2012) review the theoretical and empirical literature on hospital quality competition and conclude that most studies suggest that the probability of a hospital being chosen increases with measures of quality. Gutacker et al. (2016) or Moscelli et al. (2016) find that hospital demand responds positively to measures of observed quality based on health gains - rather traditional failure measures. Similarly, Gravelle et al. (2014) examine whether a hospital's quality is affected by the quality of other hospitals in the market. Using several quality measures and a spatial econometrics approach, they find that quality responds positively to rivals' quality in about half of the measures - those that are mores easily observable to patients.

Another explanation may be along the lines that the spending power can be transferred to fund other formal services that would be substitutes for residential care. This could be the case for home care services which have been particularly underfunded over the last decades (Glendinning 2012). Related to this, an additional explanation is the delays from hospital and health centres occurring in the district. In cases where there is bed blocking in those hospitals, there may be referrals of patients with relatively worse outcomes which could lead to reductions in the quality of care homes in the area. Patients who stay longer in hospitals tend to have worse outcomes and therefore more long term care needs. Over the period of 2013 - 2015 there has been an increase of about 30% in the delayed discharges according to the National Audit Office (National Audit Office 2016).

A final explanation for the former effect could be associated with the fact that care homes with a bad situation may not be particularly affected by an increase in local financial resources. These care homes may have structural problems that affect their performance regardless of the changes in the budgetary constraints of local authorities where they are located. Bad care homes could struggle to maintain high quality standards. We examine this argument in further detail by looking at the transitions in other quality dimensions.

4.4.3 Local budgets and other quality categories

Table 4.4 reports results of hazard ratios for other quality dimensions in addition to the overall rating considering again positive and negative changes of the spending power. Focusing first on negative changes of the spending power (upper panel), we can see that there is a significant decrease in the hazard of quality improvement regardless of the dimension considered. Care homes in local authorities that have negative changes in the spending power are less likely to improve their quality. The estimates are significant at 1% level and equal across all the specifications within each quality dimension. Also, the estimates are greater in dimensions that involve workforce more intensively (e.g. whether services are caring and effective). These domains present a 20% (exp = 0.803) lower risk of quality improvement. Trigg (2014) suggests that reductions in spending of social care harm not only the recruitment and retention of staff but also training that helps to provide better quality. This is particularly evident in the case of qualified nurses who mainly work in adult residential care homes[48]. Our results may help to explain these earlier findings.

The left-hand side of the table provides results in terms of the quality deterioration. Apart from whether services are caring, there is another dimension: whether services are well led, in which negative changes in the spending power produce significant reductions in the hazard of quality deterioration. Particularly, about 20% lower risk of deterioration in their quality compared to care homes in local authorities that do not experience a negative change in the spending power. Similarly, positive changes in the spending power (lower panel in Table 4.4) increase the hazard of quality deterioration (a 19%). In general, these results reveal that the management dimension seem to be a determinant for explaining the changes in quality. Concretely, these results suggest that facilities managed poorly see their quality deteriorate regardless of the financial situation in their local authority. To this extent, this finding is along the lines of

[48]Considering data from 2016-17, Skills for Care estimated a staff turnover rate in the adult social care of 27.8%. During the period of 2012-13 to 2016-17 the turnover rate increased by a total of 4.7 percentage points.In addition, most of the new starters (about a 66%) were staff who had worked previously within the adult social care (Skills for Care 2017)

similar findings in the literature. For instance, Bloom et al. (2015) show no relationship between further public funding and the management for case of hospitals in the UK.

The remaining dimensions in the lower panel of Table 4.4 also indicate positive hazards on quality deterioration resulting from positive changes in the local spending power. Yet, only whether services are effective and to less extent safe, are the dimensions that provide significant results. Concretely, the hazard of deteriorating quality increases by 26% and 17% in the effective and safe dimensions respectively. To this extent, ensuring the effectiveness in the services entails that staff are trained appropriately to deliver effective care, treatment and support. Our findings suggest that care homes with a workforce in poor conditions would be at a higher risk of deteriorating their quality. With regards to this, Allan and Vadean (2017) find that other factors such as high job vacancies also affect negatively the quality of the services.

4.5 Conclusion

The relationship between local funding and the quality of care homes is an important policy concern. Especially given the decreasing trend in the spending power of local authorities in real terms. In this paper we examine the influence of changes in the spending power on the frequency of quality inspections as well as on the quality improvement and deterioration of care homes.

Our findings suggest that negative changes in the spending power are negatively associated with the frequency of inspections. Similar to other services providing care, the oversight of care homes is reduced in cases where there is less local funding capacity. We also find, perhaps not surprisingly, that negative changes in the spending power are negatively linked to improvements in quality. Hence, struggling care homes with initial levels of low quality, have a lower propensity to improve their quality when their local authority reduces its spending power. On the other hand, we find evidence that positive changes do not necessarily lead to quality improvements. Indeed, they are related to quality deteriorations. We examine this result in further detail and observe

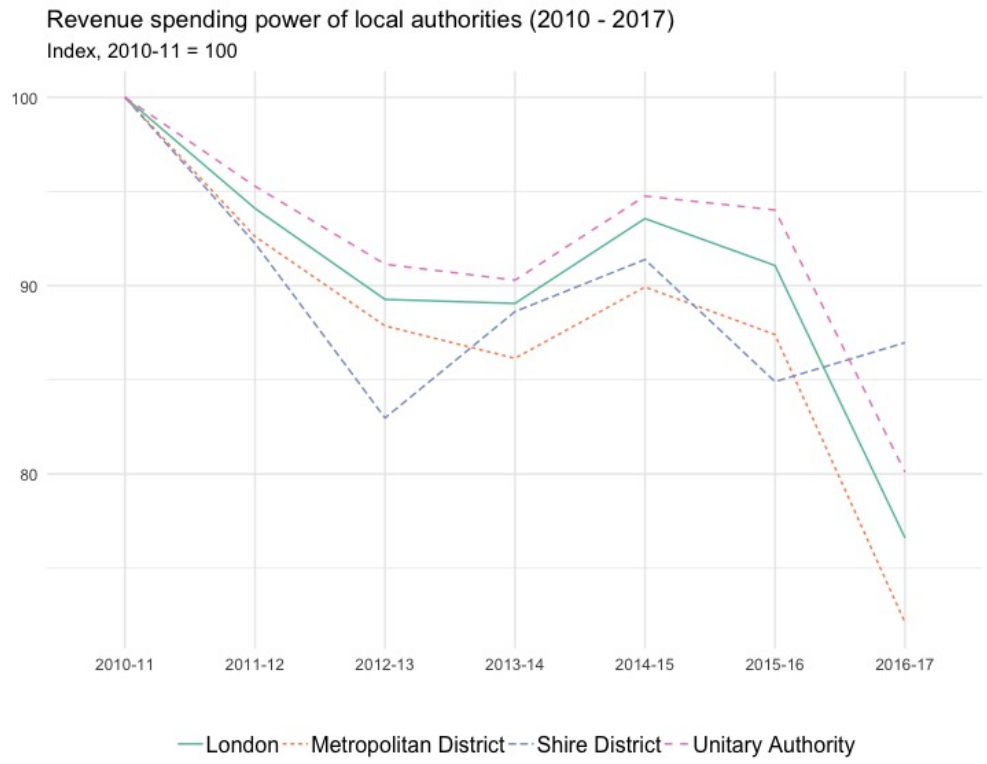
that quality dimensions that refer to labour conditions for the staff and particularly the type of management, are the most affected. How a care home is managed seems to play an important role for the provision of quality and it is independent to local financial situation.

Our study presents a limitation with regards to the data used. In particular, the data present a high level of censorship that prevents more the use of non-parametric models as proposed by Heckman and Singer (1984). These models provide more efficient estimations but yet are not recommended when data are highly censored.

The results of this research may contribute to inform which areas of the quality in the services are more critical and may be subject to closer supervision. Also, although it is not the primary purpose of this study, our findings may contribute to inform the debate associated with the funding of long term care in the forthcoming decades. In particular, how public funding may help to rise the efficiency of services by identifying aspects that provide the best outcomes for the users.

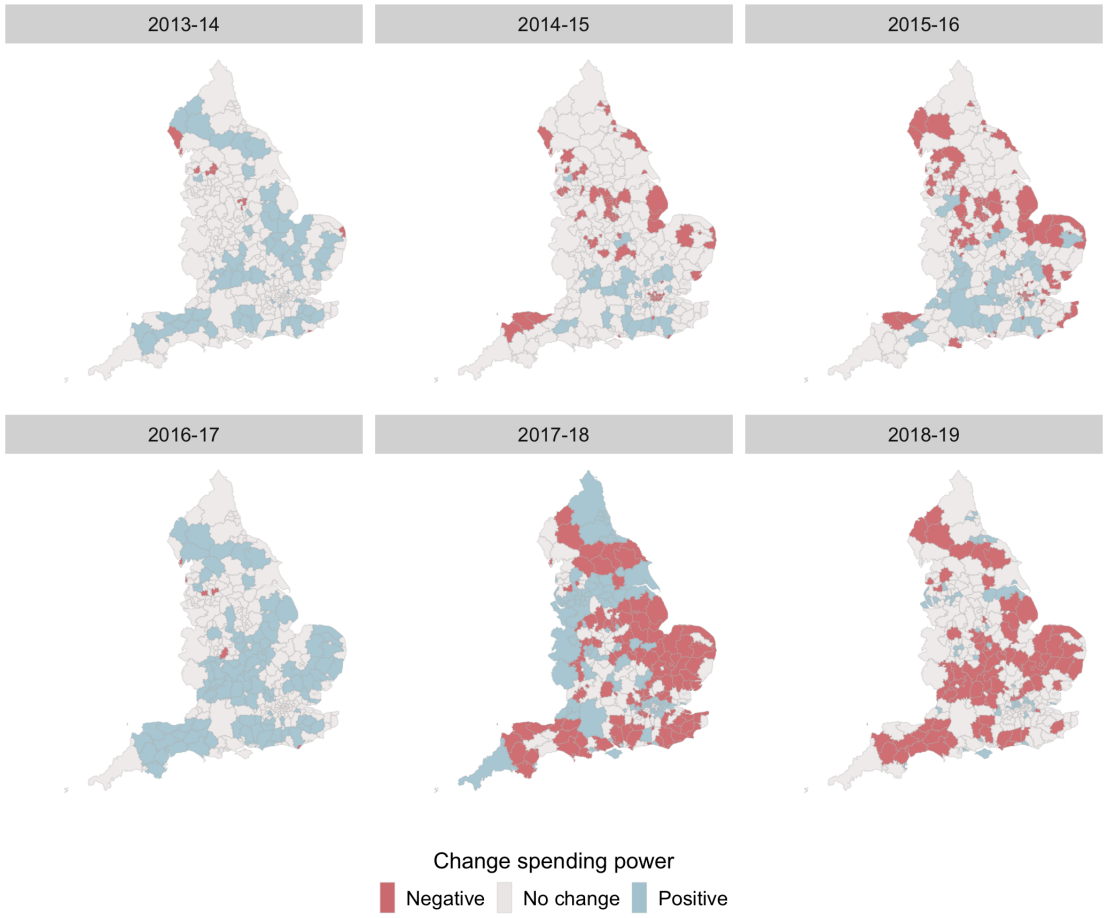
4.6 Figures

Figure 4.1: Revenue spending power local authorities, 2010-2017



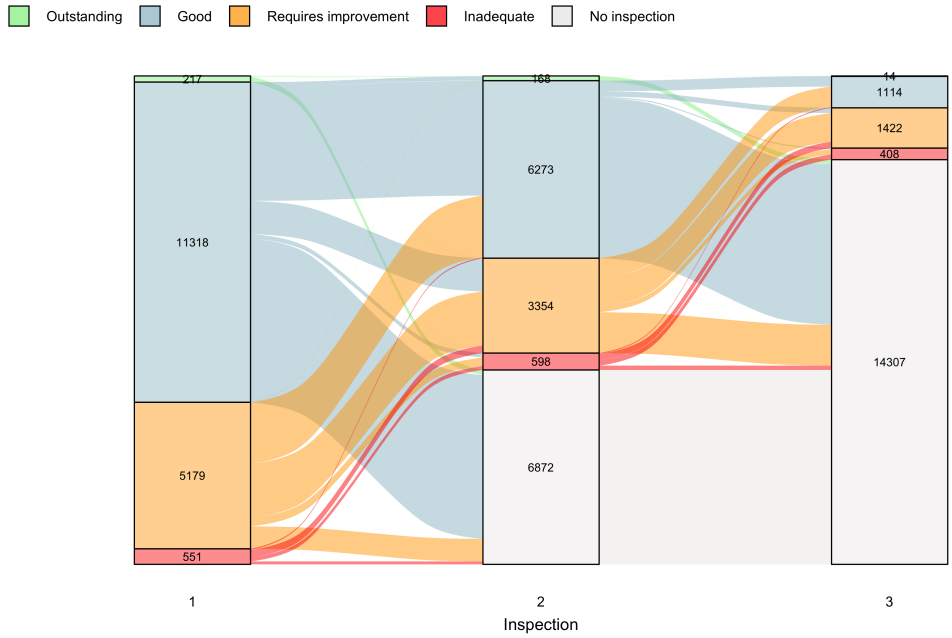
Note: Author's calculations with information from the Local Government Finance Settlement (Department of Local Government and Communities). London includes Inner and Outter boroughts. Year refers to fiscal years (April - March).

Figure 4.2: Change in core spending power, 2013 - 2018



Note: Author's calculations with information from the Local Government Finance Settlement (Department of Local Government and Communities) and ONS. Figures represent percentage change of core spending power. Negative (red) and positive (blue) changes in the spending power are represented by the first and last quintiles of the distribution respectively.

Figure 4.3: Transitions of overall quality ratings



Note: Author's own calculation with data from Care Quality Commission. Numbers represent number of care homes in each quality rating.

4.7 Tables

Table 4.1: Summary statistics

	mean	sd	min	max
Positive change revenue spending power (1 = yes)	0.64	0.48	0	1
Negative change revenue spending power (1 = yes)	0.25	0.43	0	1
Population 65+ (%)	0.19	0.05	0.06	0.34
Job seekers (%)	0.01	0.01	0	0.05
Pension credit claimants (%)	0.04	0.01	0.01	0.08
District (london) (1 = yes)	0.1	0.3	0	1
District (metropolitan) (1 = yes)	0.19	0.39	0	1
District (shire) (1 = yes)	0.46	0.5	0	1
District (unitary authority) (1 = yes)	0.25	0.43	0	1
Dimension big (1 = yes)	0.18	0.39	0	1
Dimension medium (1 = yes)	0.55	0.5	0	1
Dimension small (1 = yes)	0.26	0.44	0	1
Dementia main user (yes = 1)	0.46	0.5	0	1
Bottom 10% LSOA	0.1	0.11	0	0.49
Care homes	17265			
Local authorities (district level)	325			

Quality dimension		Spells		
		Observations	Quality deterioration	Quality improvement
	Overall	75820	1434	3083
	Care	74442	1156	1343
	Effective	74820	1370	3052
	Responsive	74601	1340	2503
	Safe	75584	1495	3167
	Well-led	75206	1700	2656

Note: CQC, DWP and Census. Figures from upper panel are based on the sample for overall ratings.

