How Deadly Is Financial Leverage?
Evidence from Care Homes during the COVID-19 crisis

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Once information about leasing and corporate structure is incorporated into the way financial leverage is calculated, highly levered care homes are found to have a death rate twice as high as that of unlevered care homes before the government provided financial support (i.e., during the first wave). Highly levered care homes cut costs more aggressively and experienced the largest drop in cash reserves. Care homes controlled by private equity firms no longer display higher COVID-19 death rates once their significantly higher leverage is controlled for. Our results illustrate the importance of accurately measuring financial flexibility and the negative externalities caused by high leverage.

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I. INTRODUCTION

We examine how financial leverage impacts care home death rates during the COVID-19 pandemic. We focus on English care homes because our analysis requires i) detailed and consolidated accounting statements for each company operating in this industry, including private companies, and these data are not available in the US (see Michaely and Roberts, 2012; Bernstein et al., 2019), and ii) data on death rates per care home per week.[1]

Care homes during the COVID-19 pandemic offer an ideal setting to study the cost of financial leverage, given i) their being hit by *two* unprecedented shocks (pandemic waves) that indiscriminately hit all of them; ii) their product homogeneity; iii) the wide dispersion of capital structures; and iv) the first shock being experienced without any financial support from the government, but the second shock occurring after financial support was available. In addition, care homes have one main stakeholder (residents). This allows us to measure the impact of financial leverage on stakeholders using a simple metric: resident death rates.

As first pointed out in Jensen and Meckling (1976), in bad times, leveraged operators have to cut costs more than unleveraged operators.[2] By doing so, operators in this sector may increase death rates among their residents. These theories also predict that the effect should be non-linear both cross-sectionally and in the time series. Leverage should matter most for care homes that are highly levered and the relationship between leverage and death rates should be stronger during the first wave, not only because the death rates in that wave are generally higher but also because the government started to support care homes financially after the first wave.[3]

We look at the effect of leverage on stakeholders from the perspective of a prospective resident who wants to check the financial leverage of different care homes to minimize the risk of being

[1] Note also that England has the same overall COVID-19 death rate as the US (at about 0.1%) and a similar fraction of deaths occurring in care homes (one-third).
[2] For example, they need to reduce spending on personal protective equipment (PPE) and on staff. The worldwide demand shock for PPE led to increases in prices for some equipment of over 1,000%, and some care homes reported increasing expenditures on PPE by over 4,700% compared to normal times (Flynn, 2020).
[3] We discuss most of the related literature in Online Appendix 1.

adversely affected by a provider's financial distress. In the UK, all the necessary information seems available. Our notional stakeholder can go to the website of the regulator and find each care home's official registration number. Using this identification, she can go to the Companies House website, find the provider's financial accounts and compute leverage in the way that is most common in the literature: Total Debt over Total Assets. We call this ratio *simple provider leverage.*

Simple provider leverage is unrelated to death rates. Thus, if we combine ownership data, as provided by the regulator, with the most common measure of leverage, the conclusion would be that financial leverage does not affect death rates. Instead, we would conclude that ownership type matters. Care homes controlled by Private Equity (PE) firms have significantly higher death rates. While the average death rate in care homes during the first wave is 3.5%, PE-controlled care homes have a death rate that is more than 50% higher at 5.5%.[4] This finding echoes that of Gupta et al. (2024) in the US who find that pre COVID-19, PE-controlled care homes have a higher death rate.

We then move away from this simple measure of leverage and make two key adjustments in the way we construct and measure leverage. First, we observe that many providers are part of a larger corporate group. In this case, an individual provider's leverage is not a meaningful proxy for the financial pressure faced by a given care home. When a provider belongs to a larger corporate group, it is more pertinent to use the leverage of that group.[5]

The regulator pools some (but not all) individual providers that it sees as related to each other under what it calls 'brands.' If we aggregate financial accounts at the regulator's 'brand' level, the results remain unchanged: *simple brand-leverage* is unrelated to death rates. To comprehensively identify larger groups for the purposes of financial analysis, we need to trace the ownership of each provider back to who ultimately controls the provider. The regulator does not do this, and it is not a trivial task. Where we find that a corporate parent owns one or more providers, and the parent files

[4] In the regression analysis, some of the spread is absorbed by care home characteristics (PE-controlled care homes tend to be larger and cater to more fragile residents), but the PE effect remains significant after these controls.
[5] The parent company may have either liquidity (cash, credit lines), or debt, which are not visible in the accounts of the provider. We implicitly assume a liquid and frictionless internal capital market; see Online Appendix 3.

consolidated accounts that include the full group, we attribute the leverage in the consolidated group accounts to each care home provider belonging to that group.[6] This *simple group leverage* is related to death rates in the first wave; but the statistical significance is low.

Our second adjustment relates to the definition of leverage. The *simple* definition of leverage, although standard in the literature, ignores the existence of operating leases.[7] Operating leases are sometimes referred to as 'off balance sheet debt' because they are akin to debt but until recently were not included in the balance sheet. In 2016, the International Accounting Standards Board introduced IFRS 16, which came into effect starting with the financial year ending December 31, 2019. IFRS 16 requires lessees to recognize both an asset and a liability on their balance sheet relating to operating leases; but it only applies to companies above a certain size.[8] In our sample, only six care home groups are subject to IFRS 16. The lease accounting issue distorts the simple measure of leverage: all else equal, it makes companies using operating leases look less leveraged. To remove this distortion, we apply a multiple to current levels of operating lease expenses to add both an asset and an offsetting liability to the balance sheet. This approach 'essentially assumes lease payments are perpetual' (Lim et al., 2017). It is thus consistent with our wish to recreate the effect of owning the underlying asset.

Both researchers and practitioners use a range of multiples. This study utilizes two publicly traded REITs in England that specialize in renting care homes. These REITs carry their care homes at fair market value. Dividing this fair value by the rental income produces a ratio of 13x. We then multiply reported lease expenses by 13 and add this amount to both the numerator and denominator of the leverage ratio.[9]

[6] To identify groups, we need to establish the corporate ownership structure of each provider. We also need to examine the financial accounts of each group. This process uncovered some errors in the way FAME reports some of the data.
[7] Care home operators have the option of either owning the care homes they operate or renting them. If they rent a care home from a third party under an operating lease, this arrangement removes both assets and liabilities from their balance sheet. All discussion of leases in this paper relates only to operating leases.
[8] IFRS 16 does not apply to most firms in our sample because of their size and unquoted status.
[9] Six groups in our sample have adopted the new accounting rules for operating leases. For these, we reverse the effect of the new rules and then apply the same adjustment as for the remainder of the sample. See Online Appendix 3.

