

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

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## Abstract

Since 2010 English local authorities have experienced major changes in their public finances which have resulted in more local fiscal constraints. This study examines the effect of changes in local funding on the quality of long term care services. To describe the prevalence of quality inspections and the transition between different quality ratings over time we fit semi-parametric hazard models on administrative data. Our findings suggest that care homes placed in local authorities with substantial financial constraints are likely to be inspected less frequently. Also, these constraints have a negative effect on the improvement of the rating as well as a positive effect on the deterioration of the quality. The former results imply that more public funding may be not necessarily helpful for preserving good quality specially in care homes with bad management.

**Keywords:** Care homes; quality; local government; long-term care; England

**JEL:** R31, I12

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# 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, 2018).

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)<sup>1</sup>. 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 2017<sup>2</sup>. 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. An alternative consequence of the austerity cuts may be a reduction in the quality. This paper addresses this question by

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<sup>1</sup>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.

<sup>2</sup>Some argue that there are other elements that could also explain these figures such the choice of individuals to not access to the services (Competition and Markets Authority, 2017)

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. 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 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), Zhao (2016) or Barron and West (2017) that use similar measures for quality.

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 2 provides background information on the institutional setup and discusses the organisation of local authorities and long term care in England. Section 3 presents the empirical approach and data sources used. Section 4 discusses the results and section 5 concludes.

## **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.

## 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 authority 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 disincentives, 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, 2018)<sup>3</sup>. As shown in Figure 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 tax 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).

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<sup>3</sup>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 authorities with long term care responsibilities would have the equivalent of less than three years' worth reserves left if they continued to use their reserves at the rate of 2016-17.

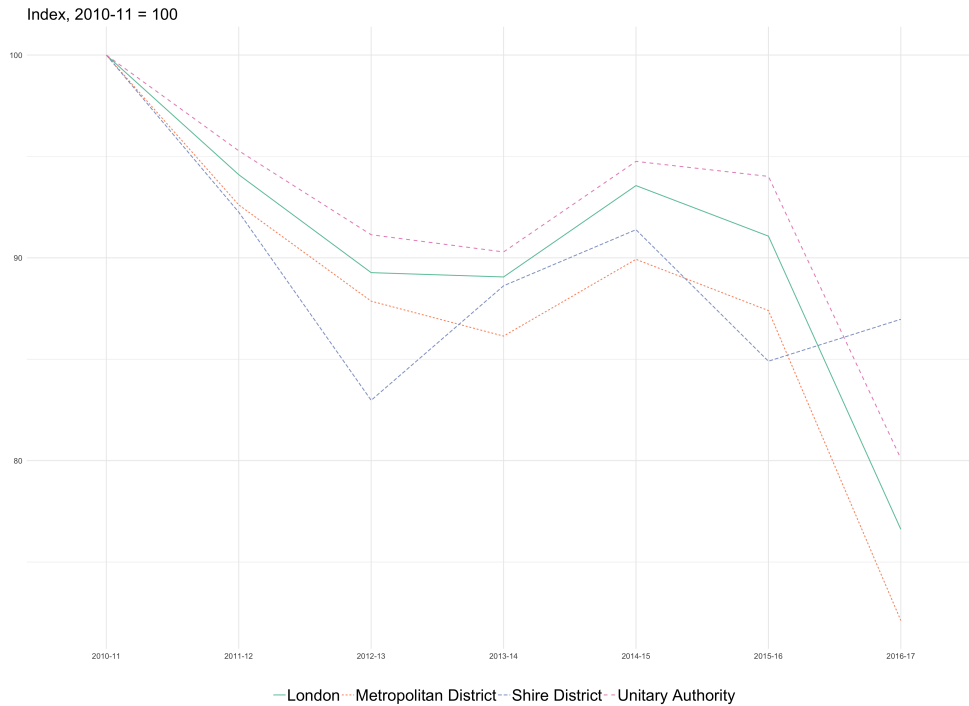


Figure 1: Revenue spending power local authorities, 2010-2017

**Note:** Source: Local Government Finance Settlement (Department of Local Government and Communities). London includes Inner and Outer boroughs. Year refers to fiscal years (April - March).

## 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

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 exercise certain market power setting higher prices to cross-subsidise the lower fees of publicly-funded residents<sup>4</sup>.

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, 2015). 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).

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

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<sup>4</sup>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.



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, 2015)<sup>5</sup>. 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<sup>6</sup>.