Table 4.2: Negative changes of spending power on frequency of inspections

	Cox	Mixed provider	Mixed district
Negative change spending power(1 = yes)	-0.106***	-0.107***	-0.147***
	(0.023)	(0.023)	(0.026)
Observations	75820	75820	75820
Spells	14876	14876	14876
Log-lik	-134584.48	-135821.18	-135661.32

Note: CQC, DWP and Census. Robust standard errors in parentheses. Table provides estimates of the hazard ratio from Equations 4.3 and 4.4 where the dependent variable is the hazard of being inspected. Random effects are applied at the level of the provider and the local autority. Controls include local characteristics, number of inspections in the care home, initial rating and fixed year effects. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$.

Table 4.3: Quality deterioration and improvement on overall dimension

	Quality deterioration			Quality improvement		
	Cox	Mixed provider	Mixed district	Cox	Mixed provider	Mixed district
Negative change spending power (1 = yes)	-0.109	-0.109	-0.101	-0.095*	-0.095*	-0.101
	(0.077)	(0.077)	(0.079)	(0.049)	(0.049)	(0.079)
LogLink	-12243.41	-12242.25	-12235.33	-25576.43	-25576.44	-25576.43
Positive change spending power (1 = yes)	0.217***	0.215***	0.221***	-0.001	-0.001	-0.001
	(0.069)	(0.069)	(0.072)	(0.043)	(0.043)	(0.072)
LogLink	-12239.57	-12238.54	-12231.5	-25578.33	-25578.33	-25578.33
Observations	47456	47456	47456	28364	28364	28364
Spells	1434	1434	1434	3083	3083	3083

Note: CQC, DWP and Census. Robust standard errors in parentheses. Table provides estimates of the hazard ratio from Equations 4.3 and 4.4 where the dependent variable is the hazard of quality deterioration/improvement. Random effects are applied at the level of the provider and the local autority. The modelling of quality deterioration uses a sample with all care homes that obtain an initial *"good"* (e.g. Good or Outstanding) rating. Similarly, the modelling of quality improvement uses a sample with all care homes that obtain an initial *"bad"* (e.g. Inadequate or Requires improvement) rating. Negative and positive change in spending power are indicated by the first and last quintiles of the spending power distribution respectively. Local controls and year fixed effects are included in all regressions. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$.

Table 4.4: Quality deterioration and improvement on other dimensions

		Quality deterioration			Quality improvement		
		Cox	Mixed provider	Mixed district	Cox	Mixed provider	Mixed district
Negative change spending power (1 = yes)							
	Well-led	-0.194**	-0.195**	-0.193**	-0.16***	-0.16***	-0.16***
		(0.074)	(0.07)	(0.071)	(0.057)	(0.053)	(0.053)
	Effective	-0.1	-0.101	-0.097	-0.198***	-0.198***	-0.198***
		(0.083)	(0.076)	(0.078)	(0.051)	(0.05)	(0.05)
	Responsive	-0.083	-0.085	-0.079	-0.163***	-0.163***	-0.163***
		(0.072)	(0.075)	(0.077)	(0.058)	(0.055)	(0.055)
	Care	-0.231**	-0.233***	-0.232**	-0.219***	-0.219***	-0.219***
		(0.083)	(0.082)	(0.085)	(0.073)	(0.074)	(0.074)
	Safe	-0.092	-0.093	-0.097	-0.126**	-0.126**	-0.126**
		(0.078)	(0.073)	(0.076)	(0.051)	(0.049)	(0.049)
Positive change spending power (1 = yes)							
	Well-led	0.201***	0.199***	0.2***	0.026	0.026	0.026
		(0.067)	(0.062)	(0.063)	(0.051)	(0.047)	(0.047)
	Effective	0.215**	0.214***	0.23***	0.001	0.001	0.001
		(0.079)	(0.067)	(0.069)	(0.05)	(0.044)	(0.044)
	Responsive	0.121	0.118*	0.136**	0.011	0.011	0.011
		(0.076)	(0.068)	(0.07)	(0.053)	(0.048)	(0.048)
	Care	0.108	0.105	0.136*	0.064	0.064	0.064
		(0.079)	(0.072)	(0.075)	(0.063)	(0.064)	(0.064)
	Safe	0.154**	0.153**	0.16**	0.008	0.008	0.008
		(0.074)	(0.065)	(0.068)	(0.048)	(0.043)	(0.043)

Note: CQC, DWP and Census. Robust standard errors in parentheses. Table provides estimates of the hazard ratio from Equations 4.3 and 4.4 where the dependent variable is the hazard of quality deterioration/improvement. Random effects are applied at the level of the provider and the local autority. Econometric specifications and samples used for quality deterioration and improvement follow the same rationale as Table 4.3. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$.

Chapter 5

The effect of care home closures on the quality of care homes nearby

5.1 Introduction

During the first half of 2018, almost a third of the English local authorities experienced a closure of a care home affecting about 3,300 people in total (see Association of Directors of Adult Social Services (2018)). Ensuring an adequate provision of care home places is essential for preserving the access to long term care for the older and more dependent population. The lack of available places in long-term premises is also a key determinant of delayed discharges from acute care wards in hospitals[49]. Given their importance, the implications of care home closures are an increasing public concern. Whilst most of the sparse literature addressing the consequences of care home closures has been focused on the distress produced on care home residents (see for example Netten et al. (2003)), less is known about the consequences on other care homes[50].

This paper investigates the effects of care home closures on the quality of long-term care services. Generally, changes in the market structure alter the competition between the firms in the market and elements such as the quality of the services also change. Thus, changes in the market structure that lead to less competition between firms may result in a decrease in the quality of services. In healthcare markets, when prices are regulated, most theoretical models find this result. However, as Propper (2018) notes, a growing body of theoretical models are showing different results by introducing further assumptions such buyers with constrained budgets (Brekke et al.

[49] Gaughan et al. (2015) and Gaughan et al. (2017) conclude that the provision of care homes affects the bed blocking in near hospitals.
[50] Glasby et al. (2018) highlight the lack of formal evidence about what happens when care homes close.

2015) or altruistic providers (Brekke et al. 2018). The main argument of the former is that in cases where prices are fixed quality is the only dimension that firms can exploit to attract consumers and consequently have the incentive to invest in quality. A key condition for increased competition to increase quality is that patients repond to quality. A number of empirical studies have examined this question analysing how the choice of a health centre is affected by the quality it provides. The general conclusion is that health centres that provide more quality are also more likely to be chosen by the patients (Gravelle et al. 2012). This is especially true when these quality measures are observable by the patient (Gutacker et al. 2016; Moscelli et al. 2016; Santos et al. 2016). Yet, firms may be also disincentived to invest in quality if the price-cost margin decreases (Gaynor and Town 2011; Gravelle et al. 2012). When prices are not regulated, competition may have an ambiguous effect on quality leading to too high or too low levels of quality (Propper 2018). The empirical literature studying the health sector when prices are variable provides mixed evidence regarding the effect of competition on quality (Castle et al. 2007; Grabowski 2004).

The market for long-term care in England is generally competitive (Forder and Allan 2014)[51] and prices are not subject to regulation, so the effect of closures is a priori ambiguous. If closures are driven by care homes that are not efficient nor competitive enough to maintain quality standards, a higher consolidation in the market may have positive effects on quality. The remaining care homes would compete on quality to attract clients and increase both their market share and profit (Netten et al. 2005). Castle et al. (2007) find evidence supporting this argument showing that higher concentration in the market is associated with an increase in care home quality. Grabowski (2004) also finds a positive association between concentration and a number of outcomes that include number of patients with pressure sores and registered nursing staff. Closures may also have negative consequences for the quality of incumbent care

[51] These authors build a weighted Herfindahl–Hirschman index (HHI) to represent the care homes competition at Medium Super Output Area (MSOA) level. Considering a market size of a 10 km radius, they find that a 90.5% of the 4,588 MSOAs in England were competitive according to the criteria defined by Office of Fair Trading (OFT).

homes; particularly, with sudden closures, if there is a lack of coordination between the parties involved in the process and existing care homes operate at their maximum capacity. In such cases, an increase in the number of residents from a forced relocation may imply a reduction of the time dedicated to caring by the staff of incumbent care homes. This would lead to reductions in the quality of the service[52].

Empirically, determining the effects of a closure on the quality of the care homes within the same local market is difficult. There may be unobserved costs and demand shocks that can impact simultaneously the market structure and the quality of the services (Bresnahan 1989). Considering the market for care homes in England, the decision to close may be determined by unobserved factors in the local market that also affect the quality of the remaining homes masking the effect of closures. For instance, long term care providers may decide to close in those areas where they expect to obtain lower returns. A simple comparison of the quality between care homes that have a closure nearby and care homes that do not may provide a spurious effect without causal interpretation.

I tackle this endogeneity problem and identify the impact of closures by exploiting the fact that care homes closures may be the result of a business strategy from their care group. Concretely, there may be long term care providers with several care homes across the country that may decide to consolidate and reduce their capacity, expressed by the number of care homes in the care group, to preserve their financial situation and carry on with their activities. Using this rationale, I define a "consolidation" variable that operates as an instrument for care home closures and which is independent of the unobserved determinants of the quality in care homes nearby. To use only plausibly exogenous variation, I focus on relevant consolidations of active providers that involve the closure of care homes located in different local authorities and different regions of the country.

[52]There is a wide consensus on the positive relationship between nursing staffing levels and quality (Harrington et al. 2016). Lin (2014) for example, uses an instrumental variables approach on American nursing homes data and finds that an increase of 0.3 hours a day of registered nurses increases the quality of care more than 16%.

Using this identification strategy on a sample composed primarily of administrative data of quality ratings from inspections of the Care Quality Commission (CQC), the regulator of long-term care services, I am able to disentangle the effect of closures from other confounding factors. I find that closures negatively affect the quality of care homes nearby. In particular, relative to those care homes that do not have a closure, closures result in quality deteriorations expressed as decreases in their quality rating. This effect, however, is moderate (about 15% of a standard deviation in our baseline specification) and decreases over time. Further, the effect remains when considering wider local markets that entail a greater catchment area. The results suggest that regulators and local authorities could be aware of the negative implications resulting from closures and anticipate the potential adverse effects, carrying out actions to mitigate problems during a closure. I explore this argument by analysing the effect of closures on the number of total inspections conducted on a care home. I find that closures operate as an "alarm system" that leads to more inspections of the nearest incumbent care homes. Likewise, I investigate the effect of care home closures on other potential destinations of displaced patients in addition to a care home. In particular, I analyse the effects of closures on providers of informal care in the local authority and on the admissions of older patients (aged 70 or more) to emergency wards of hospitals near the closing care home. Results from these analyses show evidence of a negative effect on informal care and no effect on emergency admission resulting from closures.

This study is primarily related to the body of literature that analyses the effect of the market structure on the quality of long term care services. It contributes to the literature by being the the first study to analyse the English care home market. To this extent, this paper complements other studies that have been focused on the US market (see for example Ching et al. (2015), Lin (2015) or Bowblis and Vassallo (2014)). Indeed, the closest reference to this paper is Bowblis and Vassallo (2014) who analyse the effect of closures on the quality of rural nursing homes in the US. This paper, however, diverges from this analysis in a number of ways. Firstly, it extends the analysis by focusing on the whole set of registered care homes in England, regardless of whether

they are located in rural or urban areas. Secondly, instead of an instrumental variables approach, Bowblis and Vassallo (2014) use the difference-in-differences approach that compares the quality of care homes that are in the same and different geographic markets as the closing care homes to identify the effect of closures. By using this approach, they assume that closures are exogenous. Thirdly, Bowblis and Vassallo (2014), as with most studies in the literature, examine the quality of care homes on the basis of heterogenous indicators such as clinical measures or nursing staffing levels. This paper uses a quality rating released by the CQC that reflects the multidimensional characteristics of long term care services. The use of this type measure, which is collected systematically, may allow for more conclusive results and avoid problems of mixed evidence dependent on the choice of the quality measure (Grabowski 2001).

This paper also adds to the literature by analysing the market structure through closures instead of measures of concentration[53]. Most of the literature using the former has focused on the causes of failure (see Allan and Forder (2015) or Machin and Wilson (2004) studying the case of England). Yet, there is a lack of evidence on the implications derived from these procedures for the remaining care homes in the market. Moreover, this paper is also linked to the empirical literature that has examined the interactions between competition and quality in the care-homes market (Forder and Allan 2014; Netten et al. 2003). Forder and Allan (2014), suggest that more competition does not lead to more quality in scenarios where prices can only pay for the provision of minimum quality and buyers are not interested in quality but only in cost. Unlike this research, the findings of this paper reveal that less competition leads to decreases in quality.

This paper proceeds as follows. Section 5.2 provides the main characteristics of the institutional framework of long-term care services in England. Section 5.3 describes the data used for the analysis. Section 5.4 explains the identification strategy and section 5.5 presents the results. Section 5.6 concludes.

[53] As noted by Forder and Allan (2014) or Forder and Allan (2011), most of the studies analysing the links between market competition and quality, predominantly measure market concentration by a county level Herfindhal index.

5.2 Long-term care in England

5.2.1 Institutional background

The analysis uses data on care homes. Care homes are, with home care, the main ways individuals receive formal, paid, long term care in England. The market is composed mainly of for profit providers (about 85%). The remaining 15% is composed of public and voluntary providers. Furthermore, the set of private providers is divided into those providers that have a significant capacity in terms of beds[54], and those that have a small capacity and are mainly family businesses. Lievesley et al. (2011) argue that this type of familiar businesses are normally the care homes that exit the market. In addition to being small, these facilities have low occupancy levels and often are the only care home in the care group.

The demand for care homes distinguishes two types of residents. On the one hand, there are residents that self-fund their care. These have a solid financial position that enables them to afford their care needs. The other part of the demand are residents who cannot afford their care and therefore receive some degree of public support. For individuals to be eligible for public support for their care home costs, they must pass a means test that determines their financial capacity. If patients are below a certain threshold, they receive some sort of support. For these clients the market operates as a quasi-market where the local authority commissions (i.e. purchases) care on their behalf.

Care homes normally host both types of residents. Yet, considering the same type of service, the prices paid by self-funded residents normally exceed the prices paid by residents who receive some sort of public support[55]. Allan et al. (2017) assess empirically the determinants for this difference in the fees paid by self-funded and publicly-supported residents concluding that the main driver for the gap, which is

[54] The top 25 biggest providers account for 31% of all beds. Within that group, half of the beds correspond to the *"Big Four"* (Jarret 2018).