In our sample, lease rental expenses are strongly related to group size. Among groups managing more than one thousand care home beds, 75% report lease rental expenses, and their mean ratio of lease rental expenses to total assets is 9%. By contrast, across the whole sample, the overall value of operating lease rental expenses is only 1.2% of total assets. Although operating leases are small across the full sample, taking them into account significantly changes the capital structures of some providers. Importantly, once operating leases are considered, *group-leverage* is related to the death rates in the first wave; both the statistical and economic magnitudes are large.

Moreover, once leverage is computed accurately, the leverage effect on death rates is robust to i) not correcting FAME data; ii) changing the treatment of shareholder loans, cash, and intangible assets; iii) conducting the analysis on sub-samples or wider samples; iv) changing the end dates of the two waves of mortality; v) treating members of nonconsolidated groups as consolidated groups or standalone providers; and vi) including all deaths in care homes (not just COVID-19 ones).

Once leverage is accurately constructed, we also find that ownership type becomes irrelevant. Care homes that are PE controlled no longer have higher death rates. This result means that PE ownership impacts nursing home death rates primarily by increasing their leverage. The increase in PE's involvement in the care home sector thus means higher leverage and more problems during crises.

Many papers examine the relationships between leverage, financial constraints, and nonfinancial outcomes such as worker safety, pollution, product quality, and healthcare treatment choices. We note, however, that this literature has broadly ignored operating leases. For example, Cohn et al. (2020) state that 'we do not observe operating leases which are not included in debt. However, some have argued that operating leases should be treated as debt for the purpose of calculating leverage ratios.' Rare exceptions include Serfling (2016) and Rauh and Sufi (2012), which shows that 'explicitly accounting for leased capital' makes measures of capital employed more accurate.[10]

[10] See also Chen et al. (2023) and Ma and Thomas (2022) on economic consequences of measuring leverage accurately.

One of our contributions is to show that adjustments need to be made to raw accounting data to obtain a meaningful measure of key accounting items such as total assets, debt, and return on assets. Leverage should be measured at a consolidated corporate group level; and in certain sectors (of which care homes is one) it may need to be adjusted to take account of operating leases.[11] However, we acknowledge that we are fortunate in our setup to have REIT data which enables us to capitalize leases in a sensible way. In most countries and industries, such data are not available. Researchers then face a trade-off: they can either miss some of the relevant leverage by using a traditional debt to asset ratio; or make strong assumptions about how to capitalize leases. In most sectors and for small companies, leases are relatively small, and it may be best to ignore them rather than introducing noise. For the rest, practitioners often use a multiple, between 8 and 12, which mostly varies with the level of risk-free interest rates. Researchers could use a similar multiple and check the sensitivity of the results to the one chosen; see Online Appendices 2 and 3 for more on this topic.

Leverage is not expected to affect death rates directly; rather, to do so indirectly via a lack of financial flexibility in times of crisis. We offer three pieces of evidence supporting this channel. First, in our setting, there are two COVID-19 waves (shocks). When the second shock hit, the government had care home financial support in place. We find no significant relationship between leverage and death rate during the second shock.

Second, the effect is nonlinear: leverage does not matter when it is below 50%. That is, it makes no difference to the death rate if the leverage is 10% versus 40%, but it makes a significant difference if it is 60% versus 90%. Consequently, if there is a relevant unobservable characteristic in our setting, it would have to be nonlinear and time-varying to explain our results.[12]

[11] There is a debate on the accounting treatment of operating leases. On the one hand, Chen et al. (2023) find that countries that introduced lease capitalization rules witnessed a decrease in employment and investment by firms using operating leases. Ma and Thomas (2022) find that, following ASU 2016-02, lessee firms decreased long-term operating leases and increased capital expenditures. On the other hand, many accounting scholars argue that it makes no difference whether leases appear on the balance sheet because equity investors, lenders, and credit rating agencies manually adjust financial ratios (e.g. El-Gazzar, 1993; Altamuro et al., 2014; Lim et al., 2017; Caskey and Ozel, 2019).

[12] Specifically, it would have to manifest itself during the first wave, only among highly levered companies; and not manifest itself either during the second wave or before the first shock.

Third, for a sub-sample of care home groups, we observe operating expenses. We find that groups with higher leverage are those that reduce costs (excluding wages and rent) most. In addition, we find that more highly levered groups have a larger decrease in liquidity (the number of days of operating expenses that can be covered by cash reserves) and in number of employees.

These results are related to the literature at the intersection of healthcare and finance. Besides the papers previously mentioned, a closely related study is that of Aghamolla et al. (2023). This uses bank stress tests as exogenous shocks to credit access for hospitals that have lending relationships with banks that have been stress-tested. It finds that following a negative credit shock quality of care decreases (in particular, both readmissions and mortality rates increase).[13]

Our results have direct implications for policy makers. Across the world, care homes were a flash-point in the COVID-19 pandemic. One-third of the US's 184,000 deaths occurred in such facilities (similar results were reported in, e.g., Canada, France). Knowing which care homes may be associated with a higher death rate when hit by a economic shock is important. Nonetheless, we should be cautious about generalizing. Although the English care home sector broadly resembles the US one in terms of demographics, funding and private equity involvement, the average English care home is only about one-half the size of the average US one; see Online Appendix 1 for more details.

Finally, a contemporaneous study uses the same economic argument that we use here to link care home cash reserves to COVID-19 *cases* (not deaths, as in our study) in the US (Begley and Weagley, 2023). The authors use financial data of individual facilities (not of the groups that own the facilities) to calculate the simple leverage described above. They find no relationship between simple measures of leverage and COVID-19 cases.[14] This mirrors our finding.

[13] See also Dranove et al. (2017), Adelino et al. (2022), Gao et al. (2023) and Online Appendix 1 (page 9).

[14] Note that US data only show COVID-19 cases, not death rates, and do not allow for an accurate measure of leverage. In addition, Begley and Weagley (2023)'s main variable (cash on hand at the facility level) may not accurately reflect the facility's overall financial condition. First, undrawn credit lines (an important form of liquidity) are not reported on balance sheets. Second, most US care homes belong to larger groups: "Ownership of Skilled Nursing Facilities: An Analysis of Newly-Released Federal Data", Office of Health Policy. Even if a facility holds little cash itself, it may have access to cash held by its parent or elsewhere in a group. These observations may explain why the paper's results are small in magnitude, and sensitive to empirical design (e.g., if we use case per resident as dependent variable or do not standardize the dependent variable, results no longer hold.)

II. DATA AND METHODS

Company Accounts in England

As pointed out by Brav (2009), Michaely and Roberts (2012), and Bernstein et al. (2019), England offers a good setting for studies on private companies because every registered company is required to provide financial accounting data to a public register and are subject to regulatory provisions equivalent to those of a public company. The U.K. Companies Act and related legislation requires all private and public companies to file annual financial statements with the same accounting standards and tax laws. However, as pointed out by Ball and Shivakumar (2005), the quality of financial reporting is generally lower for private companies, especially smaller ones. Our focus on the care home sector also means that we need to study entities that are not run for profit. Consequently, we must gather financial accounts from three different sources (see Figure 1).