### 3 Empirical framework

#### 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. 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

$$\lambda(t) = \lim_{\Delta t \rightarrow 0} \frac{Pr[t \leq T < t + \Delta t | T \geq t]}{\Delta t} \quad (1)$$

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

<sup>5</sup>Appendix B presents details on the questions concerning each dimension.

<sup>6</sup>For more information see: [http://www.cqc.org.uk/sites/default/files/20150327\\_asc\\_residential\\_provider\\_handbook\\_appendices\\_march\\_15\\_update\\_01.pdf](http://www.cqc.org.uk/sites/default/files/20150327_asc_residential_provider_handbook_appendices_march_15_update_01.pdf)

$S(t) = Pr[T > t]$ . 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)<sup>7</sup>

$$\lambda_i(t) = \lambda_0(t)exp(X_i\beta) \quad (2)$$

In Equation 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

$$\lambda_i(t) = \lambda_0(t)exp(\theta SP_{lt} + \beta X_{lt} + \delta C_{it} + \gamma D_t) \quad (3)$$

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.  $SP$  is a categorical variable that reflects changes in the spending power of local authority  $l$  during the period  $t$ . In particular,  $SP = 1$  if there is a negative (positive) change and 0 otherwise.  $X$  and  $C$  are vectors of controls for the local authority and the care home respectively. Furthermore, Equation 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<sup>8</sup>. Next subsection provides further details on the data used

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<sup>7</sup>The estimates are calculated in R using the *coxph* function of the survival package (Therneau and Lumley, 2017).

<sup>8</sup>These results are estimated using R and the function *plm* of the plm package (Croissant and Millo, 2008)

## 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 implemented, 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 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". Furthermore, we do not consider as quality deterioration those events that comprise a deregistration of a care home and consequently an exit from the market<sup>9</sup>. There may be an association between deregistrations and quality deteriorations. In Appendix A we examine the main results considering samples eliminating the deregistrations.

Figure 2 presents information on several aspects associated with the overall quality

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<sup>9</sup>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.

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 successive 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<sup>10</sup>.

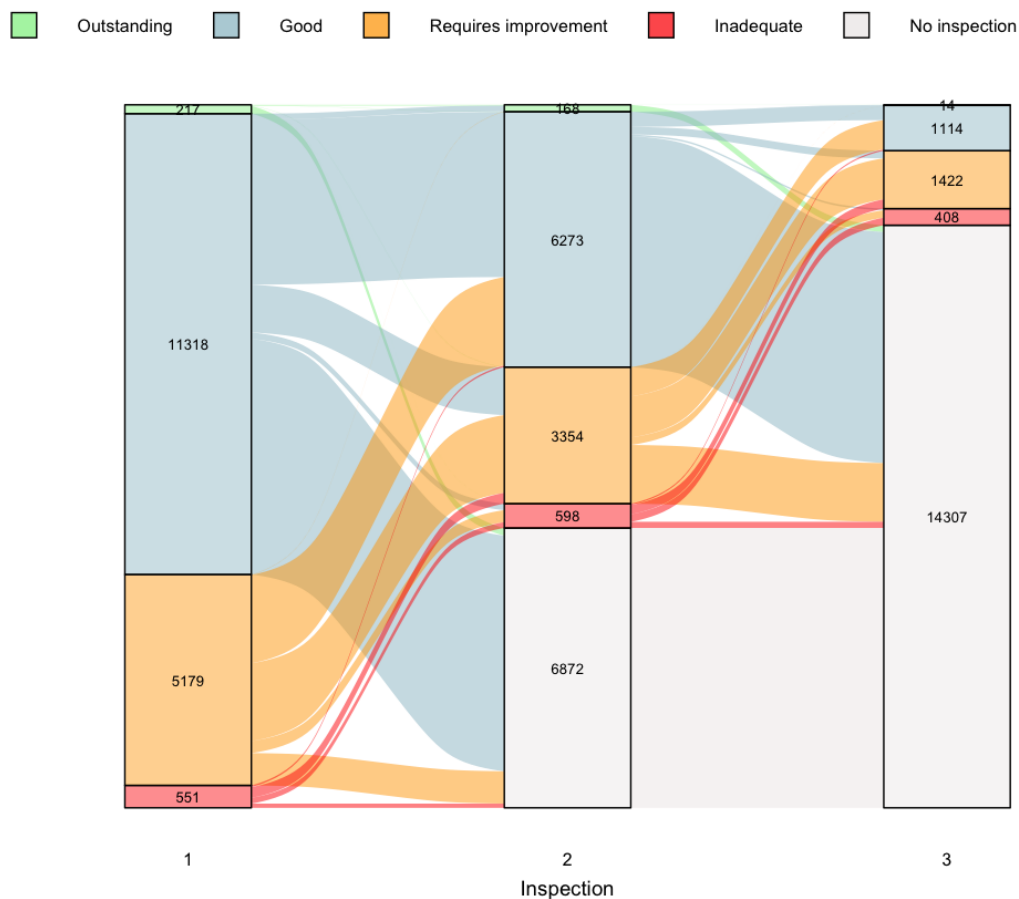


Figure 2: Transitions of overall quality ratings

**Note:** Source: Care Quality Commission. Numbers represent care homes in each quality rating.

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

<sup>10</sup>Appendix C provides similar figures for other quality dimensions.