[55] This difference in prices is also prevalent in other markets such as the US. Private self-funded residents pay a 30% more than publicly Medicaid residents (Mukamel and Spector 2002; Grabowski 2004).

estimated in about £40 a week, is based on the local authorities' market power applied in the negotiation of the contracts for publicly-supported residents. This result had been previously developed theoretically by Hancock and Hviid (2010) for the English care home market. Allan et al. (2017) also explore other aspects such the vertical quality differentiation by which self-funded residents would have a greater preference and an increased willingness to pay for quality. Although they find a positive effect derived from this mechanism, the magnitude is small.

There are 152 local authorities responsible for the management of long term care. In addition to funding care in some cases, they also provide care and manage patients in the events of care-homes closures. Hence, if a care home closes, the corresponding local authority needs to preserve the provision of care to displaced patients and ensure that they receive care in a suitable place. Yet, local authorities are not required to fund the long term care services for these displaced residents unless they are subject to some sort of public support.

5.2.2 Quality of long term care services

Since October 2014, care homes have been inspected according to a new inspection system monitored by the CQC, the independent regulator for long-term care services in England. The main difference compared to previous systems is that the new system implemented more systematic inspections driven by five so called *key lines of enquiry (KLOEs)* that structure the inspections in sets of 5 key questions. These questions are associated with issues that determine to what extent services are safe, effective, caring, responsive to people's needs and well-led. In addition to the assessment of each of these dimensions, the CQC also releases an overall rating. Both the overall rating and each of the other 5 questions are rated according to four possible categories: outstanding, good, requires improvement and inadequate.

An important component of the system is that the inspections are carried out without prior announcement. Also, the frequency of inspections is determined by the rating obtained. Thus, worse ratings lead to more frequent inspections. Obtaining an "In-

adequate" rating implies the adoption of special measures, close monitoring and a re-inspection in 6 months (Care Quality Commission 2015a)[56]. The information used to derive the ratings is obtained from different sources that include quantitative measures, the direct observation from the inspectors and the feedback from both patients, relatives and staff working in the care homes (Barron and West 2017).

5.3 Data

As outlined in the previous section, this analysis observes care homes over a period that starts in October 2014, the date when the new quality system was implemented, and ends in March 2018. The data consist of 30,061 administrative records referring to daily inspections of 17,104 care homes. The main source of information is the registry of registered and deactivated care providers released by the CQC. Next subsections provide further details on the main variables of the analysis.

5.3.1 Quality inspections and downgrades

The main dependent variables are the number of inspections and the deterioration of quality ratings. Both are obtained from the directory of registered care providers. This is a publicly available dataset that reports monthly comprehensive information on active care providers. The analysis only considers information referred to care homes[57].

The main characteristics of the care home, other than its identification code and name include details of the location, date of registration in CQC, main service provided, number of beds, local authorities where the care home is located (local authority responsible for social services) and a set of characteristics related to the provider. Likewise, and key

[56] If after 6 months bad ratings persist, the CQC may take a series of actions to stop or limit the service (Care Quality Commission 2015a).

[57] In addition to care homes, this register contains information on acute hospitals, acute services that are not hospitals, ambulance services, community services, dentists, GP practices, hospice services, independent consulting doctors, mental health, out of hours, remote clinical advice, substance misuse services and urgent care services.

for the analysis, it contains information on the overall rating corresponding to the last quality inspection in the care home. This overall rating summarises the performance of several issues of the care home and addresses the multidimensional nature of quality in the care home (Bowblis and Vassallo 2014). Also, by collecting monthly records, it is possible to track and measure the number of inspections carried out in a care home during the period of analysis. Each inspection is associated with a rating namely: "Outstanding", "Good", "Requires improvement" or "Inadequate". To obtain a measure of quality deterioration I create a dummy variable defined as 1 if the care home moves from "Outstanding" or "Good" to "Requires Improvement" or "Inadequate" and 0 otherwise. Gonzalo-Almorox et al. (2018) use a similar measure to assess the effect of changes in local public budgets on the quality of care homes.

I supplement the former information regarding the characteristics of the care home with the postcode directory from the Office of National Statistics as of November of 2017. This dataset gives information about the geographical coordinates (e.g longitude and latitude) of the care home and it is used to construct the main explanatory variable, *care home closures*, and the instrument, *care home consolidation*.

5.3.2 Care home closures and care home consolidations

To identify the care home closures and care home consolidations I use information from the directory of deactivated care providers also released by the CQC on a monthly basis. This dataset presents similar characteristics to the directory of registered care providers in terms of the information released. The main additional information that this dataset includes is the date of care home deactivation since 2010. In the analysis, I take this date as the closure date of a care home. As we shall see in section 5.4, the analysis considers different time windows of 3, 6 and 12 months between a care home closure and the inspection of an active care home. For calculating closures I remove those records that represent a deactivation but are originated by administrative changes in the care home such as modifications in the ownership or in the number of beds. Although registered as deactivated, these records do not represent real closures

but a recoding of the care home identification.

To determine the degree of closeness, I firstly group active and closed care homes located in the same local authority with responsibilities for long-term care services. I use this definition of local authority instead of districts[58] since the former deal with care home contracts and are also responsible for the reallocation of patients in the case of care home closures. Secondly, I determine the catchment areas by calculating the geodesic distance[59], which is the shortest curve between the geographical coordinates of a closing care home and the active care homes within a geographic radius of 5, 10, 15 and 20 kilometres in the local authority. Finally, considering each catchment area, I define a nearby closure by calculating the distance between an active care home and the nearest care home that closes.

Figure 5.1 shows two snapshots of the spatial variability of care home closures across English local authorities for a catchment area of 20 kilometres. Considering all local authorities, closing care homes are on average about 9 km away from active care homes. Not surprisingly, care homes located in London have nearer closures than care homes in other parts of the country. This pattern of closing care homes nearby is also found in several local authorities in the North and to a lesser extent in some areas of the South. Looking at the number of care homes closed, there is more heterogeneity. Local authorities placed in East and North West regions, show fewer care homes closing (between 1 and 5). Conversely, areas in the North, West and South East present the greater levels of care home closures (between 14 and 53 care homes).

As outlined before, the directory for unregistered care homes also gives information on the care home providers. Therefore, it is possible to know the number of care homes that a provider deactivates in a period of time, as well as when and where these deactivations take place. This is valid information to determine whether the provider

[58] Districts represent the local authorities at the lower level responsible for managing local policies such as housing. England has 325 local authorities operating at this level. Hence, some districts may share the local authority that is in charge of long-term care services and which operates at upper (e.g. county) level.

[59] These distances are calculated in R using the distGeo function from the geosphere package (Hijmans et al. 2012).

is carrying out a consolidation of the group by reducing the number of active care homes. Section 5.4 discusses in further detail the rationale of the instrument.

The analysis also incorporates several variables used as controls for the composition of local demand and supply of long term care. These variables are collected from the Census and the Department for Work and Pensions and include the share of elderly population (e.g. aged 85 or more) and share of people with care allowance over the total adult population. These are proxies for the demand and the level of need for long-term care services that have been used in the literature previously (see Fernandez and Forder (2015) for example). Also, given that long-term care is a labour intensive activity where much of the labour force is paid at around the minimum wage (see Machin et al. (2003), Machin and Wilson (2004) or more recently Giupponi and Machin (2018) for analyses of the UK care home market), I follow the literature and use the share of claimants for job seekers' allowance to characterise the supply of long term care services.

Further, since bad ratings are associated with more frequent inspections and care home closures (Allan and Forder 2015), I use as a control the total number of inspections rated as "Inadequate" or "Requires improvement" in the local authority where the care home is located. It is important to note that I consider the bad inspections that occur before the closure. Otherwise, including contemporaneous bad inspections, could raise concerns about their correlation with both the closures and the consolidations. Hence, I include the number of bad inspections that occur three months before the closure. Finally, to control for the influence of other care homes in the market, I also include the number of competing care homes to the care home analysed within the same local authority,

Given the different number of inspections carried out in each care home, our sample of analysis corresponds to an unbalanced panel. Table 5.1 presents descriptive statistics of the variables used for the analysis. On average from October 2014 up to March 2018, care homes are inspected twice. Nonetheless, there are some unsual cases where a care home has been inspected 8 times during the period of analysis. About one fifth of the

observations in the sample, report quality deterioration at least once. This figure is similar to the figures released by the CQC in their state of health and social care for 2017[60]. There are large differences across local authorities regarding the provision of formal and informal care. In particular, some local authorities (3 local authorites) only include 1 care home without competing care homes and no claimants for informal care benefits (1 local authority).

5.4 Empirical framework

To assess empirically the impact of care home closures, I use linear regression models with the following specification

$$Y_{ct} = \alpha_c + \theta_t + \beta_{clos} Closure_{jt} + \lambda X_{ct} + \epsilon_{ct} \tag{5.1}$$

where Y represents outcomes of interest, e.g, number of inspections and quality deterioration for care home c at time t. The specification also includes two sets of fixed effects: care home fixed effects α to capture factors happening in the care home that are time invariant and year fixed effects θ to incorporate common shocks for all local authorities that occur during a year, such as political changes at national level. $Closure$ is a dummy variable equal to 1 if there is a care home j in the same local authority that closes near care home c in a period of time t and 0 otherwise. As described in the previous section, the analysis considers various time windows of 3, 6 and 12 months between the closure and the inspection. The parameter of interest is β_{clos}, which I intend to interpret as the causal effect of care home closure.

The specification considering solely care home and year fixed effect would be sufficient for a valid identification of the effect of the care home closures. Yet, as outlined in the introduction, this cannot be taken as given since there may be aspects that may

[60] See page 29 in https://www.cqc.org.uk/sites/default/files/20171123_stateofcare1617_report.pdf for further details.

raise endogeneity concerns and that may invalidate such interpretation. For instance, there may be local shocks that may affect the composition of the potential local clientele. These may influence both the quality of the services in local care homes as well as their profitability. Under that situation, some providers may decide to close care homes in certain areas whereas at the same time other providers may modify their business model and therefore alter the quality of the services they deliver. Equation 5.1 also incorporates a time varying vector X with the local variables discussed in section 5.3 to control for potential selection of local variables and to improve the efficiency. Thus, X includes the share of elderly population, the share of people with care allowance, the share of claimants for job seekers allowance, the number of bad inspections (e.g. inspections rated as "Inadequate" or "Requires improvement") in the local authority before the closure as well as the number of care home rivals to the active care home.

Despite controlling for the former local variables, there may be still unobservable factors that may cause omitted variable bias. To generate plausibly exogenous variation in the incidence of care home closures, I exploit the fact that closures may be part of a consolidation strategy in their corporate group. In this business strategy, care home providers decide to close several care homes to reduce their capacity and preserve their financial sustainability. In this case, the decision of closure may be motivated by external factors (business strategy) rather than local elements of the market. Considering this rationale, Equation 5.1 is complemented with a first stage regression.

$$Closure_{jt} = \gamma_j + \kappa_t + \beta_{cons} Consolidation_{jt} + \delta X_{jt} + u_{jt} \tag{5.2}$$

where consolidation is a dummy variable that indicates whether a care home closure in care home j is part of a consolidation ($Consolidation = 1$) and 0 otherwise and the parameter β_{cons} measures the effect of consolidation on care home closures, relative to care homes that close but not as a consequence of a consolidation. In the context of this identification strategy, a reasonable concern is to think that some local factors

may remain as drivers for the consolidations. Providers may decide to close those care homes that have the worst performance within the group and this performance may be influenced by local factors.

To address this potential problem and use only plausibly exogenous consolidations, I focus on consolidations that meet three specific criteria. First, the provider that carries out the consolidation must be active by the end of the period of analysis (i.e. March 2018). This rules out the idea that a consolidation is the preceding stage of a closure. Second, the provider has to undertake closures in 3 or more different local authorities with responsibility for long term care services within the same year. To avoid the case where consolidations are carried out in neighbouring local authorities and consequently the decision to consolidate is somehow localised in a particular area of the country, the third condition establishes that the local authorities where consolidations are undertaken must correspond to at least 3 different regions. Table 5.2 shows descriptive statistics for the two types of providers that close care homes using data from the directory of registered care homes and considering local authorities at their lower level (e.g. district level). The 12 providers that carry out consolidations are large institutions with an average of 62 care homes operating in almost 10% of the districts and with a widespread presence over the country (in average 6 regions out of 9). On the other hand, most providers that close have only 1 care home and operate in one district. The former suggests that the majority of care homes that close are likely to be family businesses as suggested by Lievesley et al. (2011). Considering the whole set of local authorities, on average about 10% of the closures correspond to a consolidation.

The validity of this empirical strategy relies on two main identifying assumptions. The first assumption is that consolidations are not correlated with ϵ. The inclusion of care home fixed effects alleviates potential concerns concerning the correlation between the instrument and the error. Also, by including these fixed effects the timing between the closure and the inspection, rather than the location of the closing care home, becomes random conditional to other local characteristics. The plausibility

of this assumption entails that the instrument is as good as randomly assigned. In the framework of this paper, this assumption implies that districts with and without consolidated care homes do not present a priori significant differences in their background characteristics. Otherwise, providers that consolidate could motivate their decision based on particular characteristics of certain local authorities and that would invalidate the validity of the instrument. Considering the definition of the local authority at the lowest level, I test this assumption by comparing a number of observable characteristics associated with care homes from districts that have a consolidation and districts that do not. Table 5.3 reports the results of these comparisons. In general, we do not observe significant differences between the two types of districts. The only exception remains the share of old people but the magnitude of the difference is small (0.2 percent points)[61].

The second assumption entails that a random decision of consolidation in the group of the closing care home affects the quality deterioration of the care homes nearby only through the closure of the care home. This assumption implies that a consolidation only affects the quality of neighbouring care homes by the change produced in the market structure. In Table 5.4 I test whether the consolidation affects other variables that could potentially influence the quality of a care home: the proportion of claimants for allowance, the proportion of job seekers and the proportion of people older than 85. The coefficients for consolidation are in general statistically insignificant with the exception of the proportion of job seekers. Yet, the effect is a 10% of a standard deviation. Further, this assumption could be violated if the consolidation in the closing care home group affected several markets due to a lack of confidence by the patients that resulted in an emptying of the care homes belonging to the group. In the care homes sector this situation is unlikely. Similar situations represented by collapses of big providers, in 2011 and 2013, have have led to the acquisition of the failed care homes by other providers but not relocated patients[62]. In addition, since 2014 the CQC

[61] Appendix 7.3 presents further evidence testing the validity of the instrument.