First, Companies House publishes accounts for, and regulates, two for-profit legal forms (companies limited by shares and limited liability partnerships) and one non-profit legal form (companies limited by guarantee). Second, the Charity Commission regulates and publishes accounts for charities. Charities are organizations that operate for the public good and, in return, receive certain tax benefits. Charities use one of four legal forms: charitable incorporated organizations, royal charter companies, unincorporated trusts and associations, and companies limited by guarantee. Regardless of the legal form used, we refer to all entities that are registered with, and regulated by, the Charity Commission as charities. Note that when a company limited by guarantee chooses to register with the Charity Commission, it becomes subject to two regulators; we classify it as a charity. Third, the Financial Conduct Authority (FCA) regulates a range of other non-profit legal forms, of which the one relevant to this study is the 'registered society.'[15]

[15] Accounts are published at the Mutuals Public Register.

Sample Selection

We obtain data on care homes in England from the Care Quality Commission (CQC). The CQC is an independent regulator of health and adult social care; it is sponsored by and accountable to the UK Secretary of State for Health. The CQC's responsibilities include care homes. For each care home that it regulates, the CQC provides data including geography, size, service type, and Companies House and Charity registration number. We select care homes that have 'older people' as one of their service user bands. We refer to these as care homes.

We exclude care homes with less than 10 beds (N=202), those with no location identifier (N=4), and those with no data on weekly mortality (N=817). The remaining sample contains 8,760 care homes with 374,032 beds. We refer to this as the universe and present the relevant statistics in Table 1. For each of these 8,760 care homes, the CQC identifies a 'provider'. Each of these 5,136 providers reports to the CQC that it belongs to one of three categories: individual, partnership, or organization. We exclude providers that identify as individuals and partnerships (N=735), and organizations that are local government bodies (N=48). Neither of these two types of providers involves incorporated entities, so the providers do not produce usable financial accounts.

The CQC assigns a registration number to each of the remaining 4,353 incorporated entities. This allows us to find the filings (including financial accounts) that the provider makes with its primary regulator. Most of the sample (N=3,972) is registered at Companies House, the balance at the Financial Conduct Authority (FCA) (N=265) and the Charity Commission (N=116). Our main source for the financial accounts is the Financial Analysis Made Easy (FAME) database compiled by Bureau van Dijk. FAME contains data from filings made by all companies that are registered at Companies House and some of those regulated by the FCA but does not include data on the charities that are regulated only by the Charity Commission. For companies not covered by FAME, we rely on manual searches of the relevant regulator's website to find the non-machine-readable pdf documents. This sample contains 4,223 providers (operating 7,585 care homes) which we call the

broader sample. The final working sample used for regression analysis consists of 3,356 care homes operated by 1,045 providers with consolidated, audited P&L accounts (see Table 1).[16]

Identifying Provider Groups, Financial Ratios and Ownership Types

A provider may belong to a larger corporate group. In this case the relevant unit of study becomes the corporate group rather than the provider. This assertion reflects two conventional assumptions. One is that a liquid and frictionless internal capital market exists within a corporate group; the other is that the larger group can use its combined resources to support any of its subsidiaries (Stein, 1997). We discuss this point further, with examples, in Online Appendix 2.

We define a "corporate group" as "the level where third-party lenders have first claim on the group's cash flows." In most cases, a group simply captures all the entities that are ultimately controlled by a single parent company. The parent company then publishes consolidated financial accounts that includes the results of all the subsidiaries it owns. The private equity investment model presents a particular issue when it comes to defining corporate groups. A private equity firm may control 10 or more "portfolio companies." Each of these portfolio companies is controlled by the same private equity firm. However, a private equity firm typically arranges for each of its portfolio companies to borrow and to operate on a standalone basis, independently of other portfolio companies that are under common control. For a private equity controlled company we therefore define the group as the portfolio company (consolidated accounts of its 'topco' holding company).

< Figure 1 here >

< Table 1 here >

Most providers in our sample are closely held by families or small groups of individuals. Such owners face relatively little pressure from outside stakeholders, such as third-party investors or lenders, to present a consolidated financial picture. This means that even where several providers

[16] The gap includes 61 for-profit providers not in FAME and 69 non-profit providers with fewer than 50 beds.

share common ownership and control, the owners in question have less reason to organize those providers under a single parent company that files consolidated accounts.

We assign each provider to one of three group types. (i) A "standalone" provider is one that is not part of any larger group. (ii) A "consolidated group" matches the conventional definition of a corporate group described above. All private equity-owned groups and some (mostly larger) unquoted groups fall into this category. (iii) A "non-consolidated group" is a group of companies that are under common control but do not share a single parent company that files consolidated accounts. Figure 2 illustrates the relationships among different actors, from individual care homes up to the ultimate owners. Online Appendix Figure A.1 provides further discussion.

< Figure 2 here >

We identify and map provider groups by triangulating three data sources. (i) The CQC allocates 862 providers to 202 'brands.' Although the CQC's brand concept does not purport to address group ownership structures, or to identify any relevant parent companies, a 'brand' association indicates an ownership link of some kind between a group of providers. (ii) For the 4,063 providers covered by FAME, we can use the entries for "Global Ultimate Owner" and directors' names. (iii) For all providers, we can manually inspect the notes to the accounts which usually indicate group and ownership status.

Financial ratios. For standalone providers, we calculate financial ratios based on the provider's own accounts. For consolidated groups, we use the consolidated accounts of the parent company. For nonconsolidated groups, we aggregate the accounts of providers that belong to the group. Finally, to ensure that the accounts we use are unaffected by the pandemic, we apply a cut-off date for financial accounts of March 31, 2020. That is, we use the accounts for the year ending closest to, but no later than, March 31, 2020.

Ownership types. We introduce five ownership categories. First, we identify PE-held groups using Capital IQ, Pitchbook and published reports of PE firm involvement in the sector, and relevant

filings.[17] Online Appendix 2 provides more detail on this part of the process. Second, if all directors share the same surname, the provider is identified as a family firm. Third, we label the remaining for-profit providers 'other for profit'.[18] Fourth, we label any provider registered with the Charity Commission a 'charity'. The fifth group, consisting almost entirely of registered societies under the FCA, is labelled 'other non-profit'.[19] We assign one of these five ownership types to each provider group on the following basis: For consolidated groups it reflects the ownership type of the parent company ('Topco'). As nonconsolidated groups consist almost exclusively of for-profit providers, we follow the pattern described above: PE, family firm, or other for-profit. The standalone provider's ownership type is simply that of the provider.