which correspond to the beginning of the fiscal year. As outlined in section 2, we measure the funding capacity of local authorities 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 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 analysis uses data for fiscal years that include the period from 2013-14 to 2017-18. To consider a significant change, we define positive and negative changes of the spending power in terms of the quintiles in the distribution of changes in the spending power. Thus, a negative change corresponds to the first quintile and implies fewer money available to make decisions in the local authority. Similarly, a positive change is given by the fifth quintile and supposes a greater funding capacity. Considering the former definition, figure 3 plots the percentage change of the spending power over time for the set of English districts.



Figure 3: Change in core spending power, 2013 - 2018

**Note:** Source: Local Government Finance Settlement (Department of Local Government and Communities) and Office of National Statistics. 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.

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 deprivation 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 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<sup>11</sup> in the 10% most deprived.

Table 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

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<sup>11</sup>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.

(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).

|   | 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+ (%)                                | 0,03  | 0,01 | 0,01 | 0,06 |
| 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:** Source: CQC, DWP and Census. Figures from upper panel are based on the sample for overall ratings.

Table 1: Summary statistics

### 3.3 Unobserved heterogeneity

Under the specification in 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 be 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 services. We incorporate this and the former frailties including a random effect,  $\alpha_j$ , in equation 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  $\alpha$  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 2 is therefore re-specified as a mixed proportional hazard model

$$\lambda_i(t) = \lambda_0(t) \exp(X_i\beta + \alpha_j) = \exp(\alpha_j) \exp(X_j\beta) \quad (4)$$

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)<sup>12</sup>. 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 it uses a functional form in the hazard baseline function. In addition,

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<sup>12</sup>The estimates considering the gamma distribution are computed using R with the *coxme* function in the *coxme* package (Therneau, 2015).

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 with the unobserved heterogeneity would be to consider the cluster specific effect  $\alpha$  as fixed. Yet, imposing fixed effects would involve an important point. Concretely, 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).

## 4 Results

### 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 to 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 change its quality if it is inspected), fewer inspections lead necessarily to fewer changes regardless of the underlying quality.

Table 2 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 3 and 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 the yielded a bad or a good result. Likewise, in all cases, the unit of analysis is the care home.

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

**Note:** Source: CQC, DWP and Census. Robust standard errors in parentheses. Table provides estimates of the hazard ratio from Equations 3 and 4 where the dependent variable is the hazard of being inspected. Random effects are applied at the level of the provider and the local authority. 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 2: Negative changes of spending power on frequency of inspections

Table 2 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 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.

## 4.2 Local budgets and overall quality ratings

Table 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 3.2, 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).

|  | Quality deterioration |                     |                     | Quality improvement |                    |                   |
|--|-----------------------|---------------------|---------------------|---------------------|--------------------|-------------------|
|  | Cox                   | Mixed provider      | Mixed district      | Cox                 | Mixed provider     | Mixed district    |
| Negative change spending power (1 = yes) | -0.109<br>(0.077)     | -0.109<br>(0.077)   | -0.101<br>(0.079)   | -0.095*<br>(0.049)  | -0.095*<br>(0.049) | -0.101<br>(0.079) |
| LogLink                                  | -12243.41             | -12242.25           | -12235.33           | -25576.43           | -25576.44          | -25576.43         |
| Positive change spending power (1 = yes) | 0.217***<br>(0.069)   | 0.215***<br>(0.069) | 0.221***<br>(0.072) | -0.001<br>(0.043)   | -0.001<br>(0.043)  | -0.001<br>(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:** Source: CQC, DWP and Census. Robust standard errors in parentheses. Table provides estimates of the hazard ratio from Equations 3 and 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 authority. 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 3: Quality deterioration and improvement on overall dimension

The upper panel of Table 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 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 hypotheses could explain the former result. First, greater funding power may imply a greater number of publicly funded clients. This may imply increases of demand of 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<sup>13</sup>. 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

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<sup>13</sup>Allan et al. (2017) measure this gap and set it in an average £40 a week.

et al., 2007). Another argument, typically found in the 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 more 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 of 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 of the 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 standards in their quality. We examine the former argument in further detail by looking at the transitions in other quality dimensions.