[62] A report about the stability of the care homes market, providers did not find evidence about a risk of contagion in case of failure. It concludes that failures normally respond to market corrections

has implemented a regulation aimed at preventing such failure[63].

Equation 5.1 is transformed into the following reduced form

$$Y_{clt} = \alpha_c + \theta_t + \beta_{clos}\widehat{Closure}_{jclt} + \lambda X_{lt} + \epsilon_{clt} \tag{5.3}$$

Equation 5.3 regresses quality deterioration against the predicted number of closures ($\widehat{Closure}$) estimated in Equation 5.2. The parameter β_{clos} yields the effect of care home closures on the probability of quality deterioration in the care homes.

5.5 Results

5.5.1 Effects of closures on the quality deterioration

Table 5.5 presents the baseline results relative to the effect of closures on the quality deterioration of care homes within a catchment area of 5 km. The upper panel shows OLS estimates of Equation 5.1. It seems plausible that incumbent care homes react differently depending on when the care closes. Hence, the first column shows results for a time window of 3 months between the closure and the inspection and columns 2 and 3 show estimates for periods of 6 and 12 months respectively. All estimations include local controls and fixed effects at the year and care home level. Furthermore, errors are clustered at the level of the care home. The results show a positive association of the care home closure and the deterioration of quality in the care homes nearby that diminishes when the time window between the closure and the inspection increases. Regardless of the period considered, these relationships are not statistically significant.

As explained above, the OLS results are likely to be biased because of the influence of confounding local factors that hinder the identification of the closure's effect. Panels

(Institute of Public Care 2014).

[63]Further details about the Market Oversight regime by the CQC can be found in https://www.cqc.org.uk/guidance-providers/market-oversight-corporate-providers/market-oversight-adult-social-care

(B) and (C) of Table 5.5 show two stage and first stage estimates of care homes closures on the quality deterioration of nearby care homes (Equations 5.2 and 5.3). The values of the *Kleibergen-Paap F* statistics associated with each specification exceed the critical value of 16.38 proposed by Stock and Yogo (2005) for one endogenous variable and one instrument. Therefore, the null hypothesis that the instrument is weak can be rejected. Also the results show a significant positive association between the consolidations and the closures that increases with the time between the closure and the inspection.

Looking at the Panel (B) of Table 5.5 we observe a positive effect of closures on the quality deterioration of care homes nearby. When the closure occurs within the three months before the inspection, the quality deteriorates by 0.190 points. This effect shrinks progressively over time being 0.0661 when the inspection occurs within a year since the closure. In terms of standard deviations (0.39), results range from about 50% to a 15% of a standard deviation in twelve months. Despite of decreasing in magnitude, results are only significant at a 10% significance for those closures that occur 12 months before the inspection. Results are similar when including local authority fixed effects at a wider level and with different error specifications (see Tables 11 and 12 in Appendix 7.3).

Comparing the results from the OLS and IV estimates, we can see that IV coefficients are generally larger (in particular for shorter periods of time between the closure and the inspection). This can be explained by the fact that the OLS estimation includes local factors that may improve the quality and partially offset the negative effect from closures found when applying the instrument. For example, the literature has identified several local factors such as a better inclusion of the care home in the community (Wiener 2003) and a better coordination among the different stakeholders (e.g. NHS services and primary care GPs) involved in the process of care (Baylis and Perks-Baker 2017) as key elements to enhance the quality of care homes. A more coordinated and integrated system may contribute to contain costs and therefore preserve the financial sustainability of care homes (Forder et al. 2018)[64]. Williams et al.

[64]As these authors conclude, the lack of a single definition of integrated care and the number of

(2002) report that cost implications are a leading driver in the decision of care home closure.

These results indicate that treated care homes, care homes with a closing care home nearby, are negatively affected in the short-run. A potential explanation could be that incumbent care homes do not have a suitable set of resources to offset an unexpected increase in the demand and address a potential forced relocation of the patients from the closing care home. For example, issues such as the number and conditions of staff are important determinants for the level of quality. Bearing in mind that long term care is a labour internse activity, if care workers from incumbent care homes feel more pressure, the quality of the service they provide is likely to decrease. Other studies, such as Allan and Vadean (2017) have addressed this issue and analysed how working conditions affect the level of quality. They conclude that poor conditions such as low payments or high turnover rates, affect negatively the quality of care homes.

A potential concern of this analysis is that results may differ when varying the size of the catchment area. I define a wider care home catchment area within the local authority responsible for long term care services and re-run the analysis to check the robustness of results in Table 5.5. Results in Table 5.6 consist of a catchment area of 15 km and are similar in magnitude to the results obtained in Table 5.5. Yet, they improve the statistical significance. The similarity of the results for catchment areas of 5 and 15 km respectively is puzzling and suggests that closing care homes may be clustered. Actually, considering the sample of care homes that have a neighbouring care home that close, in 70% of the cases the nearest neighbouring care home that closes is the same for both catchment areas.

In general, the weak statistical significance of the baseline result suggests that the effect of closures does not vary significantly between care homes that have a closing care home nearby and a those do not have a closing care home. One explanation to this result would be related to the procedures of closing care homes. As outlined before,

processes and models involved lead to challenging comparisons and conclusions about the cost effects of greater coordination of health and social care services.

in the event of closure, local authorities are responsible for the allocation of displaced patients. It seems plausible that in such an event, local authorities allocate displaced patients to those care homes that have enough capacity to provide care under the minimum quality standards imposed by the CQC.

5.5.2 Effects of closures on the number of inspections

Another explanation for the low significance of results in Table 5.5 may be that closures operate as an *"alarm system"* for the CQC. Given the positive association between quality downgrades and closures shown by Allan and Forder (2015), the CQC would give more attention to those local markets where there is a closure. The rationale would be to anticipate potential negative consequences on incumbent care homes' quality derived from closures of care homes nearby. Consequently, the CQC would inspect more frequently care homes nearby and ensure that minimum quality standards are met. Also, if care homes are aware of this increase in the inspections by the CQC when there is a closure, it is possible that they prepare for a more likely inspection.

I test these conjectures by investigating the effect of closures on the total number of inspections carried out in the nearest registered care home. Results are reported in Table 5.7 and estimates are obtained by re-estimating Equations 5.1, 5.2 and 5.3 using now the number of total inspections carried out in a care home as the outcome variable. Furthermore, the analysis is based on catchment areas of 10 and 20 km respectively. These distances better approximate the area of action for CQC inspectors in local long term care markets. The structure of Table 5.7 is similar to previous tables and displays results in terms of 3, 6 and 12 months since the care home closure.

From Panel B, considering a catchment area of 10 km, we observe that closures increase the number of inspections by 0.316 points (a 39% of a standard deviation) in the first 3 months. This effect shrinks as time goes by and results in increases of 0.108 points (a 13% of a standard deviation) in the 12 months after the closure. These findings, which are significant at the 5% level for inspections 12 months after the closure, confirm the idea that the CQC increases its control over the incumbent local

care homes when there is a closure of a care home nearby. Results for a catchment area 20 km also decrease for wider time windows between the closure and inspection, are smaller in magnitude and no statistically significant.

5.5.3 Effects on informal care

Another argument to explain the main results in Table 5.5 consists of looking at alternatives for displaced patients. The natural option for displaced patients from a closed home would be another care home. This conjecture could be tested by using information on care home attendances. However, there is no publicly available information on the number of patients referred to each care home. In case there are not available places in a care home, displaced patients may be cared for informally. As in other countries such as Spain or the US, this is the most common form of long term care giving in England (Sole-Auro and Crimmins 2014)[65].

In this subsection I explore the effects of closures on the proportion of people of the adult population that provide informal care in the district. Results are shown in Table 5.8 considering a catchment area of 5 Km for periods of 3, 6 and 12 months since the care home closure. Estimates from Panel B show a reduction in the proportion of people that provide informal care as a consequence of the closures. In terms of the patterns in the results, the effect of the closure decreases over time. Regardless of the time between the closure and the inspection the effect is small (between a 2% and 0.6% of a standard deviation) and it is only statistically significant at 10% level.

There are several reasons that may explain these findings. One explanation concerns the perspective of informal carers in cases of care home closures. Considering case studies based on the UK, Williams et al. (2003) report that normally most residents moved to other care homes but with different owners (84% of their sample). Alternatively, displaced residents might seek other ways of formal care such as home care. Another explanation would be associated with the distance between potential informal

[65]The Office of National Statistics (ONS) estimate that informal carers were providing care worth £57 billion (Office of National Statistics 2017).

carers and displaced residents. Given that the geographical distance between generations is increasing for the UK (Chan and Ermisch 2015)[66] and that an important part of informal care is provided by daughters (Hoff (2015), Della Giustia and Jewell, 2014)[67], it seems plausible that in case displaced residents received informal care as a consequence of a care home closure, it could be in a different local authority where the care home was located.

5.5.4 Effects on the A&E departments

Results from section 5.5.3 do not support the hypothesis that displaced patients return to their home and receive informal care. In this section I explore whether displaced patients may be referred to other facilities such as A&E wards. England has registered an increase of emergency admissions of 42% over the last twelve years (Steventon et al. 2018). An important part of those have been admissions which could be avoided by an effective community care and case management (National Audit Office 2018b). Considering patients coming from care homes, Smith et al. (2015) conclude that such patients experienced between 40% and 50% more admissions to A&E departments than other patients.

I investigate the effect of closures on attendances of the A&E wards of the nearest hospital. For this analysis I use information from the NHS Digital for years 2014 to 2017 concerning 170 health centres[68]. In particular, I use aggregate information on attendances of patients who are aged 70 or more. Patients over this age range are more likely to be affected by a care home closure. This analysis is carried out through Equation 5.4 which is similar to Equation 5.1

[66] Using the first wave of Understanding Society these authors show that intergenerational proximity is based primarily on the moves of the younger generation. To this extent, the authors argue that as parents get older, the distance between where they live and where they children live tends to increase.

[67] Daughters mainly care for the oldest patients. Wives are the main providers in cases of married older people (Hoff 2015).

[68] Appendix 7.3 provides further details and summary statistics for this sample.

$$Y_{ilt} = \alpha_l + \theta_t + \beta_{clos} Closure_{jclt} + \lambda X_{lt} + \delta h_{lt} + \epsilon_{clt} \tag{5.4}$$

where Y represents the A&E attendances of patients of different age groups in hospital i in local authority l during year t. $Closure$ represents a dummy variable that indicates whether a care home closed near that hospital ($Closure = 1$) . Yet, unlike Equation 5.1, Equation 5.4 incorporates h_{lt} which is a control that indicates whether the second closest hospital to the closing care home is within a catchment area of 5 Km.

Results are displayed in Table 5.9. Columns 1,2,3 and 4 present information for the whole sample of patients and subsequently patients aged 70 to 80, 80 to 89 and 90 or more. Results, with the exception of admissions of patients who are 80-89 years old, reveal a general negative and statistically insignificant effect derived from care home closures suggesting that they do not have significant influence on the patient flow of hospitals nearby.

5.6 Discussion and conclusion

The closure of a care home may have important implications for long term care services. Yet there is little evidence assessing the consequences of closures. Whereas most evidence has been focused on the consequences for displaced residents, the effects on other care homes in the market have been less researched. This paper is the first attempt to address this question for the case of the English care-home market by looking at the effects on the quality of the remaining care homes.

This paper finds some evidence associated with a negative effect on the quality of the care homes in a market as a consequence of a closure in a care home nearby. Considering the baseline specification, this effect decreases over time reaching a 15% of a standard deviation when care homes are inspected after a year from the closure in the neighbouring care home. Results are similar for wider catchment areas suggesting that care homes could be clustered in local areas. These findings are consistent to the

results found by Bowblis and Vassallo (2014) who show declines in the staffing levels after the closure in the remaining care homes. These authors, however, find positive effects in other non-staffing quality measures.

I examine several hypotheses that help to explain the results in more detail. First, I evaluate how closures affect the control by CQC by looking at the inspections carried out by the regulator in the incumbent care homes. I argue that closures may be a signal to pay particular attention to and to tackle potential quality deteriorations. In addition, I check the implications on other destinations where displaced residents from closing care homes could potentially be referred to. Considering the levels of informal care, I observe some significant evidence of a decrease of the people providing informal care in the same district where the closing care home is located. I also look at emergency services in hospitals and do not observe significant evidence changes in the number of A&E admissions in the hospitals near a closing care home. These results suggest that in case of care home closure, displaced residents are likely to move to another care home and receive similar formal care. Alternatively, displaced residents may also have other sorts of formal care such as home care.

Bearing in mind the former points, the main findings suggest that the quality of incumbent care homes is hardly affected by closures. Since local authorities are in charge of managing the process of closure, a plausible explanation is that patients may be allocated to facilities that can cope with the new demand without sacrificing their quality. In these cases, incumbent care homes are likely to redefine its capacity to accommodate the new demand and preserve the levels of quality. Indeed, for most providers quality is the main motivation of their business – beyond profit (Knapp et al. 2001; Matosevic et al. 2008) and it is the main way to attract residents (Competition and Markets Authority 2017b).

A limitation of this study is the lack of information regarding the type of residents in closing and remaining care homes. This implies that it is not possible to know how the proportion of self-funded and publicly-supported residents affects quality. This is an important point given the likely different valuation and willingness to pay for

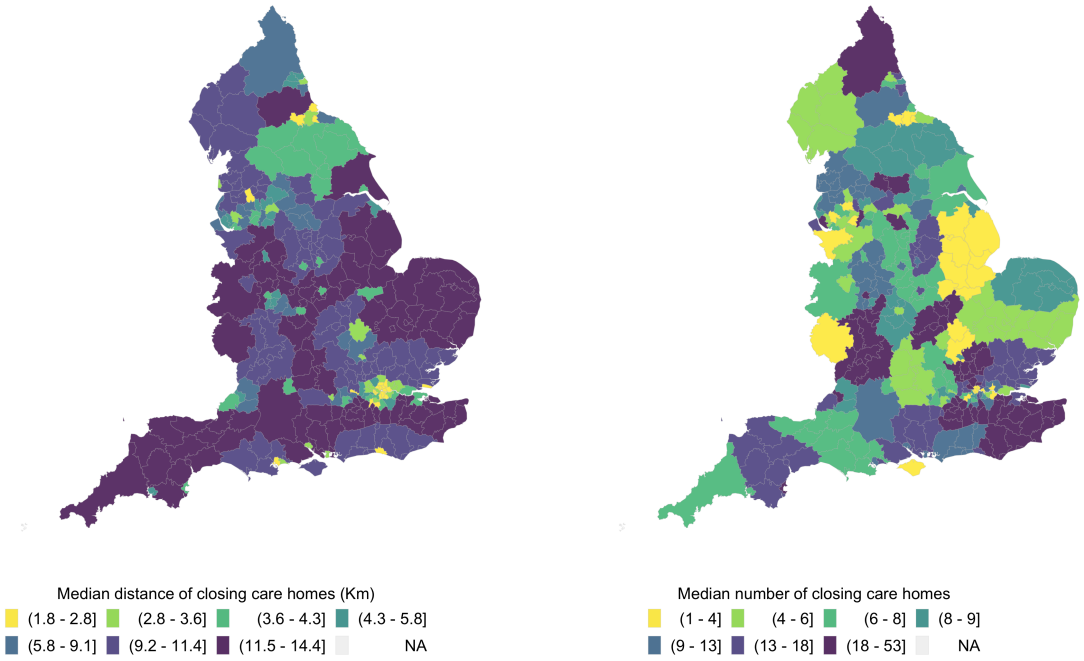
quality of both kinds of residents. For example, self-funded clients may value quality and be willing to pay for higher levels of quality. In cases when the core clientele of the remaining care homes is composed mainly by self-funded residents, providers may differentiate vertically and discriminate in prices according to different levels of quality. Having this possibility would temper the negative effect on quality derived from a closure nearby.