Private Equity, charity, and other non-profit sectors operate roughly similar proportions (8% to 11%) of the 345k total beds operated by incorporated providers. Family firms operate nearly twice as many beds as any of those three categories (17% of the total). The remaining beds (55% of the total) are 'Other for profit'.[20] Online Appendix 1 provides some context on how the ownership of our sample compares with similar US-based studies.

Control Variables from the CQC and the ONS

The nursing home market in England is highly fragmented. The largest group (HC-One) operates 258 care homes with 15,673 beds (4.2% of all beds). The top 50 groups account for more than one-third of all the beds (38%). At the other end of the distribution, 3,023 groups that manage fewer than 100 beds account for 30% of total capacity.[21]

CQC data include an indicator variable for the services provided by each care home: nursing services, dementia services, and other non-elderly services. In addition, we use CQC ratings for care

[17] See, e.g., Kotecha (2019), Smith (2018).
[18] This category includes only four groups that are publicly listed, of which three are US-based.
[19] The exceptions are BUPA and Somerset Care.
[20] Online Appendix 2 describes how we identify provider groups and classify ownership types. Online Appendix 3 describes how we construct financial ratios.
[21] See Online Appendix Table A.7 for the list of the largest 20 groups (group size, ownership type, and structure type in Panel A; death rate, care quality rating, and group leverage in Panel B) and Table A.8 for the list of the largest PE-controlled groups (TopCo, PE Sponsor, group size and death rate).

homes.[22] The overall ratings fall into four bands. As of June 2020, in our working sample, 1.3% of care homes were rated as Inadequate, 17.4% as Requires Improvement, 74.6% as Good, and 6.7% as Outstanding. In addition to these overall ratings, the CQC also rates five other characteristics of each home: whether it is caring, effective, responsive, safe, and well led. We create a dummy variable called 'bad rating' if the safe category is rated either Inadequate or Requires Improvement.

England has 343 Local Authorities (LAs) for administrative purposes. LAs range in population size from 2,259 (Isles of Scilly) people to 1,554,636 (Kent County Council) and in geographical size from 3 square kilometers (City of London) to 5,014 (Northumberland). London is divided into 33 LAs (Westminster, Camden, Ealing, City of London). Our working sample contains 12 care homes on average in each LA, with half of the LAs having between 6 and 14 care homes.

We measure the concentration of care homes in an LA using the Herfindahl-Hirschman index. We also obtain the population density of each LA from the ONS.[23] Finally, we define 'hospital pressure' in each LA as Covid deaths in hospitals per 1,000 inhabitants, as reported by the ONS.

Measuring Death Rates

The CQC provided us with data on COVID-19 deaths, sub-classified as confirmed and suspected. The data are per week per care home from April 10th, 2020, the date at which the CQC started to track this information. The CQC states that 'the inclusion of a death in the published figures as involving COVID-19 is based on the statement of the care home provider (…) These are notifications of deaths of people in care of the provider, who is required to inform the CQC of deaths of those under their care regardless of the cause of death or where the death occurred.'

This is important because it implies that, in principle, the provider must notify the CQC of the death of a resident, whether or not the death occurred in the care home that the provider operates. Thus, if a care home resident is discharged to a hospital and passes away at the hospital, our data should

[22] The CQC inspects each nursing home at intervals that range from 6 to 30 months, depending on the most recent rating. The CQC assigns ratings that cover individual aspects of the service provided along with an overall rating.
[23] Table P04UK 2011 Census: Population density, local authorities in the United Kingdom.

record this as a care home death. The number of deaths then needs to be scaled. Although we do not know the number of residents in each care home at each point in time, we have a proxy for the total number of beds in a care home, whether occupied or not. When registering, a care provider reports the 'Max Service Users'. We use this variable to scale the number of deaths.

We also obtain from the CQC the number of deaths in each care home in 2019, which we also scale by 'Max Service Users.' By adding the death rate over the same period in the previous year, we partly correct for noise in the denominator. An alternative would be to use the growth in death rates from one year to the next; however, many care homes had no deaths in 2019.

III. KEY VARIABLES AND DESCRIPTIVE ANALYSIS

Measuring Leverage

In the literature, debt is usually defined as the sum of short- and long-term debt (e.g., Michaely and Roberts, 2012; Bernstein et al., 2019).[24] Leverage scales debt by total assets. Total assets would ideally be measured at both book and market value, but since only four firms in our sample are quoted we only use book value leverage. The nature of the sector we study requires one key adjustment to the standard definition of leverage: the impact on reported balance sheets of operating leases. Under the accounting standards that most companies in our sample follow (FRS102), when a company uses an operating lease to rent a care home, it reduces both the asset side (because it did not have to buy the care home) and the liability side of its balance sheet (because it had to raise neither debt nor equity to buy the care home). This creates an inconsistency between groups that own the care homes they operate and those that rent homes from a third party. It therefore becomes necessary to capitalize operating leases, that is, to estimate the value of the care homes being leased and add this amount to both the debt figure and the Total Asset figure.

There are two ways to adjust a balance sheet to reflect operating leases. The first way involves computing the present value of future cash flows under both an existing lease contract and any

[24] We use FAME variables "Short Term Loans & Overdrafts" plus "Long Term Debt".

likely future extensions of it. New accounting rules use this approach. They introduce the concept of a "Right of Use" (ROU) asset, together with an offsetting liability.

However, calculating the ROU asset and the associated liability requires both judgement (e.g., assessing likelihood of future extensions) and data (regarding possible future extensions) that are not available. That means an ROU asset and the associated liability can only be accurately calculated by the company in question.[25] Furthermore, because calculating an ROU asset and associated liability imposes additional costs both GAAP and IFRS chose not to make this new requirement universal: small companies are exempt. Most companies in our sample are small and therefore exempt. As a result, we need an alternative way to adjust balance sheets for operating leases.

We use a second, simpler way to adjust balance sheets for operating leases: we apply a multiple to annual operating lease expenses. This creates an asset and a liability that are close to what would be on the company's balance sheet if it had either (a) bought and now owned the physical asset or (b) self-reported an accurate ROU asset and liability.

Two of the biggest lessors of care homes in the UK are quoted REITs called Impact Healthcare and Target Healthcare. These REITs report the fair market value of care homes on their own balance sheets; and the lease rental income that they receive from care home operators. Dividing the former by the latter produces a multiple of 13. We therefore take the FAME data item called 'Land & Building or Property Rents & Other' – which we simply refer to as 'rent' -- and multiply it by 13. We then add this amount to both debt and to Total Assets.