### 4.3 Local budgets and other quality categories

Table 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<sup>14</sup>. Our results may help to explain these earlier findings.

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<sup>14</sup>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)

|  | Quality deterioration |                      |                     | Quality improvement  |                      |                      |
|--|-----------------------|----------------------|---------------------|----------------------|----------------------|----------------------|
|  | Cox                   | Mixed provider       | Mixed district      | Cox                  | Mixed provider       | Mixed district       |
| Negative change spending power (1 = yes) |                       |                      |                     |                      |                      |                      |
| Well-led                                 | -0.194**<br>(0.074)   | -0.195**<br>(0.07)   | -0.193**<br>(0.071) | -0.16***<br>(0.057)  | -0.16***<br>(0.053)  | -0.16***<br>(0.053)  |
| Effective                                | -0.1<br>(0.083)       | -0.101<br>(0.076)    | -0.097<br>(0.078)   | -0.198***<br>(0.051) | -0.198***<br>(0.05)  | -0.198***<br>(0.05)  |
| Responsive                               | -0.083<br>(0.072)     | -0.085<br>(0.075)    | -0.079<br>(0.077)   | -0.163***<br>(0.058) | -0.163***<br>(0.055) | -0.163***<br>(0.055) |
| Care                                     | -0.231**<br>(0.083)   | -0.233***<br>(0.082) | -0.232**<br>(0.085) | -0.219***<br>(0.073) | -0.219***<br>(0.074) | -0.219***<br>(0.074) |
| Safe                                     | -0.092<br>(0.078)     | -0.093<br>(0.073)    | -0.097<br>(0.076)   | -0.126**<br>(0.051)  | -0.126**<br>(0.049)  | -0.126**<br>(0.049)  |
| Positive change spending power (1 = yes) |                       |                      |                     |                      |                      |                      |
| Well-led                                 | 0.201***<br>(0.067)   | 0.190***<br>(0.062)  | 0.2***<br>(0.063)   | 0.026<br>(0.051)     | 0.026<br>(0.047)     | 0.026<br>(0.047)     |
| Effective                                | 0.215**<br>(0.079)    | 0.214***<br>(0.067)  | 0.23***<br>(0.069)  | 0.001<br>(0.05)      | 0.001<br>(0.044)     | 0.001<br>(0.044)     |
| Responsive                               | 0.121<br>(0.076)      | 0.118*<br>(0.068)    | 0.136**<br>(0.07)   | 0.011<br>(0.053)     | 0.011<br>(0.048)     | 0.011<br>(0.048)     |
| Care                                     | 0.108<br>(0.079)      | 0.105<br>(0.072)     | 0.136*<br>(0.075)   | 0.064<br>(0.063)     | 0.064<br>(0.064)     | 0.064<br>(0.064)     |
| Safe                                     | 0.154**<br>(0.074)    | 0.153**<br>(0.065)   | 0.16**<br>(0.068)   | 0.008<br>(0.048)     | 0.008<br>(0.043)     | 0.008<br>(0.043)     |

**Note:** Source: CQC, DWP and Census. Robust standard errors in parentheses. Table provides estimates of the hazard ratio from Equations 3 and 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 authority. Econometric specifications and samples used for quality deterioration and improvement follow the same rationale as Table 3. \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ .

Table 4: Quality deterioration and improvement on other dimensions

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 a 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) increase the hazard of quality deterioration (a 19%). In general, these results reveal that the management dimension seem to be 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 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 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 more 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.