Linked to that, it may be possible that care homes simply rely more on the self-funded segment of the market to cross-subsidise the lower prices paid by public residents. In such cases, an event of closure with a fair proportion of publicly supported clients may exacerbate the knock-on effect discussed by Allan et al. (2017) by which care homes exploit their market power over self-funded residents to extract their rents.

The findings in this paper may contribute to inform the design of policies to enhance the competition in the long term care market. They may also help to understand better the effects of the market structure on quality and the mechanisms by which care homes provide quality in their services. Further avenues of work consist of disentangling the former findings in terms of each quality dimension that compose the KLOEs. It seems plausible that some quality dimensions may be more afected than others. Also, it would be important to analyse the former results considering the various types of care homes regarding their principal activity.

5.7 Figures

Figure 5.1: Descriptive statistics of care home closures



Note: CQC and ONS, author's own calculations. Figures represent median distance between active care homes and nearest closing care home and median number of closing care homes in the local authority. Figures are expressed in terms of local authorities at district level.

5.8 Tables

Table 5.1: Summary statistics

	Mean	S.d	Min	Max
Quality deterioration (1 = yes)	0,19	0,39	0	1
Closure within 3 months (1 = yes)	0,04	0,19	0	1
Closure within 6 months (1 = yes)	0,08	0,27	0	1
Closure within 12 months (1 = yes)	0,15	0,36	0	1
Consolidated (1 = yes)	0,01	0,09	0	1
Number of inspections care home	1,58	0,81	1	8
Number of informal carers	224762,85	176418,83	0	1073045
Proportion of carers allowance	0,01	0,004	0	0,03
Proportion of job seekers	0,01	0,01	0	0,36
Proportion people 85+	0,03	0,01	0	0,05
Rival care homes in local authority	207,94	156,18	0	633
Number bad inspections 6 months before closure	0,66	0,66	0	2
Number bad inspections 9 months before closure	0,61	0,65	0	2
Number bad inspections 15 months before closure	0,49	0,63	0	2
Observations	30061			
Care homes	17104			
Local authorities	152			

Table 5.2: Local characteristics of closing care homes

	Consolidated n = 222		No consolidated n = 2899		
	Mean	S.d	Mean	S.d	p.value
Proportion Job seekers	0,006	0,005	0,006	0,005	0,235
People providing informal care	234461	202853,466	230738,851	176807,713	0,338
Number bad inspections district	0,82	0,944	0,844	1,054	0,309
Proportion people 85+	0,025	0,006	0,027	0,008	0,001
Proportion claimants allowance	0,012	0,005	0,012	0,004	0,432
Average IMD score district	21,43	9,455	21,079	8,014	0,935

Table 5.3: Summary statistics of consolidated and non consolidated providers

	Consolidated providers n = 12			No consolidated providers n =7755		
	Mean	Max	Min	Mean	Max	Min
Number of beds	1128	6844	101	58	10668	0
Number of care homes	70	254	16	2	167	1
Number of districts operating	39	114	6	1	113	1
Number of regions operating	6	8	3	1	8	1

Table 5.4: Placebo tests of care home closures on other outcomes

	(1) Claimants allowance	(2) Job seekers	(3) People 85+	(4) Claimants allowance	(5) Job seekers	(6) People 85+
	OLS	OLS	OLS	FE	FE	FE
Consolidation	-0.000299	0.000193	-0.00252***	-7.17e-05	-0.00112***	4.25e-05
	(0.000277)	(0.000356)	(0.000409)	(5.71e-05)	(0.000309)	(5.33e-05)
Time controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	30,061	30,061	30,061	30,061	30,061	30,061
R-squared	0.063	0.008	0.063	0.823	0.046	0.893
Number of care homes				17,104	17,104	17,104

Note: CQC, DWP and Census, author's own calculations. Robust errors are calculated at care home level. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$.

Table 5.5: Effects of closures on quality of nearby care homes

	Quality deterioration in care home (1 = yes) in…		
	(1)	(2)	(3)
Panel A. OLS	3 months	6 months	12 months
Closure	0.00617	0.00272	0.00357
	(0.0116)	(0.00875)	(0.00674)
Observations	30,061	30,061	30,061
R-squared	0.109	0.109	0.108
Panel B. 2SLS	Quality deterioration in care home (1 = yes) in…		
	3 months	6 months	12 months
Closure	0.190	0.118	0.0661*
	(0.117)	(0.0727)	(0.0391)
Observations	22,625	22,625	22,625
Number care homes	9,668	9,668	9,668
R-squared	0.187	0.191	0.194
Panel C. First stage	Closure nearest care home within 5 km in…		
	3 months	6 months	12 months
Consolidation	0.323***	0.528***	0.971***
	(0.0361)	(0.0378)	(0.0117)
Kleibergen-Paap Wald rk F statistic	80.04	194.80	6882.43
Partial R squared	0.021	0.029	0.053

Note: CQC, DWP and Census, author's own calculations. Robust errors are calculated at care home level. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$.

Table 5.6: Effects of closures on quality of nearby care homes

	Quality deterioration in care home (1 = yes) in…		
	(1)	(2)	(3)
Panel A. OLS	3 months	6 months	12 months
Closure	0.00739	0.00323	0.00666
	(0.00978)	(0.00744)	(0.00579)
Observations	30,061	30,061	30,061
R-squared	0.109	0.109	0.108
Panel B. 2SLS	Quality deterioration in care home (1 = yes) in…		
	3 months	6 months	12 months
Closure	0.188*	0.117*	0.0651**
	(0.101)	(0.0627)	(0.0331)
Observations	22,625	22,625	22,625
Number care homes	9,668	9,668	9,668
R-squared	0.185	0.189	0.193
Panel C. First stage	Closure nearest care home within 15 km in…		
	3 months	6 months	12 months
Consolidation	0.320***	0.516***	0.971***
	(0.0303)	(0.0321)	(0.00987)
Kleibergen-Paap Wald rk F statistic	111.34	257.83	9681.96
Partial R squared	0.02	0.027	0.051

Note: CQC, DWP and Census, author's own calculations. Robust errors are calculated at care home level. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$.

Table 5.7: Effects of care home closures on total number of inspections in care homes nearby

	Total number of inspections			Total number of inspections		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. OLS	3 months	6 months	12 months	3 months	6 months	12 months
Closure	0.0182	0.00183	0.00314	0.00207	-0.00336	0.00207
	(0.0207)	(0.0148)	(0.0123)	(0.0101)	(0.0128)	(0.0101)
Observations	30,061	30,061	30,061	30,061	30,061	30,061
R-squared	0.358	0.358	0.361	0.361	0.358	0.361
Panel B. 2SLS	Total number of inspections			Total number of inspections		
	3 months	6 months	12 months	3 months	6 months	12 months
Closure	0.316*	0.197*	0.108**	0.201	0.126	0.0712
	(0.168)	(0.102)	(0.0551)	(0.134)	(0.0828)	(0.0443)
Observations	22,625	22,625	22,625	22,625	22,625	22,625
Number care homes	9,668	9,668	9,668	9,668	9,668	9,668
R-squared	0.693	0.694	0.700	0.695	0.696	0.700
Panel C. First stage	Closure nearest care home within 10 km in…			Closure nearest care home within 20 km in…		
	3 months	6 months	12 months	3 months	6 months	12 months
Consolidation	0.323***	0.528***	0.971***	0.320***	0.516***	0.971***
	(0.0361)	(0.0378)	(0.0117)	(0.0303)	(0.0321)	(0.00987)
Kleibergen-Paap Wald rk F statistic	80.04	194.80	6882.43	111.34	257.83	9681.96
Partial R squared	0.021	0.029	0.053	0.020	0.027	0.051

Note: CQC, DWP and Census, author's own calculations. Robust errors are calculated at care home level. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$.

Table 5.8: Effects of care home closures on informal care

	Number of people providing informal care		
	(1)	(2)	(3)
Panel A. OLS	3 months	6 months	12 months
Closure	-4,633	-2,827	-1,297
	(4,053)	(2,961)	(2,194)
Observations	30,061	30,061	30,061
R-squared	0.360	0.358	0.344
Panel B. 2SLS	Number of people providing informal care		
	3 months	6 months	12 months
Closure	-3,716*	-2,193*	-1,167*
	(2,038)	(1,228)	(666.0)
Observations	22,625	22,625	22,625
Number care homes	9,668	9,668	9,668
R-squared	0.627	0.626	0.627
Panel C. First stage	Closure nearest care home within 5 km in...		
	3 months	6 months	12 months
Consolidation	0.323***	0.528***	0.971***
	(0.0361)	(0.0378)	(0.0117)
Kleibergen-Paap Wald rk F statistic	80.04	194.80	6882.43
Partial R squared	0.021	0.029	0.053

Note: CQC, DWP and Census, author's own calculations. Robust errors are calculated at care home level. $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Table 5.9: Effects of care home closures on A&E admissions

	Total number of A & E admissions			
	(1)	(2)	(3)	(4)
Panel A. OLS	All admissions	Age 70 - 79	Age 80 - 89	Age 80 - 89
Closure	-20.54	-148.7	80.46	47.69
	(967.9)	(429.4)	(408.9)	(141.6)
Observations	617	617	617	617
R-squared	0.094	0.065	0.052	0.076
Panel B. 2SLS	Total number of A & E admissions			
	All admissions	Age 70 - 79	Age 80 - 89	Age 80 - 89
Closure	-70.76	-54.38	0.475	-16.85
	(555.3)	(355.4)	(194.3)	(56.34)
Observations	607	607	607	607
Number hospitals	160	160	160	160
R-squared	0.317	0.283	0.302	0.317
Panel C. First stage	Closure nearest care home within 5 km			
	All admissions	Age 70 - 79	Age 80 - 89	Age 80 - 89
Consolidation	0.882***	0.882***	0.882***	0.882***
	(0.118)	(0.118)	(0.118)	(0.118)
Kleibergen-Paap Wald rk F statistic	55.583	55.583	55.583	55.583
Partial R squared	0.083	0.083	0.083	0.083

Note: CQC, DWP and Census, author's own calculations. Robust errors are calculated at care home level. $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Chapter 6

Final remarks

This thesis provides evidence on three core topics for the market of long-term care in England. It does so by using econometric methods traditionally used in applied microeconomics for the identification of causal effects and the evaluation of public policies.

Chapter 3 investigates the role of the housing market in the provision and quality of long term care. The results of the study show that higher house prices lead to fewer and smaller care homes. In particular, areas that have higher house prices have less care homes per old population and the existing care homes have less beds. An implication from this result is that higher house prices may imply reductions in the provision of other services such as long-term care that are delivered at local level.

The chapter also finds a positive effect of house prices on the number of excellent care homes in terms of quality and a negative effect on care homes with the worst ratings. The latter result suggests that long term care providers may be attracted by asset-rich clients when deciding where to locate their care homes. If this case, wealthier clients would be particularly benefited by the provision of long-term care services nearby. An implication of this finding, suggests that high house prices might not be as uniformly beneficial to older homeowners as usually suggested in public debates. Rather, it will benefit those homeowners whose property values are relatively higher.

The main contribution of chapter 3 is to provide the first empirical evidence of the effects of house prices on the provision and quality of care home services. Additionally, it considers for the analysis the most recent regulatory framework for quality inspec-

tions. Similar work referred to England (see for example Forder and Allan (2014)) has considered the precedent quality regime.

In policy terms, the former insights entail two main implications. Firstly, the design of planning policies should consider the interactions between crucial areas such as housing and essential sectors as long-term care. The insights from chapter 3 suggest that developers may have more incentives to develope alternative projects to care homes such as, for instance, domestic properties. To this regard, considering the needs of their local populations, local authorities should design policies that preserve the provision of long-term care services. Secondly, it has been shown that housing is an important social determinant with significant impacts on health and wellbeing (Marmot et al. 2010). Chapter 3 has investigated an alternative perspective that is the extent by which housing markets, as a result of a generalised rise in prices over time, contribute to shape the supply and access to long-term care services in local communities.

Chapter 4 analyses the effect of changes in the funding capacity of local authorities on the changes in quality of care homes. The results of this chapter show that care homes located in areas with higher constraints in their funding capacity have less propensity to be inspected and are less likely to improve their overall quality rating. Yet, increases of the spending power do not necessarily lead to care home quality improvements. Actually, the findings show evidence on quality deterioration as a result of positive changes in the spending power. We perform the analysis over different quality dimensions and find that characteristics based on staff and specially management of the care home are important drivers of the former result. The results of this chapter may help to inform which areas of the quality in the services are more critical and may be subject to closer supervision. Also, although it is not the primary purpose of this study, our findings may contribute to inform the debate associated with the funding of long term care in the forthcoming decades. In particular, how public funding may help to rise the efficiency of services by identifying aspects that provide the best outcomes for the users.

The core contribution of chapter 4 consists of addressing the effects of public finance, and more concretely the changes in the spending power, on the quality of care homes. This work differs from previous work on the use of the local funding capacity rather than the spending as a measure of public finance. Further, conversely to most studies in the literature that use measures on the process of care, this study uses a quality measure based on a quality ratings.

Finally, chapter 5 inspects the effects of variations in the market structure of long term care resulting from care home exits on the quality of the incumbent care homes. The findings of this chapter suggest that care home closures negatively affect the quality of neighbouring care home that remain active. The effect is however moderate and decreases over time. Given that local authorities are actively involved in the process of care home closures, our results imply that local authorities allocate appropriately patients in remaining care homes in the local market that can afford effectively having displaced patients.

The core contribution of this chapter is to analyse the consequences of care home exits from the market on the incumbent care homes instead of the health and wellbeing of displaced patients. Unlike previous research focused on certain localised long term care markets, this is the first study that analyses care home considering the whole market of a country.