Six large groups in our sample have adopted the new accounting standards that address the operating lease issue. These new standards require users to account for both operating leases and a corresponding asset on the balance sheet, as described above. To put these groups on the same basis

[25] In 2020 one of the leading global accounting firms wrote: "At first sight, the definition [of a lease under IFRS 16] looks straightforward. But, in practice, it can be challenging to assess the various parts of this definition. In particular, the determination of the lease term can be a significant judgement in applying IFRS 16." (PwC, In depth – A look at current financial reporting issues. TIAG perspectives on lease term under IFRS 16") The fact that the IFRS 16 definition can be challenging even for insiders who have access to all the necessary private information shows how hard it is for outsiders to calculate accurate ROU-related figures.

as the rest of our sample, we reverse the accounting changes they implemented and then apply the 13 times multiple in the way already described.

Importantly, adjusting operating leases in this way requires a Profit and Loss statement (P&L). Unfortunately, submitting a P&L to Companies House is mandatory only for companies that have certain characteristics, mostly related to their size (defined in terms of turnover, assets, and employees). 24% of the groups (managing 66% of the beds in total) submitted audited P&L accounts.

The Cross Section of Leverage Ratios

Table 2 reports descriptive statistics of the leverage ratios. Panel A of Table 2 shows the distribution of the four different leverage ratios. We note that leverage at the group level is much lower than that at the provider level. Leverage after adjusting for operating leases is usually higher.

Table 2 – Panel B shows the coefficients of correlation between the four different leverage ratios. Adjusting for operating leases changes the leverage about equally at the provider level and at the group level; in each case the correlation between the ratio before and after the adjustment is about 85%. This high correlation reflects the fact that 80% of the groups in our working sample do not have any operating leases. This is shown in Panel C: only 21% of groups have operating leases. However, it is strongly correlated with size. More than half of the groups that manage 1000 beds or more, representing half of the overall sample, use operating leases. In contrast, only 19% of the groups that manage *less* than 1000 beds have operating leases in place. For groups managing less than 100 beds, lease rental expenses, on average, represent only 0.4% of the Total Assets.[26]

< Table 2 here >

Table 2 – Panel D shows that operating leases are used by all types of owners, but it is more prevalent under PE ownership. Finally, Table 2 – Panel E shows that leverage is strongly related to the

[26] 90% of the groups for which we do not have an audited P&L have fewer than 100 beds. Therefore, we assume that these groups have no operating leases, and can then include them in our robustness analysis.

number of beds operated by the group. Groups with less than 100 beds have an average leverage ratio of 20% whereas groups operating 5000 beds or more have an average leverage ratio of 70%.

Table 2 – Panel F shows the leverage ratio distribution at the care home level broken down by ownership type. Charity-run care homes have the lowest leverage: only 48% of them have debt at all. Other non-profit, although not run for profit, have higher leverage: 18% on average. Unsurprisingly PE-controlled care homes have the highest leverage, with a median of 89% and a relatively narrow interquartile range. Family-run and other for-profit care home groups have similar leverage at about 40%, on average.

Aggregated Mortality Data

Figure 3 shows the number of deaths in England reported by the Office of National Statistics (ONS). Statistics are shown from week 12 (March 16th–22nd 2020), which is the week when death certificates started to mention COVID-19. The end date is week 60 (February 12–19, 2021), which is the last week for which we have CQC data on per care home death rates. These data are recorded weekly and are split by place of death: hospitals, care homes, and elsewhere. Importantly, care home residents who died in a hospital are added to the hospital figure in the ONS data, whereas our data add these deaths to the care home total. Conversely, the ONS data include care home deaths in all care homes that are not in our working sample.

The peak occurred in week 15 in hospitals (6,000 deaths), and one week later in care homes, with approximately 2,400 deaths. The number of deaths decreases rapidly to nearly zero by week 28. In week 23, the number of COVID-19 deaths in care homes goes below 500 and we set this week as the first week that is 'between waves.' Importantly, week 23 (the end of the first wave) coincides with the beginning of a government program to provide financial support to care homes (the £600 million Infection Control Fund). In Week 48, the number of deaths in care homes is again above 500, and we take this week as the starting week of the second wave. In week 61, this figure was again below 500. We then define wave two as spanning weeks 48–60.

< Figure 3 here >

Table 3 compares the figures from the ONS dataset with those from the CQC (corresponding to Figure 3). The number of deaths in care homes according to the ONS data is similar but slightly lower than in our sample, probably because the ONS reports only the deaths that occurred in care homes. The discrepancy is wider for the first wave because care home residents were frequently 'discharged' into hospitals. It should be noted that the seven-week duration of the first wave saw at least twice as many deaths as the following six-month period (between waves) did. The second wave is twice as long as the first wave but saw fewer deaths in total.

< Table 3 here >

During the first wave, 55% of the care homes in the working sample had at least one resident who died of COVID-19. Conditional on at least one death occurring, death rates vary greatly across care homes. Online Appendix Figure A.3 shows in the first wave two histograms of the standardized death rate among care homes with at least one death (working vs broader samples). We also take the natural log of the death rate and show its histogram in (online appendix) Figure A.3.

Death Rates and Key Care Home Characteristics

Table 4 – Panel A shows the death rate in each wave broken down by ownership type. During the first wave – which is when the pandemic was most severe – PE-controlled care homes stand out with a death rate that is more than 50% higher than average at 5.5%. Other non-profit comes next. The remaining ownership types have similar death rates, with family-owned care homes having the lowest death rate among the care homes with incorporated providers. PE-controlled care homes still have a higher death rate in between waves, but a lower death rate in the second wave.

The care homes excluded from the working sample are smaller and have lower death rates in the first wave (2.95% versus 4.52%). Panel B shows that size is a key determinant of death rates in each leverage category during the first wave. The size effect is less pronounced between waves and during the second wave, but the smallest care homes (those with less than 25 beds) always have

the lowest death rates. Panel B also shows that the relationship between the death rate and leverage is non-linear, stronger for larger care homes, and only significant during the first wave.

< Table 4 here >

The reason why leverage seems to matter more for large care homes may be that larger care homes face the largest shock. Small care homes seldom had COVID-19 cases, whereas larger care homes almost certainly had some. Hence, if high leverage impedes swift management actions to fight the crisis, then we should observe the highest death rates in large and highly levered care homes, and not in other types. Panel B shows the distribution of care homes by size and leverage. 210 care homes (6% of all care homes) have no leverage at all. About as many (1,083 care homes) have high leverage (above 75%). Unlevered care homes have a death rate of 2.91% during the first wave. Highly levered care homes have a death rate nearly twice as high, which is a considerable difference. We do not observe any such difference between the waves or during the second wave.

< Figure 4 here >

Figure 4 shows the time series of the main variable (mean death rates) at quarterly frequency, for four separate sub-sets of care home groups: PE-controlled (they all have leverage above 75%); and non-PE controlled with high leverage (above 75%), mild leverage (40%-75%), and low leverage (below 40%). We show that there are no clear pre-trends and see the clear spike in death rates during the first wave, with a distinct effect for highly leveraged care homes. When the second wave arrives, death rates are again higher for high-leverage homes but the magnitude is smaller.