## 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.

## References

- Abbring, J. H. and G. J. Van Den Berg (2007). "The unobserved heterogeneity distribution in duration analysis". *Biometrika* 94.1, pp. 87–99.
- AGEUK (2017). "Briefing: Health and Care of Older people in England 2017."
- Allan, S. (2015). "Implications of the Care Act 2014 on social care markets for older people". *Unit Costs of Health and Social Care 2015*.
- Allan, S. and J. Forder (2015). "The determinants of care home closure". *Health Economics* 24.S1, pp. 132–145.
- Allan, S., K. Gousia, and J. Forder (2017). "Explaining the fees gap between funding types in the English care homes market". *Not published*.
- Allan, S. and F. Vadean (2017). "The impact of workforce composition and characteristics on English care home quality".
- Association of Directors of Adult Social Services (2015). *Distinctive, valued, personal: why social care matters: the next five years*. Tech. rep. Association of Directors of Adult Social Services.
- Austin, P. C. (2017). "A tutorial on multilevel survival analysis: methods, models and applications". *International Statistical Review* 85.2, pp. 185–203.
- Barron, D. N. and E. West (2017). "The quasi-market for adult residential care in the UK: Do for-profit, not-for-profit or public sector residential care and nursing homes provide better quality care?" *Social Science and Medicine* 179, pp. 137–146.
- Bloom, N., C. Propper, S. Seiler, and J. Van Reenen (2015). "The impact of competition on management quality: evidence from public hospitals". *The Review of Economic Studies* 82.2, pp. 457–489.
- Care Quality Commission (2015). "How the CQC regulates: residential adult social care services".
- Care Quality Commission (2015). "Enforcement policy".
- Chou, S.-Y. (2002). "Asymmetric information, ownership and quality of care: an empirical analysis of nursing homes". *Journal of Health Economics* 21.2, pp. 293–311.

- Competition and Markets Authority (2017). *Care homes market study: Final Report*. Tech. rep. Competition and Markets Authority.
- Cox, D. R. (1972). "Regression models and life-tables". *Journal of the Royal Statistical Society. Series B (Methodological)*. No. 2. (1972), pp. 187-220. 34, pp. 187–220.
- Croissant, Y. and G. Millo (2008). "Panel data econometrics in R: The plm package". *Journal of Statistical Software* 27.2, pp. 1–43.
- Fernandez, J.-L., A. McGuire, and M. Raikou (2018). "Hospital Coordination and Integration with Social Care in England: The Effect on Post-Operative Length of Stay". *Journal of Health Economics*.
- Forder, J. (2007). *Self-funded social care for older people: an analysis of eligibility, variations and future projections*, Commission for Social Care Inspection & PSSRU, University of Kent. Tech. rep. PSSRU Discussion Paper 2505. URL: [http://www.csci.org.uk/pdf/20080128\\_Selffunded\\_social\\_care\\_for\\_older\\_people.pdf](http://www.csci.org.uk/pdf/20080128_Selffunded_social_care_for_older_people.pdf).
- Forder, J. and S. Allan (2011). "Competition in the English nursing homes market". *University of Kent: PSSRU*.
- (2014). "The impact of competition on quality and prices in the English care homes market". *Journal of Health Economics* 34, pp. 73–83.
- Forder, J. and J.-L. Fernandez (2011). "Length of stay in care homes".
- Glendinning, C. (2012). "Home care in England: markets in the context of under-funding". *Health and Social Care in the Community* 20.3, pp. 292–299.
- Grabowski, D. C. and N. G. Castle (2004). "Nursing homes with persistent high and low quality". *Medical Care Research and Review* 61.1, pp. 89–115.
- Gravelle, H., R. Santos, and L. Siciliani (2014). "Does a hospital's quality depend on the quality of other hospitals? A spatial econometrics approach". *Regional Science and Urban economics* 49, pp. 203–216.
- Gravelle, H., R. Santos, L. Siciliani, and R. Goudie (2012). "Hospital quality competition under fixed prices". *Centre for Health Economics, University of York CHE Research Paper* 80.

- Gutacker, N., L. Siciliani, G. Moscelli, and H. Gravelle (2016). "Choice of hospital: Which type of quality matters?" *Journal of Health Economics* 50, pp. 230–246.
- Heckman, J. and B. Singer (1984). "A method for minimizing the impact of distributional assumptions in econometric models for duration data". *Econometrica: Journal of the Econometric Society*, pp. 271–320.
- Huh, K. and R. C. Sickles (1994). "Estimation of the duration model by nonparametric maximum likelihood, maximum penalized likelihood, and probability simulators". *The Review of Economics and Statistics*, pp. 683–694.
- Humphries, R., R. Thorlby, H. Holder, P. Hall, and A. Charles (2016). "Social care for older people". *Kings Fund*.
- Jarret, T. (2018). *Social care: care home market – structure, issues, and cross-subsidisation*. Tech. rep. Commons Library Briefing. House of Commons.
- Jones, A. M., N. Rice, T. B. d’Uva, and S. Balia (2013). *Applied health economics*. Routledge.
- Lancaster, T. (1992). *The econometric analysis of transition data*. 17. Cambridge university press.
- Laughlin, A., M. Parsons, K. D. Kosloski, and B. Bergman-Evans (2007). "Predictors of mortality: Following involuntary interinstitutional relocation". *Journal of Gerontological Nursing* 33.9, p. 20.
- Liu, K., T. Coughlin, and T. McBride (1991). "Predicting nursing-home admission and length of stay: A duration analysis". *Medical Care*, pp. 125–141.
- Malley, J. (2010). "Measuring the quality of long-term care in England". *Eurohealth* 16.2, pp. 21–24.
- Marmot, M., Z. Oldfield, S. Clemens, M. Blake, A. Phelps, J. Nazroo, and J. Banks (2014). *English Longitudinal Study of Ageing: Waves 0-6, 1998–2013 [UK Data Archive]*.
- Moscelli, G., L. Siciliani, N. Gutacker, and H. Gravelle (2016). "Location, quality and choice of hospital: Evidence from England 2002–2013". *Regional science and urban economics* 60, pp. 112–124.
- National Audit Office (2016). *Discharging older patients from hospital*. Tech. rep. National Audit Office.