There are several avenues for future research that may depart from the insights of this thesis. First, the findings of this thesis may be nicely complemented with information regarding the prices of services.This variable constitutes a key element for competition and it may play a main role in understanding how care homes accommodate changes in relevant variables that affect their services such as house prices, local spending power or the market structure. Along the same lines, more research is needed to elucidate what type of patients are mostly affected and what the consequences of the clientele composition are for care homes. Due to the lack of information, this thesis has not addressed differences in residents. Yet, this question seems to be key when designing long-term care policies.

Considering the quality of long term care services, other questions could be addressed such as for example to what extent good or bad quality is spatially clustered across local authorities. In addition, the new sources of available information that directly capture the opinion of users such as online reviews offer a promising route on the analysis of quality and reporting. Some works have pointed at this direction (see Trigg (2014), Campbell and Li (2018) or Hefele et al. (2018)) but the literature is still incipient.

To this extent, this thesis gives several messages in policy terms. The insights from chapter 3 entail two main implications. Firstly, the design of planning policies should consider the interactions between crucial areas that operate at local level such as housing and long-term care. The findings suggest that developers may have more incentives to develope alternative projects to care homes such as, for instance, domestic properties. To this regard, considering the needs of their local populations, local planning should design policies considering the important role of long-term care and preserving its provision. Secondly, it has been shown that housing is an important social determinant with significant impacts on health and wellbeing (Marmot et al. 2010). Chapter 3 has investigated an alternative perspective that is the extent by which housing markets, as a result of a generalised rise in prices over time, contribute to shape the supply and access to long-term care services in local communities.

Further, the core policy implication derived from chapter 4 consists of the importance of care home management for ensuring a good quality of the services. Future reforms of long-term care, focused on preserving the quality of the services, should aim to overcome some of the challenges faced by care home managers. For instance, some reviews have a identified the amount of bureaucracy faced by managers as a core barrier for a good management (Orellana 2014). Policies aimed at simplifying these tasks to let managers focus on the care activities could improve and preserve good levels of quality. Good management is also important for other key elements related to the quality of the services such as the retention of workforce.

Finally, the structure of the market is an important aspect for the quality of the

services. Hence, although the main priority regarding long-term care reforms concerns the funding of services, there are still other relevant matters in the long-term care agenda such as the market shaping. The insights from this thesis may help to shed more light on the latter and contribute to inform the planning capacity needed to meet future long-term care needs.

From a wider perspective, the findings from this thesis concerning aspects associated with the provision and quality of long-term care services could be considered by other important institutions involved in the process of care such as the NHS. During last years, the NHS has been involved in a series of measures aiming at further integrating its health services with long-term care services delivered at both local authority and community level (National Audit Office 2017). The latest initiative is the creation of Integrated Care Systems (ICSs) which are close partnerships between the NHS organisations, councils and others to manage collectively resources and improve the health of the populations they serve. A first wave, implemented in 2017, is composed of 14 NHS areas[69]. The main purpose of this strategy consists of tackling more efficiently the needs of older patients that in most cases have multiple, complex and long-term conditions that required different types of services and professionals. Charles et al. (2018) have reviewed the progress of the ICSs finding promising results regarding a more collaborative framework especially in the management of finances and performance across the system. Yet, any conclusion is still premature due to the short length of the program.

[69]See https://www.england.nhs.uk/integratedcare/integrated-care-systems/

Chapter 7

Appendices

7.1 Appendix to Chapter 3

Specifications with different instruments

This section presents results for the main outcomes (e.g. number of care homes per 1000 population 65 or older and the care homes entry rates) considering alternative specifications based on different combinations of the instruments described in Section 3.4. Columns 1 to 3 use solely the instruments and columns 4 and 5 combine them with the historical density population. Hence, Column (1) uses the changes in the delay rate pre and post planning reform, column (2) uses the historical and contemporaneous share of Labour votes in general elections and column (3) the share of historical density population. Results are similar to the results obtained in Table 3.3 for both the number of care homes per 1000 population aged 65 or more and the entry rates.

Table A3.1: Effects of house prices on number of care homes and entry rates

	Number of care homes per 1000 population 65+				
	(1)	(2)	(3)	(4)	(5)
Average house prices (log)	-0.978	1.461	-1.194***	-1.156***	-0.612**
	(0.964)	(1.176)	(0.343)	(0.300)	(0.272)
R-squared	0.197	-0.671	0.170	0.176	0.202
	Entry rates				
Average house prices (log)	0.0616	-0.0928**	-0.0183	-0.00443	-0.0292*
	(0.0530)	(0.0453)	(0.0214)	(0.0188)	(0.0152)
R-squared	-0.151	-0.233	0.010	0.017	-0.003
Historical share of Labour votes	No	Yes	No	Yes	No
Change delay rate	Yes	No	No	No	Yes
Historical density population	No	No	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes
Region FE	Yes	Yes	Yes	Yes	Yes
Observations	1260	1260	1260	1260	1260
Local authorities	315	315	315	315	315

Note: CQC, DWP and Census, author's own calculations. Robust standard errors at the LSOA level are in parentheses. Table provides estimates of the second stage equation 3.1 where the dependent variable is number of care homes per 1000 population 65 or older and the care homes entry rates. Controls are the share of old population, contemporaneous share of Labour votes, region and year fixed effects. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$

Augmented tables including controls

This section presents augmented tables associated with the main results that include estimates for the controls used in the regressions.

Table A3.2: Effects of house prices on number of care homes and entry rates - augmented table including controls

	Number of care homes per 1000 population 65+			Entry rates		
	(1)	(2)	(3)	(4)	(5)	(6)
Average house prices (log)	-0.780***	-0.107	-0.622***	-0.00385	-0.0103**	-0.00652
	(0.118)	(0.0898)	(0.178)	(0.00478)	(0.00406)	(0.00868)
Share of old people	0.00798	0.00840	0.00693	-0.000664**	-0.000698***	-0.000646**
	(0.00742)	(0.00640)	(0.00744)	(0.000262)	(0.000248)	(0.000266)
Contemporaneous share Labour	0.103	0.0789**	0.0767**	-0.0789	-0.0719	-0.0681
	(0.086)	(0.0361)	(0.0368)	(0.0951)	(0.0415)	(0.0395)
Region: East Midlands (1 = yes)	-0.594***		0.214**	0.00974		0.0109**
	(0.200)		(0.106)	(0.00620)		(0.00499)
Region: East of England (1 = yes)	-0.545***		0.198	0.00117		0.00346
	(0.171)		(0.147)	(0.00575)		(0.00623)
Region: London (1 = yes)	-		0.647**	-		0.00392
			(0.260)			(0.00972)
Region: North East (1 = yes)	-0.860***		-0.00357	0.0114		0.0117*
	(0.225)		(0.113)	(0.00833)		(0.00650)
Region: North West (1 = yes)	-0.856***		-0.0126	0.00282		0.00343
	(0.210)		(0.107)	(0.00764)		(0.00556)
Region: South East (1 = yes)	0.0128		0.731***	-0.00222		0.000492
	(0.150)		(0.178)	(0.00454)		(0.00705)
Region: South West (1 = yes)	-0.249		0.514***	0.00238		0.00435
	(0.191)		(0.140)	(0.00645)		(0.00655)
Region: West Midlands (1 = yes)	-0.706***		0.0951	0.00429		0.00561
	(0.192)		(0.104)	(0.00630)		(0.00523)
Region: Yorkshire and the Humber (1 = yes)	-0.824***		-	-0.000930		-
	(0.212)			(0.00675)		
Year 2014	-	0.162***	0.0754**	-	-0.00612*	-0.00548
		(0.0207)	(0.0312)		(0.00337)	(0.00362)
Year 2015	-0.0192**	0.0982***	0.0461**	-0.00181	-0.00751**	-0.00712*
	(0.00851)	(0.0136)	(0.0198)	(0.00352)	(0.00363)	(0.00379)
Year 2016	-0.0524***	0.0293***	0.00472	0.00379	-0.00156	-0.00138
	(0.0142)	(0.00753)	(0.0106)	(0.00323)	(0.00336)	(0.00341)
Year 2017	-0.0496**	-	-	0.00504	-	-
	(0.0203)			(0.00335)		
Constant	11.66***	2.837**	8.907***	0.103*	0.190***	0.139
	(1.523)	(1.138)	(2.097)	(0.0612)	(0.0517)	(0.104)
Estimation	OLS	IV	IV	OLS	IV	IV
Observations	1,260	1,260	1,260	1.260	1,260	1,260
R-squared	0.209	0.043	0.204	0.021	0.014	0.048

Note: CQC, DWP and Census, author's own calculations. Robust standard errors at the LSOA level are in parentheses. Table provides estimates of the second stage equation 3.1 where the dependent variables are is number of care homes per 1000 population 65 or older and the care homes entry rates. $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$

Table A3.3: Effects of house prices on care homes capacity - augmented table including controls

	New registered beds			Care home average size		
	(1)	(2)	(3)	(4)	(5)	(6)
Average house prices (log)	-38.08***	-65.47***	-98.42***	0.0839	-5.893***	-9.259**
	(9.407)	(11.29)	-21,95	(2.673)	(2.028)	(4.228)
Share of old people	-3.525***	-3.611***	-3.126***	-0.387**	-0.264*	-0.325**
	(1.002)	(0.781)	-0,959	(0.166)	(0.149)	(0.166)
Share contemporaneous Labour	1.221	1.163***	1.159**	-0.379	-0.2184	-0.1935
	(0.00328)	(0.0314)	(0.00240)	(0.0263)	(0.0250)	(0.0208)
Region: East Midlands (1 = yes)	-13.55		-63.25***	2.110		-9.761***
	(16.39)		(21,16)	(4.097)		(3.57)
Region: East of England (1 = yes)	0.849		(24.25)	9.422**		1.36
	(14.00)		(24.05)	(3.697)		(4,592)
Region: London (1 = yes)	-		11.62	-		-2.377
			(33.22)			(6.714)
Region: North East (1 = yes)	26.82		-41.51*	13.20**		-1.559
	(20.13)		(24.2)	(5.202)		(4.215)
Region: North West (1 = yes)	10.76		-52.48**	9.380**		-4.588
	(20.73)		(24.14)	(4.549)		(3.528)
Region: South East (1 = yes)	3.544		-12,07	8.425**		1.832
	(13.02)		(25.91)	(3.360)		(4.893)
Region: South West (1 = yes)	16.08		-16,58	6.745*		2.488
	(18.56)		(24.01)	(4.047)		(4.502)
Region: West Midlands (1 = yes)	28.95		(18.22)	11.18**		0.298
	(24.90)		(27.56)	(4.510)		(4.274)
Region: Yorkshire and the Humber (1 = yes)	55.97**		-	12.84**		-
	(27.60)			(5.408)		
Year 2014	-	-52.56***	-57.82***	-	-13.51***	-14.10***
		(8.004)	(8.708)		(2.167)	(2.256)
Year 2015	8.930*	-41.81***	-45.02***	2.420	-10.73***	-11.08***
	(4.982)	(7.444)	(7.824)	(1.808)	(2.173)	(2.214)
Year 2016	24.17***	-25.11***	-26.69***	3.858**	-9.000***	-9.161***
	(5.693)	(7.630)	(7.729)	(1.613)	(2.188)	(2.202)
Year 2017	47.97***	-	-	12.57***	-	-
	(7.526)			(2.172)		
Constant	583.1***	981.5***	1,404***	20.76	112.6***	157.2***
	(123.9)	(152.5)	-269,1	(34.34)	(25.71)	(49.74)
Estimation	OLS	IV	IV	OLS	IV	IV
Observations	1,260	1.260	1,260	1.260	1,260	1,260
R-squared	0.121	0.087	0.094	0.058	0.036	0.048

Note: CQC, DWP and Census, author's own calculations. Robust standard errors at the LSOA level are in parentheses. Table provides estimates of the second stage equation 3.1 where the dependent variables are the number of new registered beds and care home average size. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$

Table A3.4: Effects of house prices on care homes by quality rating - augmented table including controls

	Outstanding			Requires improvement			Inadequate		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Average house prices (log)	3.70e-05	-0.115***	-0.0197***	0.00432***	-0.0310**	-0.0111***	0.00675**	-0.0825***	-0.0227***
	(0.00185)	(0.0217)	(0.00446)	(0.00130)	(0.0136)	(0.00284)	(0.00300)	(0.0303)	(0.00648)
Share of old people	0.000158	0.000835	0.000535*	0.000380***	0.000520	0.000211	0.000114	0.000618	0.000555*
	(0.000154)	(0.00155)	(0.000285)	(0.000133)	(0.00123)	(0.000237)	(0.000157)	(0.00155)	(0.000287)
Share contemporaneous Labour	-0.00221	-0.0863***	-0.0159**	0.0379	0.0184	0.00784	0.103	0.190***	0.139*
	(0.00328)	(0.0314)	(0.00640)	(0.00263)	(0.0250)	(0.0108)	(0.0612)	(0.0517)	(0.104)
Region: East Midlands (1 = yes)	-	-	-	-0.0144***	-0.230***	-0.0261***	-0.0141***	-0.238***	-0.0279***
				(0.00150)	(0.00811)	(0.00208)	(0.00158)	(0.00986)	(0.00234)
Region: East of England (1 = yes)	0.00381***	0.276***	0.0307***	-0.0109***	0.0410***	0.00411	-0.0107***	0.0358***	0.00301
	(0.000756)	(0.00908)	(0.00251)	(0.00160)	(0.00819)	(0.00291)	(0.00164)	(0.00838)	(0.00291)
Region: London (1 = yes)	0.0111***	0.291***	0.0307***	-0.00381**	0.0509***	0.00375	-0.00369**	0.0485***	0.00319
	(0.00130)	(0.0107)	(0.00255)	(0.00182)	(0.00771)	(0.00266)	(0.00183)	(0.00762)	(0.00266)
Region: North East (1 = yes)	0.0152***	0.244***	0.0274***	-	-	-	-	-	-
	(0.00156)	(0.00942)	(0.00218)						
Region: North West (1 = yes)	-0.000175	-0.0769**	-0.0253***				-0.00274	-0.00452	-0.0183***
	(0.00273)	(0.0310)	(0.00617)				(0.00274)	(0.0175)	(0.00576)
Region: South East (1 = yes)	-0.00128	-0.0837***	-0.0104**				-0.00658**	-0.0247	-0.00209
	(0.00214)	(0.0251)	(0.00485)				(0.00318)	(0.0215)	(0.00653)
Region: South West (1 = yes)	-	-	-				-0.00939**	0.0390	0.0101
							(0.00448)	(0.0401)	(0.0100)
Region: West Midlands (1 = yes)	0.000119	-0.101**	-0.0140				-0.000379	-0.0184	-0.00784
	(0.00300)	(0.0394)	(0.0107)				(0.00263)	(0.0250)	(0.0108)
Region: Yorkshire and the Humber (1 = yes)	-0.000131	-0.103***	-0.00842				-0.00119	-0.0230	-0.00203
	(0.00277)	(0.0368)	(0.00735)				(0.00279)	(0.0217)	(0.00622)
Year 2014	0.00498**	0.0118	0.00250				-0.00138	0.0657**	0.0113
	(0.00226)	(0.0206)	(0.00418)				(0.00343)	(0.0304)	(0.00789)
Year 2015	0.00671**	-0.0509	-0.0158***				0.00225	0.0122	-0.00791
	(0.00312)	(0.0335)	(0.00583)				(0.00364)	(0.0246)	(0.00617)
Year 2016	0.00221	-0.0863***	-0.0159**				-0.000645	-0.0153	-0.00867
	(0.00328)	(0.0314)	(0.00640)				(0.00311)	(0.0182)	(0.00620)
Year 2017	0.00187	-0.0758**	-0.00676				-	-	-
	(0.00319)	(0.0333)	(0.00795)						
Constant	-0.00525	1.450***	0.240***	-0.0455***	0.602***	0.157***	-0.0680*	1.227***	0.297***
	(0.0238)	(0.273)	(0.0568)	(0.0169)	(0.180)	(0.0373)	(0.0354)	(0.360)	(0.0769)
Estimation	OLS	OLS	OLS	IV	IV	IV	IV	IV	IV
Observations	1,260	1,260	1,260	1,260	1,260	1,260	1,260	1,260	1,260
R-squared	0.115	0.467	0.176	0.094	0.430	0.130	0.107	0.464	0.175