IV. REGRESSION ANALYSIS

Regression Setting

As our dependent variable has a large cluster at zero (45% of the observations), we use a Tobit estimation method. The main specification is as follows:

$$Death\ rate_i = \beta_0 + \beta_1 * Leverage_i + \beta_2 * Ownership\ type_i + \sum \beta_k * control\ variables_i + \epsilon_i$$

Control variables include a set of home-specific variables discussed in the previous section and area-specific variables. We standardize all the continuous variables, so they have mean zero and unit standard deviation. We cluster standard errors at the group level (the level at which leverage varies). Variable definitions and construction are provided in the table description. The parameter β_1 is our main coefficient of interest: the effect of leverage on death rate.

Where Leverage Matters

In Table 5, Panel A, Specifications 1-2 show the results when we do not include leverage as a control variable. We observe that PE-controlled care homes have higher death rates. Specification 2 shows that size is an important explanatory variable. It is possible that, because larger care homes have more residents, they have a greater chance of seeing one infected person transmitting the disease to others, thereby leading to a higher death toll per resident.

We also note that local hospital pressure is highly significant. It also makes sense that care homes that cater to fragile residents – those offering dementia and nursing services – have higher death rates. Also, the death rate in the same period the previous year is highly significant, probably capturing some additional unobserved care home characteristics.

The CQC's care home quality ratings show only a weak relationship with death rates. Competitive pressure – areas with many care homes versus not – also plays no role in explaining variations in death rates. Surprisingly, population density in the area where the care home is located is also unrelated to death rates. In contrast, areas with higher ethnic minority populations and where hospitals reported more COVID-19 deaths have a higher death rate in their care homes.

Specifications 3-4 show the strong effect of leverage. Note that the effect of PE on the death rate seen in Specifications 1-2 is significantly weakened once leverage is included as a control variable. As homes owned by PE have much higher leverage compared to their counterparts, our results

suggest that care home mortality is related to PE through higher leverage. In other words, the observed negative outcomes of PE ownership occur through this leverage channel. As leverage is correlated with size, this control variable matters. The remaining control variables have no impact on the leverage effect.

< Table 5 here >

Given the persistence in our key variables (leverage, PE owned,…), we study the relationship between death rates and leverage using Propensity Score Matching and, then, in a Panel regression setting with care homes or groups fixed effects.

We conduct a propensity score matching (PSM) analysis, as in Fang et al. (2014) and Frydman and Wang (2020). The idea is to match care homes that are similar in terms of all the characteristics, except for leverage (each high-leverage care home is matched with a low leveraged one). However, care homes with above median leverage differ from those that have low leverage across each of the control variables. Hence, an important limitation of this approach in our context is that close and unique matches are not common and some of the matches are therefore loose.

Nonetheless, results in specifications 5-6 appear to be similar to those obtained with the Tobit regression analysis in specifications 3-4. Similarly, results in Panel B show that the leverage affect in Q2-2020 is observed in a panel regression setting irrespective of the level at which we set the care home fixed effect (home, provider or group). Panel B also shows that leverage is not significant in other quarters, in line with the descriptive statistics reviewed above.

Results in Panel C show that leverage has a non-linear effect. Leverage is weakly related to death rates when below 40%. In contrast, when leverage is above 75%, the partial correlation between leverage and the death rate becomes much stronger.

Where Leverage Does Not Matter

Table 6 shows the specifications for which leverage is unrelated to death rates. First, we find that if we measure leverage at the provider or brand level, leverage is unrelated to the death rate during

the first wave. This result holds even if we adjust for operating leases (specification 1). The coefficient on leverage is always nearly exactly zero. In other words, if we simply took the provider listed for each care home, as per the information provided to the public by the regulator and assigned that provider's leverage to the corresponding care home, the conclusion would be that leverage does not matter, even if we adjust for operating leases.

The same is true for the regulator's so-called 'brands'. If we calculate the aggregate leverage for all the providers that the regulator groups in a given brand and apply that leverage to each home belonging to providers in that brand, we find that leverage has no effect (specification 2). In non-tabulated results, we also find that the coefficient of leverage is near zero in specifications 1 and 2 if we do not adjust for operating leases, use other time periods (between the two waves and second wave), and use all deaths and not only COVID-19 deaths. Understanding the corporate ownership structure (the group) in which each provider sits is essential.

Specification 3 shows that if we do not make the operating lease adjustments but compute leverage at the group level, leverage is weakly related to death rates. Hence, adjusting the operating leases is crucial. Leverage plays no role in explaining death rates after the first wave (specifications 4–7).

< Table 6 here >

Channel

For a sub-sample of care homes, we can observe operating expenses, cash at hand and number of employees. We define Total Cost as the sum of "Cost of sales" and "Administration expenses", minus "Total amortization & impairment", and "Depreciation".[27] Variable costs is equal to Total

[27] We do not deduct "Other income" (FAME item IFO2) from costs because "Other income" for the care home industry in these years consists mainly of grants that the UK government provided, after the pandemic's first wave, to offset the increased costs that providers were incurring (for example, for PPE equipment and/or agency workers). Netting off these grants from costs would accurately capture the net cost to providers. However, it would understate the gross amount that providers spent (before receiving any subsidy). Consistent with our main approach to measuring leverage, we use lease-adjusted total assets to scale costs, and we measure costs at the group level. We exclude groups whose percentage change in lease-adjusted total assets is above 20% or below -20% (which indicates major events such as restructuring or M&A during 2020). We apply this filter again when conducting trend analysis. In Online Appendix Table A.13, we also show results when we scale costs by revenue rather than total assets.

Cost minus "Wages & Salaries" and "Rent." We label the residual costs 'variable costs' both for simplicity and to capture the fact that wages and rent are relatively sticky. The Variable costs category captures items such as personal protective equipment (PPE); this is the kind of spending that should decline most if our hypothesis holds.

Liquidity is defined as the number of days' worth of operating expenses and calculated as the sum of "Bank & Deposits" and "Investments (Current Assets)", divided by ("Turnover" minus "EBITDA" and "Depreciation")/365).

Table 7 shows the results from OLS regressions where the dependent variable is either the (percentage) change in liquidity, in cost ratios, or in number of employees during the year of the first wave (versus the preceding accounting year). The model used is that of specification 3 in Table 5 (with care home variables). Note that we capture leverage via a dummy variable that is one if leverage is above 75%. All the PE-controlled care home groups fall into the high leverage category, thus the coefficient for a PE-controlled group is the sum of the two coefficients (high leverage and PE).

The results show that liquidity goes down for highly leveraged groups. Total cost also goes down for highly leveraged groups and even more so if they are PE-held. However, most of the decrease in cost for PE-controlled groups comes from a decrease in wages.