- National Audit Office (2018). *Financial sustainability of local authorities*. Tech. rep. Ministry of Housing, Communities & Local Government.
- Paton, D. and L. Wright (2017). “The effect of spending cuts on teen pregnancy”. *Journal of Health Economics*.
- Phillips, D. and P. Sampson (2018). “Changes in councils’ adult social care and overall service spending in England, 2009-10 to 2017–18”. *Institute for Fiscal Studies*. ISSN: Available at: [www.ifs.org.uk/publications/13066](http://www.ifs.org.uk/publications/13066).
- Robertson, R., L. Wenzel, J. Thompson, et al. (2017). *Understanding NHS financial pressures: How are they affecting patient care? King’s Fund, 2017*.
- Rodriguez, G. (1994). “Statistical issues in the analysis of reproductive histories using hazard models”. *Annals of the New York academy of sciences* 709.1, pp. 266–279.
- (2005). “Unobserved heterogeneity”. *Handouts for POP509: Survival Analysis*. URL: <http://data.princeton.edu/pop509>.
- Skills for Care (2017). *The state of the adult social care sector and workforce in England*.
- Smith, N. A., D. Phillips, P. Simpson, D. Eiser, and M. Trickey (2016). *A time of revolution? British local government finance in the 2010s*. Tech. rep. IFS Reports, Institute for Fiscal Studies.
- Therneau, T. M. and T. Lumley (2017). *Package ‘survival’*.
- Therneau, T. (2015). “R package coxme: Mixed effects cox models.” *Reference Source*.
- Trigg, L. (2014). “Using online reviews in social care”. *Social Policy and Administration* 48.3, pp. 361–378.
- Van den Berg, G. J. (2001). “Duration models: specification, identification and multiple durations”. *Handbook of econometrics* 5, pp. 3381–3460.
- Vlachantoni, A., R. Shaw, R. Willis, M. Evandrou, J. Falkingham, and R. Luff (2011). “Measuring unmet need for social care amongst older people”. *Population Trends* 145.1, pp. 60–76.
- Watkins, J., W. Wulaningsih, C. D. Zhou, D. C. Marshall, G. D. C. Sylianteng, P. G. D. Rosa, V. A. Miguel, R. Raine, L. P. King, and M. Maruthappu (Nov. 2017). “Effects of health and social care spending constraints on mortality in England: a time trend analysis”. *BMJ Open* 7.11.

Zhao, X. (2016). "Competition, information, and quality: Evidence from nursing homes".  
*Journal of Health Economics* 49, pp. 136–152.

# Appendix

## A 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 5 shows results regarding overall ratings. Table 6 provides result on other quality dimensions. The structure of both Tables is similar to Tables 3 and 4.

|  | Quality deterioration |                    |                   | Quality improvement |                    |                    |
|--|-----------------------|--------------------|-------------------|---------------------|--------------------|--------------------|
|  | Cox                   | Mixed provider     | Mixed district    | Cox                 | Mixed provider     | Mixed district     |
| Negative change spending power (1 = yes) | -0.131*<br>(0.077)    | -0.131*<br>(0.077) | -0.121<br>(0.08)  | -0.125**<br>(0.05)  | -0.125**<br>(0.05) | -0.125**<br>(0.05) |
| LogLink                                  | -12092.9              | -12091.42          | -12082.19         | -25013.66           | -25013.66          | -25013.66          |
| Positive change spending power (1 = yes) | 0.195**<br>(0.07)     | 0.192**<br>(0.07)  | 0.19**<br>(0.073) | -0.039<br>(0.044)   | -0.039<br>(0.044)  | -0.039<br>(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               |