Note: CQC, DWP and Census, author's own calculations. Robust standard errors at the LSOA level are in parentheses. Table provides estimates of the second stage equation 3.1 where the dependent variable is the share of care homes with an outstanding rating, requires improvement or inadequate. $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$

7.2 Appendix to Chapter 4

Table A4.1: Negative changes of spending power on frequency of inspections - augmented table including controls

	Cox	Mixed provider	Mixed district
Spending power change (1 = yes)	-0.106***	-0.107***	-0.147***
	(0.023)	(0.023)	(0.026)
Number of inspections in care home	0.002***	0.002***	0.004***
	(0)	(0)	(0.001)
Start good rating (1 = yes)	-0.858***	-0.86***	-0.863***
	(0.017)	(0.017)	(0.018)
Proportion 65+	-3.731**	-3.735**	-1.526
	(1.511)	(1.522)	(3.458)
Prorportion job seekers	20.696***	21.107***	99.872***
	(2.468)	(2.482)	(4.566)
Proportion pension claimants	1.267	1.111	-12.165***
	(1.392)	(1.404)	(3.59)
Metropolitan district	-0.104**	-0.106**	0.108
	(0.038)	(0.039)	(0.102)
Shire district	0.026	0.027	0.429***
	(0.038)	(0.038)	(0.087)
Unitary Authority	-0.087**	-0.089**	0.131
	(0.035)	(0.035)	(0.091)
Dimension medium	-0.102***	-0.105***	-0.097***
	(0.021)	(0.022)	(0.022)
Dimension small	-0.324***	-0.329***	-0.315***
	(0.03)	(0.03)	(0.03)
Year 2015	0.056***	0.057***	0.053**
	(0.019)	(0.019)	(0.019)
Year 2016	3.72	6.718	8.178
	(122.595)	(549.373)	(870.305)
Year 2017	9.812	12.808	14.462
	(122.591)	(549.373)	(870.304)
Year 2018	9.897	12.888	14.676
	(122.591)	(549.373)	(870.304)
IMD	9.945	12.932	14.809
	(122.591)	(549.373)	(870.304)
Observations	75820	75820	75820
Events	14876	14876	14876
Log-lik	-134584.48	-135821.18	-135661.32

Note: CQC, DWP and Census. Robust standard errors in parentheses. Table provides estimates of the hazard ratio from Equations 4.3 and 4.4 where the dependent variable is the hazard of being inspected. Random effects are applied at the level of the provider and the local autority. $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Results without deregistration events

The following Tables present results considering a sample without the events that represent a care home deregistration. They may be associated with quality deteriorations. Table A4.2 shows results regarding overall ratings. Table A4.3 provides result on other quality dimensions. The structure of both Tables is similar to Tables 4.3 and 4.4.

Table A4.2: Quality deterioration and improvement on overall dimension excluding care home deregistrations

	Quality deterioration			Quality improvement		
	Cox	Mixed provider	Mixed district	Cox	Mixed provider	Mixed district
Negative change spending power (1 = yes)	-0.131*	-0.131*	-0.121	-0.125**	-0.125**	-0.125**
	(0.077)	(0.077)	(0.08)	(0.05)	(0.05)	(0.05)
LogLink	-12092.9	-12091.42	-12082.19	-25013.66	-25013.66	-25013.66
Positive change spending power (1 = yes)	0.195**	0.192**	0.19**	-0.039	-0.039	-0.039
	(0.07)	(0.07)	(0.073)	(0.044)	(0.044)	(0.044)
LogLink	-12090.52	-12089.15	-12080.03	-25016.49	-25016.49	-25016.49
Observations	46181	46181	46181	27299	27299	27299
Events	1434	1434	1434	3083	3083	3083

Source: CQC, DWP and Census, author's own calculations. Robust standard errors in parentheses. Table provides estimates of the hazard ratio from Equations 4.3 and 4.4 where the dependent variable is the hazard of quality deterioration/improvement. Random effects are applied at the level of the provider and the local autority. The modelling of quality deterioration uses a sample with all care homes that obtain an initial *"good"* (e.g. Good or Outstanding) rating. Similarly, the modelling of quality improvement uses a sample with all care homes that obtain an initial *"bad"* (e.g. Inadequate or Requires improvement) rating. Negative and positive change in spending power are indicated by the first and last quintiles of the spending power distribution respectively. Local controls and year fixed effects are included in all regressions.

Table A4.3: Quality deterioration and improvement on other dimensions excluding deregistrations

		Quality deterioration			Quality improvement		
		Cox	Mixed provider	Mixed district	Cox	Mixed provider	Mixed district
Negative change spending power (1 = yes)							
	Well-led	-0.216***	-0.215***	-0.213***	-0.187***	-0.187***	-0.187***
		(0.07)	(0.07)	(0.072)	(0.054)	(0.054)	(0.054)
	Effective	-0.113	-0,114	-0.111	-0.235***	-0.235***	-0.235***
		(0.076)	(0.076)	(0.079)	(0.05)	(0.05)	(0.05)
	Responsive	-0.094	-0.096	-0.09	-0.201***	-0.201***	-0.201***
		(0.075)	(0.075)	(0.078)	(0.056)	(0.056)	(0.056)
	Care	-0.243***	-0.246***	-0.243***	-0.227***	-0.227***	-0.227***
		(0.082)	(0.082)	(0.086)	(0.075)	(0.075)	(0.075)
	Safe	-0.125*	-0.124*	-0.13*	-0.152***	-0.152***	-0.154***
		(0.073)	(0.073)	(0.076)	(0.049)	(0.049)	(0.049)
Positive change spending power (1 = yes)							
	Well-led	0.173**	0.173**	0.17**	-0.007	-0.007	-0.006
		(0.062)	(0.062)	(0.064)	(0.048)	(0.048)	(0.048)
	Effective	0.183**	0.182**	0.197**	-0.039	-0.039	-0.039
		(0.067)	(0.068)	(0.07)	(0.044)	(0.044)	(0.044)
	Responsive	0.089	0.087	0.105	-0.029	-0.029	-0.029
		(0.068)	(0.068)	(0.071)	(0.049)	(0.049)	(0.049)
	Care	0.078	0.079	0.108	0.015	0.015	0.015
		(0.073)	(0.073)	(0.077)	(0.065)	(0.065)	(0.065)
	Safe	0.13*	0.129*	0.132*	-0.035	-0.035	-0.035
		(0.066)	(0.066)	(0.069)	(0.044)	(0.044)	(0.044)

Source: CQC, DWP and Census, author's own calculations. Robust standard errors in parentheses. Table provides estimates of the hazard ratio from Equations 4.3 and 4.4 where the dependent variable is the hazard of quality deterioration/improvement. Random effects are applied at the level of the provider and the local autority. The modelling of quality deterioration uses a sample with all care homes that obtain an initial *"good"* (e.g. Good or Outstanding) rating. Similarly, the modelling of quality improvement uses a sample with all care homes that obtain an initial *"bad"* (e.g. Inadequate or Requires improvement) rating. Negative and positive change in spending power are indicated by the first and last quintiles of the spending power distribution respectively. Local controls and year fixed effects are included in all regressions. $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

Key Lines of Enquiry

Quality ratings are defined according to key lines of enquiry that compose each rated category.

- *Safe*: assesses whether patients are protected from abuse and avoidable harm. The key questions asked are:
  - How do systems, processes and practices keep people safe and safeguarded from abuse?
  - How are risks to people assessed, and their safety monitored and managed so they are supported to stay safe?
  - Do staff have all the information they need to deliver safe care and treatment to people?
  - How does the provider ensure the proper and safe use of medicines, where the service is responsible?
  - What is the track record on safety?
  - Are lessons learned and improvements made when things go wrong?
- *Effective*: assesses whether care, treatment and support achieve good outcomes, promote good quality of life and is based on the best available evidence.
  - Are people's needs assessed and care and treatment delivered in line with current legislation, standards and evidence-based guidance to achieve effective outcomes?
  - How are people's care and treatment outcomes monitored and how do they compare with other similar services?
  - How does the service make sure that staff have the skills, knowledge and experience to deliver effective care, support and treatment?
  - How well do staff, teams and services work together within and across organisations to deliver effective care and treatment?

  - How are people supported to live healthier lives and, where the service is responsible, how does it improve the health of its population?
  - Is consent to care and treatment always sought in line with legislation and guidance?

- *Caring*: assesses whether services involve and treat people with compassion, kindness, dignity and respect.
  - How does the service ensure that people are treated with kindness, respect and compassion, and that they are given emotional support when needed?
  - How does the service support people to express their views and be actively involved in making decisions about their care, treatment and support as far as possible?
  - How are people's privacy and dignity respected and promoted?

- *Responsive*: assesses whether the services meet people's need.
  - How do people receive personalised care that is responsive to their needs?
  - Do services take account of the particular needs and choices of different people?
  - Can people access care and treatment in a timely way?
  - How are people's concerns and complaints listened and responde to and used to improve the quality of care?

- *Well-led*: assesses whether the leadership, management and governance of the organisation assures the delivery of high-quality and person-centred care, supports learning and innovation, and promotes an open and fair culture
  - Is there the leadership capacity and capability to deliver high-quality, sustainable care?
  - Is there a clear vision and credible strategy to deliver high-quality sustainable care to people, and robust plans to deliver?

- Is there a culture of high-quality, sustainable care?
- Are there clear responsibilities, roles and systems of accountability to support good governance and management?
- Are there clear and effective processes for managing risks, issues and performance?
- Is appropriate and accurate information being effectively processed, challenged and acted on?
- Are the people who use services, the public, staff and external partners engaged and involved to support high-quality sustainable services?
- Are there robust systems and processes for learning, continuous improvement and innovation?

Rating transitions in other quality dimensions

Figure A4.1: Transitions of overall quality ratings

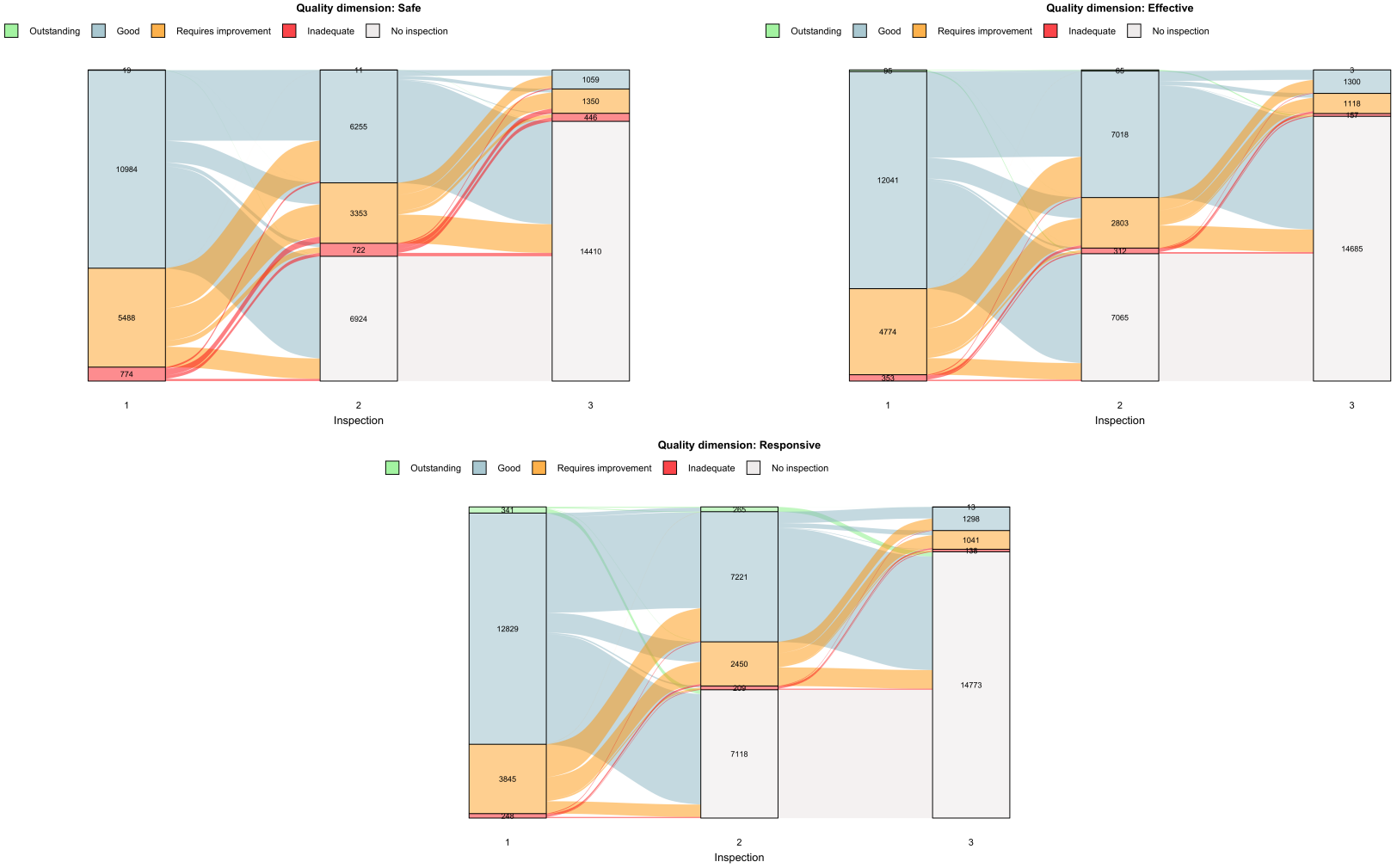
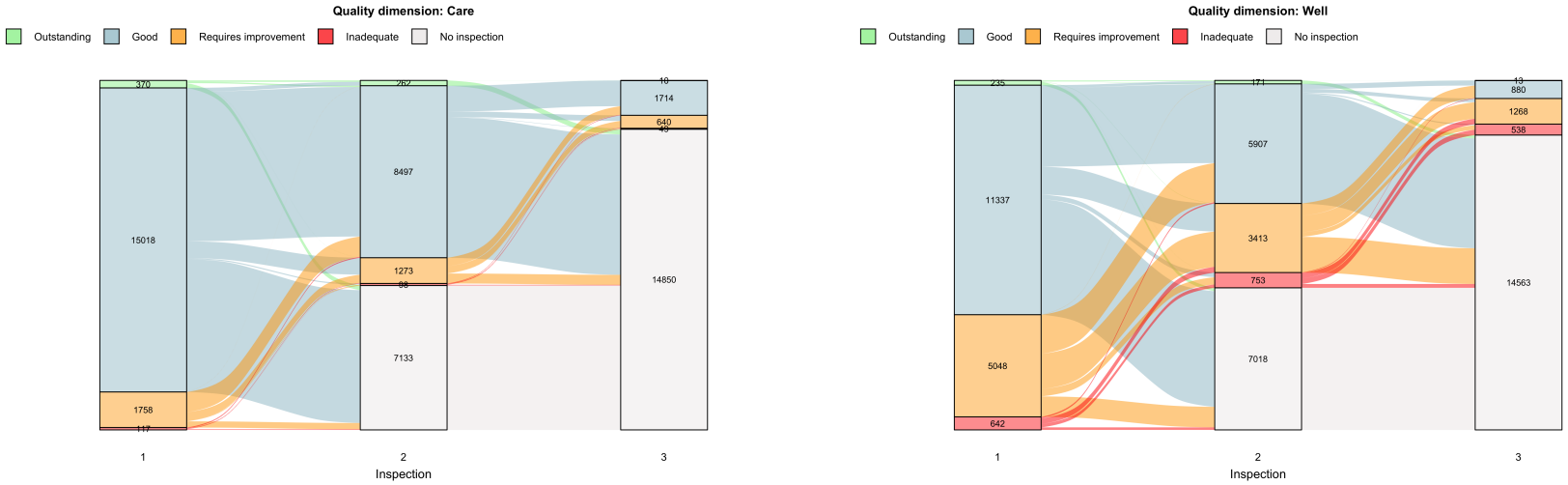