Variable costs and liquidity go down much less for PE-controlled groups. This result is consistent with Lavery and Wilson (2023). They show that highly leveraged firms with PE backing had better access to capital during the COVID-19 pandemic than similarly leveraged non-PE backed firms.

The number of employees goes down for highly leveraged groups, and even more so for PE-controlled groups. The decrease in number of employees is more significant than the decrease in wages. This may imply that non-PE groups that were highly leveraged had fewer full-time employees but paid more to remaining full-time staff (possibly extra hours) or hired external temporary workers.

The fact that the main decrease in cost comes from variable costs and centers on highly leveraged non-PE controlled groups is consistent with the hypothesis that the spike in death rate observed in highly leveraged groups comes from a reduction in spending by these highly financially constrained groups. We therefore find evidence supporting the view that leverage affects death rates directly via a lack of financial flexibility in times of crisis.

< Table 7 here >

Main Sensitivity Analysis

We now assess the robustness of our findings. Table 8 – Panel A shows that our key result holds in samples other than the working sample (the universe and the sample that includes all incorporated providers with financial accounts; see Table 1). Table 8 – Panel B shows that our key result holds if we use all the deaths reported in each care home, and not just the ones related to COVID-19, and if we use the confirmed COVID-19 cases only. Panel C shows our results are robust to using the difference in death rates in the 2nd, 3rd, 4th quarter in 2020 versus the same quarter in 2019.

One advantage of our setting is that, because care homes in England are relatively homogeneous, we do not expect differences in required yields on operating leases. Therefore, using the same multiple of annual rents for all care homes is reasonable. However, the choice of multiple options could be disputed. For example, Serfling (2016) uses 10x whereas we use 13x. Panel D shows the results when we change the coefficient to 5x, 10x and 15x. Although leverage remains statistically significant overall, the coefficients here are about half of what they are in the default specification.

PE firms in the UK typically invest most of their equity into each portfolio company in the form of shareholder loan notes or similar instruments. Reasons may include (i) tax and (ii) the desire to shift operating managers' equity stake further out of the money to create so-called high-powered incentives (Phalippou (2021) Chapter 4). Non-PE owners also sometimes provide loans to their own companies. It is debatable whether such shareholder loans should be treated as debt, as is the case by default in our study and in the literature, or as equity. The rationale for excluding PE

shareholder loans from debt and therefore from leverage ratios is that unlike most third-party debt, such loans typically require minimal to no contractual cash payments; are long-term; and a lender who is a shareholder (rather than a third party) is unlikely to take legal action in case of financial distress. Shareholder loans are generally reported in FAME as one of four items: Group Loans (short-term), Group Loans (long-term), Director Loans (short-term), and Director Loans (long-term). For PE-controlled groups, however, finding the exact amount of shareholder loans requires a full reading of the annual accounts, as details are typically found only in the footnotes.

The results are shown in Table 8, Panel E. Treating shareholder loans as equity does not affect the leverage coefficient in the subsample of financial accounts. In the working sample, however, the impact is larger; the coefficient decreases from 0.30 to 0.13. Nonetheless, leverage remains statistically related to death rates at the 1% level.

Another reasonable adjustment to make when computing leverage ratios involves Total Assets. When a group has grown through acquisitions, its balance sheet includes intangible assets that reflect the difference between the price paid for assets and their book value. Accounting rules generally require these intangible assets to be amortized over time through a non-cash charge in the income statement. This process distorts the reported assets relative to the actual capital invested.[28] We adjust for this issue by replacing net intangible assets with gross intangible assets. Note that gross intangible assets are only available in the footnotes to the annual accounts and FAME does not contain the variable necessary to make this adjustment; we do it manually. Doing this has the effect of adding back all accumulated non-cash amortization charges to restore the amount invested in the asset in the first place.[29] The results are unaffected (Panel E).[30]

[28] When an acquisition has been made at a premium to book value, total assets become progressively more understated over time, relative to the original investment made. In the less common case of acquisitions made at a discount to book value, the reverse is true. Boucly et al. (2011) is one of the rare studies to acknowledge this issue.
[29] We do not adjust in the same way for depreciation expense on tangible fixed assets because tangible assets (unlike intangible ones) experience physical wear and tear, which spending on maintenance capital expenditure aims to offset.
[30] Note that care homes make significant use of tangible fixed assets. If a premium is paid in an acquisition in this sector, the premium is generally allocated to tangible fixed assets. Such assets are subsequently subject to both depreciation expense and capital expenditure: the problem that comes from amortizing intangible assets is therefore less significant in this sector than it is in sectors where intangible assets play a bigger role.

Private equity practitioners (usually) and researchers (sometimes) scale debt by an income measure such as EBITDA rather than by assets because loans are expected to be repaid out of cashflow (rather than by selling assets) – see for example the recent white paper by Brown (2021). However, scaling debt by measures of income presents significant limitations in our context, which we detail in Online Appendix 4. Even so our results are robust to using both [lease-adjusted debt/revenue] and [lease-adjusted debt/EBITDAR] ratios; see Panel F.[31]

It could be that it is not leverage that drives the effect but leases. We then construct the fraction of lease into total debt as follows: Lease/Debt = (13*rents)/(total debt + 13*rents). That is, leases are capitalized, and this value is compared to total debt including the capitalized leases. Panel G shows that the leverage effect remains after controlling for operating leases, whether we scale by Total Debt or Total Asset. However, lease intensity is not significant once we control for total leverage.

Table 2 Panel D shows that there is a large correlation between PE ownership and leverage. This may create a bad control issue, whereby the leverage variable may also absorb a lot of the variation due to PE ownership. We then split the sample across two leverage categories (high, very high) and three size categories (mid, large, very large). We omit the low leverage category because there is no PE ownership in that category. Results in Panel H show no consistent and statistically significant difference between PE and non-PE care homes in terms of death rates within each of the six groups. These results further show that holding leverage and size broadly constant, being PE-owned is not related to death rates.

Results in Panel I show that undoing the changes we made to FAME data do not affect results much (Specification 1). For providers linked by common ownership but not producing consolidated accounts, we aggregate their balance sheets to create their group leverage. If we reverse this step and keep these providers as standalone entities, the leverage reported for all providers belonging to

[31] Lease-adjusted debt is scaled either by three-years average Revenue or EBITDAR. The three years exclude the Covid-19 year (2018, 2019, 2021). We either winsorize or exclude observations with a leverage ratio above the 95th percentile. The thresholds are 3x (Revenue scaled) and 15x (EBITDAR scaled).

nonconsolidated groups changes, but the key result is unaffected (Specifications 2 and 3). In the same way, although netting cash from debt has a large effect on the coefficient of leverage, statistical significance remains (specification 4).[32]

< Table 8 here >

As mentioned above, one limit of the Propensity Score Matching approach is that close and unique matches are often not available. This claim is illustrated in Table 9 – Panel A. Naturally, we want to observe whether results are different if we focus on the subset of care homes for which there exits close and unique matches and thus the subsample for which the PSM approach is more appropriate.