**Note:** Source: CQC, DWP and Census. Robust standard errors in parentheses. Table provides estimates of the hazard ratio from Equations 3 and 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 authority. 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 5: 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) |            |                       |                      |                      |                      |                      |                      |
|   | Well-led   | -0.216***<br>(0.07)   | -0.215***<br>(0.07)  | -0.213***<br>(0.072) | -0.187***<br>(0.054) | -0.187***<br>(0.054) | -0.187***<br>(0.054) |
|   | Effective  | -0.113<br>(0.076)     | -0.114<br>(0.076)    | -0.111<br>(0.079)    | -0.235***<br>(0.05)  | -0.235***<br>(0.05)  | -0.235***<br>(0.05)  |
|   | Responsive | -0.094<br>(0.075)     | -0.096<br>(0.075)    | -0.09<br>(0.078)     | -0.201***<br>(0.056) | -0.201***<br>(0.056) | -0.201***<br>(0.056) |
|   | Care       | -0.243***<br>(0.082)  | -0.246***<br>(0.082) | -0.243***<br>(0.086) | -0.227***<br>(0.075) | -0.227***<br>(0.075) | -0.227***<br>(0.075) |
|   | Safe       | -0.125*<br>(0.073)    | -0.124*<br>(0.073)   | -0.13*<br>(0.076)    | -0.152***<br>(0.049) | -0.152***<br>(0.049) | -0.154***<br>(0.049) |
| Positive change spending power ( 1 = yes) |            |                       |                      |                      |                      |                      |                      |
|   | Well-led   | 0.173**<br>(0.062)    | 0.173**<br>(0.062)   | 0.17**<br>(0.064)    | -0.007<br>(0.048)    | -0.007<br>(0.048)    | -0.006<br>(0.048)    |
|   | Effective  | 0.183**<br>(0.067)    | 0.182**<br>(0.068)   | 0.197**<br>(0.07)    | -0.039<br>(0.044)    | -0.039<br>(0.044)    | -0.039<br>(0.044)    |
|   | Responsive | 0.089<br>(0.068)      | 0.087<br>(0.068)     | 0.105<br>(0.071)     | -0.029<br>(0.049)    | -0.029<br>(0.049)    | -0.029<br>(0.049)    |
|   | Care       | 0.078<br>(0.073)      | 0.079<br>(0.073)     | 0.108<br>(0.077)     | 0.015<br>(0.065)     | 0.015<br>(0.065)     | 0.015<br>(0.065)     |
|   | Safe       | 0.13*<br>(0.066)      | 0.129*<br>(0.066)    | 0.132*<br>(0.069)    | -0.035<br>(0.044)    | -0.035<br>(0.044)    | -0.035<br>(0.044)    |

**Note:** Source: CQC, DWP and Census. Robust standard errors in parentheses. Table provides estimates of the hazard ratio from Equations 3 and 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 authority. 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 6: Quality deterioration and improvement on other dimensions excluding deregistrations

## B 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 responded 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?