Figure A4.2: Transitions of overall quality ratings (cont')



Note: Author's own calculation with data from Care Quality Commission. Numbers represent number of care homes in each quality rating.

7.3 Appendix to Chapter 5

Theoretical model

To understand the association between the market structure and quality, this section sketches a simple model following Forder and Allan (2014). A care home i has an objective function U that is composed by the profits obtained π and a factor m that characterises their altruistic behaviour and depends positively on the quality of the service. As Brekke et al. (2018) argue this assumption is relevant not only for models on long term care but also in healthcare, education and other sectors in public economics where individuals are mission oriented.

$$U_i(\pi_i, q_i) = \pi_i + m_i(q_i)X_i \tag{7.1}$$

Taking into account the institutional characteristics discussed in Section 5.2, the demand (X) for this care home is composed by two types of residents: self-funded (X^s) and publicly funded (X^p). Since self-funded residents value quality q, the price they are willing to pay depends on the level of quality provided. Hence, their price is expressed as $p^s(q_i)$. Also, the prices paid by publicly-funded residents are determined by the local authorities that are only interested in meeting the minimum quality standard so that their prices p^p are exogenous to the levels quality beyond the minimum standard. There are marginal and fixed costs (C_i and F_i respectively) that increase with quality. Considering these aspects it is possible to introduce the profits function and re-define Equation 7.1 as:

$$U_i = P_i^p X_i^p(q_i, P_i^p) + P_i^s(q_i)X_i^s(q_i, P_i^s) - C(q_i)(X_i^p + X_i^s) - F(q_i) + m_i(q_i)(X_i^p + X_i^s) \tag{7.2}$$

Maximising the objective function with respect to quality (q_i), we get first-order condition for care home i:

$$\frac{\partial U_i}{\partial q_i} = P_i^p \frac{\partial X_i^p}{\partial q_i} + (m_i - C_i)\frac{\partial X_i^p}{\partial q_i} + \frac{\partial X_i^s}{\partial q_i} X_i^s + P_i^s \frac{\partial X_i^s}{\partial q_i} + (m_i - C_i)\frac{\partial X_i^s}{\partial q_i} + \\ + \left[\frac{\partial m}{\partial q_i} - \frac{\partial C}{\partial q_i}\right](X_i^s + X_i^p) - \frac{\partial F}{\partial q_i} = 0 \tag{7.3}$$

The effect of the number of care homes in market (N) on the quality of care home i is obtained by solving Equation 7.3 for N.

$$\frac{\partial U_i}{\partial q_i \partial N} = \frac{\partial P_i^p}{\partial N}\frac{\partial X_i^p}{\partial q_i} + P_i^p \frac{\partial X_i^p}{\partial q_i \partial N} + \frac{\partial P_i^s}{\partial q_i \partial N} X_i^s + \frac{\partial P_i^s}{\partial q_i}\frac{\partial X_i^s}{\partial N} + \frac{\partial P_i^s}{\partial N}\frac{\partial X_i^s}{\partial q_i} + \\ + P_i^s \frac{\partial X_i^s}{\partial q_i \partial N} + (m_i - C_i)\left[\frac{\partial X_i^p}{\partial q_i \partial N} + \frac{\partial X_i^s}{\partial q_i \partial N}\right] + \left[\frac{\partial m_i}{\partial q_i} - \frac{\partial C_i}{\partial q_i}\right]\left[\frac{\partial X_i^p}{\partial N} + \frac{\partial X_i^s}{\partial N}\right] \tag{7.4}$$

Since $\frac{\partial P_i}{\partial N} < 0$ and $\frac{\partial X_i}{\partial N} < 0$ the sign of this effect is ambigous and depends on how responsive the demand is with regards to prices. In cases with low price elasticity, the increase in competition may lead to increases in quality (Gaynor and Town 2011). This would be plausible in cases were prices are regulated such as for example hospitals in England.

Further evidence on the validity of the instrument

To be valid, an instrument should not be correlated with the error term nor with ommited variables. To examine the validity in further detail Table A5.1 presents several specifications considering various sets of controls. If the instrument is valid, including more controls in the specification should not modify the results of the second and first stage.

Table A5.1: Tests on the instrument

	No controls			Demand controls			Supply controls		
Panel A. 2SLS	Quality deterioration in care home (1 = yes) in...			Quality deterioration in care home (1 = yes) in...			Quality deterioration in care home (1 = yes) in...		
	(1) 3 months	(2) 6 months	(3) 12 months	(4) 3 months	(5) 6 months	(6) 12 months	(7) 3 months	(8) 6 months	(9) 12 months
Closure	0.190	0.116	0.0633	0.204*	0.125*	0.0682*	0.176	0.108	0.0585
	(0.118)	(0.0732)	(0.0394)	(0.117)	(0.0727)	(0.0390)	(0.118)	(0.0731)	(0.0393)
Time controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	22,625	22,625	22,625	22,625	22,625	22,625	22,625	22,625	22,625
Number care homes	9,668	9,668	9,668	9,668	9,668	9,668	9,668	9,668	9,668
R-squared	0.183	0.185	0.188	0.183	0.186	0.189	0.187	0.189	0.192
Panel B. First stage	Closure nearest care home within 5 km in...			Closure nearest care home within 5 km in...			Closure nearest care home within 5 km in...		
	3 months	6 months	12 months	3 months	6 months	12 months	3 months	6 months	12 months
Consolidation	0.324***	0.529***	0.971***	0.325***	0.529***	0.973***	0.323***	0.527***	0.970***
	(0.0361)	(0.0378)	(0.0114)	(0.0361)	(0.0378)	(0.0115)	(0.0361)	(0.0378)	(0.0115)
Kleibergen-Paap Wald rk F statistic	80.64	195.77	7239.10	80.70	196.45	7132.40	79.95	194.06	7126.21
Partial R squared	0.021	0.029	0.053	0.021	0.029	0.0528	0.021	0.029	0.052

Note: CQC, DWP and Census, author's own calculations. Robust errors are calculated at care home level. $^{***}p < 0.01$,$^{**}p < 0.05$, $^{*}p < 0.1$.

Additional robustness checks

This section presents further analysis and robustness checks in the main specifications considering (i) fixed effects at the lower level of the local authority (i.e. districts) and (ii) fixed effects at the upper level of the local authority (i.e. counties) which are the type of local authorities with responsibility in long-term care service. The analysis is based on the baseline specification that uses a catchment area of 5km between a care home that is inpsected and its nearest closing care home. Estimates also include time periods of 3, 6 and 12 months between the date of care home closure and the date of inspection of the neighbouring care home.

Table A5.2: Effects of care home closures on quality deterioration with local authority fixed effects

Panel A. 2SLS	Quality deterioration in care home (1 = yes)			Quality deterioration in care home (1 = yes) in..		
	(1) 3 months	(2) 6 months	(3) 12 months	(4) 3 months	(5) 6 months	(6) 12 months
Closure	0.196*	0.129*	0.0609*	0.217*	0.144*	0.0672*
	(0.115)	(0.0752)	(0.0353)	(0.113)	(0.0742)	(0.0345)
Observations	30,061	30,061	30,061	30,061	30,061	30,061
R-squared	0.493	0.495	0.497	0.487	0.489	0.492
Panel B. First Stage	Closure nearest care home within 5 km			Closure nearest care home within 5 km		
	3 months	6 months	12 months	3 months	6 months	12 months
Consolidation	0.111***	0.196***	0.399***	0.122***	0.184***	0.394***
	(0.0127)	(0.0164)	(0.0185)	(0.0198)	(0.0234)	(0.0277)
Kleibergen-Paap Wald rk F statistic	66.12	141.99	465.05	33.273	49.320	106.977
Partial R squared	0,015	0,026	0,057	0.0082	0.0101	0.0248
Fixed effects (district)	Yes	Yes	Yes	No	No	No
Fixed effects (local authority LTC)	No	No	No	Yes	Yes	Yes
Fixed effects (year)	Yes	Yes	Yes	Yes	Yes	Yes

Note: CQC, DWP and Census, author's own calculations. Robust errors are calculated at care home level. $^{***}p < 0.01, ^{**}p < 0.05, ^{*}p < 0.1$.

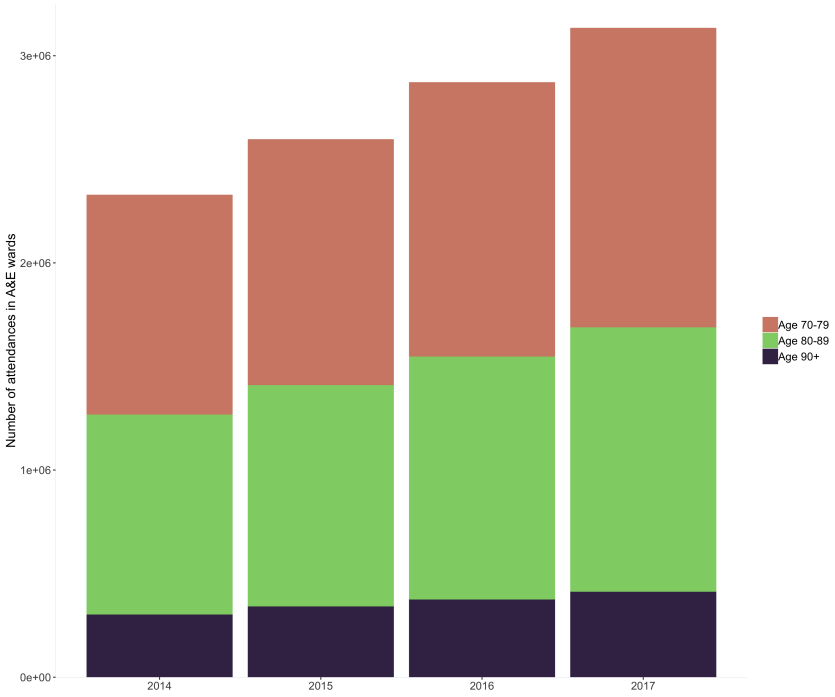
Data regarding A&E attendances

In this section I describe the data sources used in section 5.5.4. Data are obtained from the Health Care and Social Care Information Centre (HCSIC) and NHS Digital. The information collected concerns statistics from the Hospital Episode Statistics and the Accident and Emergency statistics.

Data are collected on a fiscal year basis (starting in April) at the level of the health provider (e.g hospitals). The sample of analysis comprises 170 health centres on 137 districts. To calculate the nearest closing care home I use geodesic distance on a similar basis as described in section 5.3.2 and subset by those care homes that have the minimum distance. The average distance between a closing care home and the nearest hospital acute ward is 1.75 km. The maximum distance is 59.4 km and there are 2 closing care homes that are in the same building as the acute ward. To calculate control hospitals (h in Equation 5.4), I select the second nearest hospital to the closing care home.

Figure A5.1 shows the yearly attendances over the period of 2014-2018. There has been an increase in the attendances driven specially by attendances of people within the range of 70-79 years old.

Figure A5.1: Yearly attendances in A&E wards - England



Note: HSCIC and NHS Digital, author's own calculations. Figures represent A&E attendances for years 2014-2018. Attendances are represented by patient age group.

Abbreviations

ADL	Activities of Daily Living
ASCOT	Adult Social Care Outcome Toolkit
CMA	Competition and Markets Authority
CSCI	Commission for Social Care Inspection
CQC	Care Quality Commission
DWP	Department of Work and Pensions
GP	General Practitioner
HHI	Herfindahl-Hirschman Index
ICSs	Integrated Care Systems
IV	Instrumental Variables
LSOA	Local Super Output Area
LTC	Long Term Care
MHCLG	Ministy of Housing Communities and Local Government
MSOA	Medium Super Output Area
NAO	National Audit Office
NHS	National Health Service
NHS OF	National Outcomes Framework
NICE	National Institute of Care Excellence
NPLME	Non Parametric Maximum Likelihood
OECD	Organisation for Economic Co-operation and Development
OFT	Office of Fair Trading
OLS	Ordinary Least Squares
ONS	Office of National Statistics
QALY	Quality-Adjusted Life Year
RCT	Randomised Controlled Trials
UK	United Kingdom
US	United States
VOA	Valuation Office Agency

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