# C Rating transitions in other quality dimensions

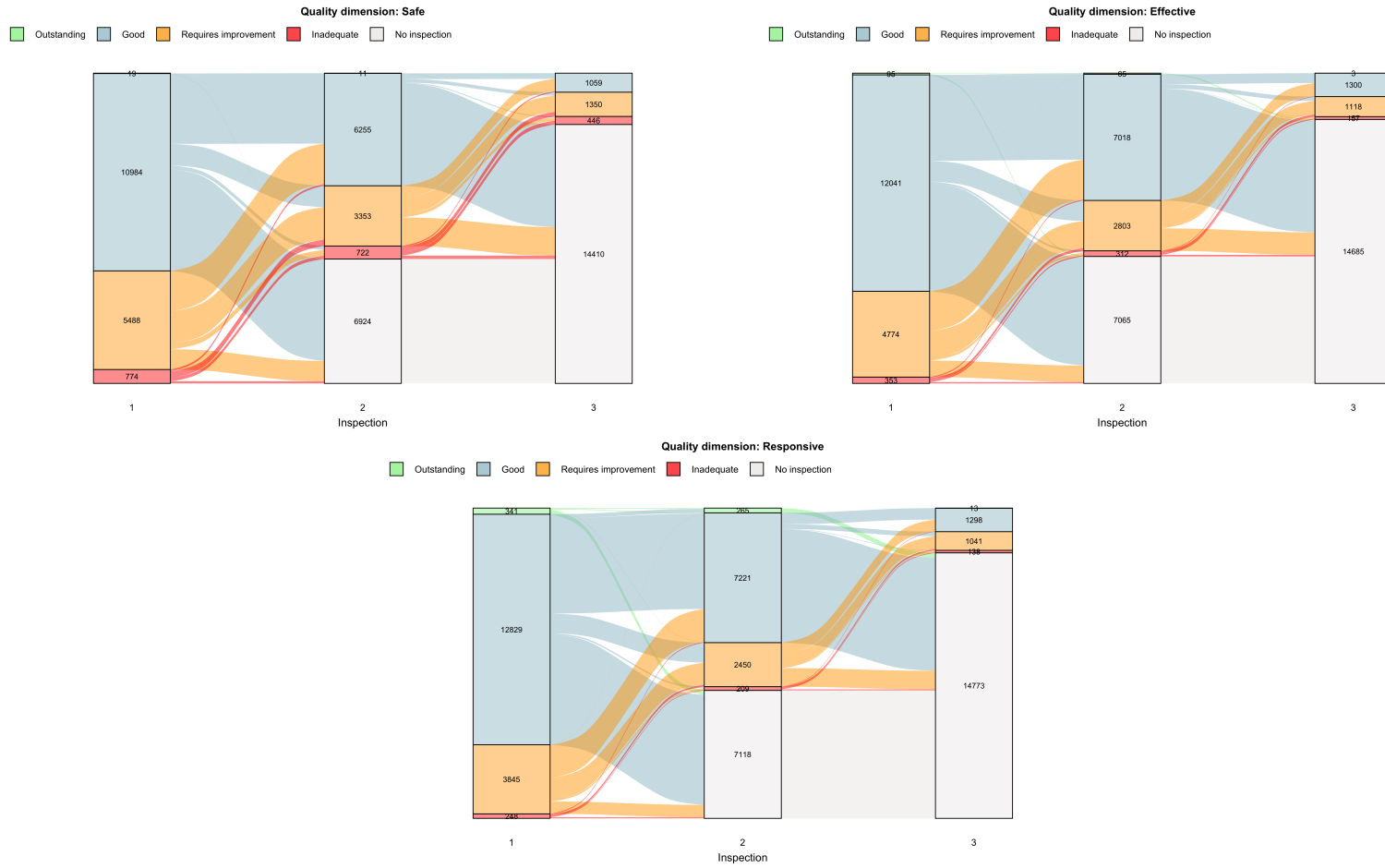


Figure 4: Transitions of overall quality ratings

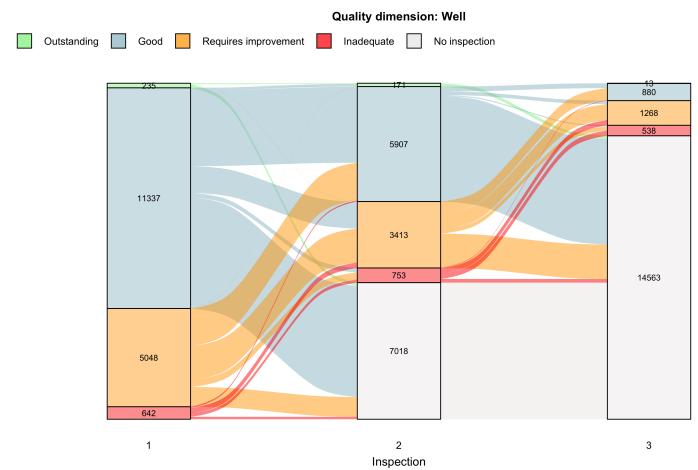
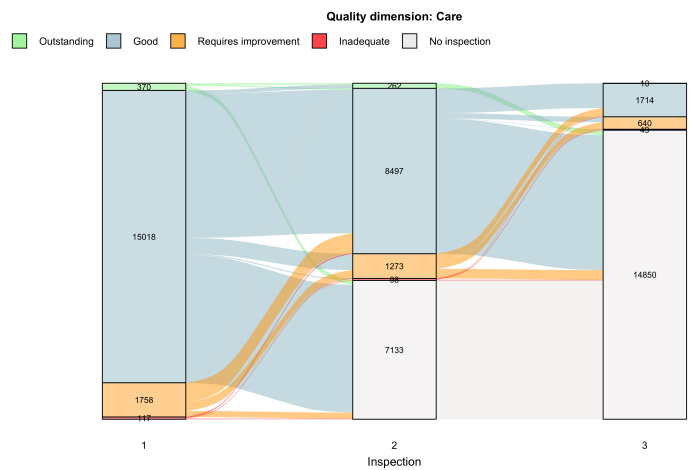


Figure 5: Transitions of overall quality ratings (cont')

Note: Source: Care Quality Commission. Numbers represent care homes in each quality rating.