If we set the maximum difference in propensity scores to 0.001, which is quite strict, and do not allow for any replacement (no redrawing of matches), we obtain 731 matches.[33] Results in Table 9 Panel B show that in this case, we do not observe any significant differences between the key characteristics of the two samples. If we relax the constraints by allowing replacements (up to three), we double the number of observations.

Results in Table 9 – Panel B show that the leverage effect is significant in the two subsamples. Our PSM results are also robust to using different thresholds (e.g., 70%, 75%, or 85%) to classify high leverage care homes (despite sample size being reduced further); see Online Appendix Table A.12.

< Table 9 here >

Trend Analysis

We now show the dynamics of the main variables to make sure pre-trends are not driving these results. Figure 5 Panel A shows that liquidity increased in 2020 except for the non-PE high leverage

[32] In the Online Appendix, we also show that the leverage effect is not driven by the largest groups (Table A.7 Panel C and Table A.9), that results are not driven by PE-controlled groups (Table A.9), and that our results remain if we change the starting and ending date of the first wave (Table A.10 Panel B), or using OLS instead of Tobit (Table A.10 Panel A). In addition, we show results for economic significance in Table A.11 and Figure A.2.
[33] Frydman and Wang (2020) use 0.005, Fang et al. (2014) use 0.001.

homes, as documented above; but we do not observe a clear increase either in the year before or the year after 2020.

< Figure 5 here >

Leverage slightly decreased in 2020 and then again in 2021, but this deleveraging is noticeable only for PE-controlled homes. This could be the result of PE-backed companies "de-levering" more after the initial wave, due to injections of capital from their shareholders. This may, in turn, explain why PE-controlled care homes had a relatively low death rate in the second wave. Panel B shows the dynamics of the different cost components when costs are scaled by total assets. Panel C shows the same thing when costs are scaled by revenue. We do not see any clear pre-trends.

V. CONCLUSION

This paper highlights challenges in measuring leverage. These apply even in the UK, where Companies House provides more financial disclosure about unquoted companies than is available in the US (albeit some of the UK financial data is not available in machine-readable form). Obtaining a reliable measure of leverage also requires identifying the full ownership structure within which each company sits, which is a non-trivial exercise. The widespread use of operating leases in some sectors adds an additional layer of complexity. Overall, constructing leverage accurately required several hundred hours of work from someone with experience in reading financial accounts.

Our results have policy implications. The CQC's regulatory approach, which focuses on the quality of care, could benefit from better addressing financial viability. It was the 2011 bankruptcy of the UK's largest care provider, the Southern Cross, that led to the 2014 Care Act. This gave the CQC a statutory duty to monitor the financial health of a few very large care providers (known as the Market Oversight Scheme). Yet the CQC does not make its findings public. Our results imply that consumers need financial information for the care home market to work efficiently. They also show that this is not simple. Financial data at the level of individual providers does not yield meaningful

information about financial health. Leverage needs to be carefully constructed for it to be a relevant variable for consumers.

Studying the relationship between death rates and ownership type is also relevant considering the global trend towards the privatization of care services. Thirty years ago, over 80% of care homes in England were operated by the state; today, the state versus private mix has been reversed. A similar situation applies in many other countries. For-profit companies may offer stronger financial incentives, have more professional management, and be better resourced, particularly if they are controlled by private equity firms. Our evidence supports this view, but the high leverage used by private equity firms (among others) seems to dent these benefits, particularly in times of crisis.

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Table 1. Sample Description

Ownership	Definition and Identification	Providers	Homes	Beds
These first two categories are out of the working sample because providers are not incorporated				
Individuals & Partnerships	Providers that self-identify as individual or partnership, thus not an incorporated entity.	735	847	22k
Government	Local government operated care homes.	48	180	7k
These two categories are not-for-profit providers (and incorporated)				
Charity	Companies with non-profit legal forms that are regulated by the Charity Commission.	265	733	32k
Other non-profit	Companies with non-profit legal forms that are not regulated by the Charity Commission and report to either the FCA (*Registered Societies)*, or to Companies House (*Companies Limited by Guarantee*).	116	549	28k
These three categories are for-profit (and incorporated)				
Private Equity	If controlled by a Private Equity firm.	86	623	37k
Family	If same last name for all the directors.	1,203	1,595	60k
Other for profit	For-profit but neither PE nor Family.	2,683	4,233	188k
Total (Universe)		5,136	8,760	374k
All incorporated providers with financial accounts (Broader sample)		4,223	7,585	340k
Providers with consolidated, audited P&L accounts (Working sample)		1,045	3,356	178k

Table 2. Computing Leverage Ratios

All statistics are based on the working sample. Panel A shows summary statistics for leverage. Panel B shows the correlations between the four leverage measures in Panel A. Panel C and Panel E provide information regarding operating leases and lease adjusted group leverage, respectively, by group size. Panel D and Panel F show summary statistics of the lease over debt ratio and lease adjusted group leverage, respectively, by ownership type. Leverage is defined as (total debt / total assets). Lease adjusted leverage is defined as (total debt + 13xleases) / (total assets + 13xleases). Lease-Debt ratio is defined as (13xleases) / (total assets + 13xleases).

Panel A: Distribution of Leverage Ratios

Percentile:	25th	50th	75th	95th	99th
1. Provider leverage	1.57%	31.69%	61.33%	139.34%	542.30%
2. Lease adjusted provider leverage	2.83%	37.00%	65.77%	136.94%	422.78%
3. Group leverage	0.00%	23.35%	47.83%	79.25%	117.60%
4. Lease adjusted group leverage	0.08%	26.97%	51.09%	82.25%	116.87%

Panel B: Correlation Matrix

	(1)	(2)	(3)	(4)
1. Provider leverage	1.00			
2. Lease adjusted provider leverage	0.88	1.00		
3. Group leverage	0.36	0.26	1.00	
4. Lease adjusted group leverage	0.33	0.39	0.84	1.00

Panel C: Operating Leases and Group Size

Group size	Operating lease divided by Total Asset				
(by bed count)	Fraction with some (>0)	Mean	Groups	Homes	Beds
10-100	16%	0.4%	307	410	15k
100-500	21%	0.2%	197	832	40k
500-1000	24%	7.0%	37	485	25k
1000-5000	67%	9.3%	18	695	41k
5000+	100%	7.6%	6	934	56k
Total	21%	1.2%	565	3,356	178k

Panel D: Operating Leases and Ownership Type

		Lease-Debt ratio			
	% Lease > 0	mean	50th prctile	75th prctile	N_ Groups
Charity	32%	27%	0%	62%	96
Other non-profit	31%	11%	0%	15%	35
Private Equity	64%	21%	10%	37%	14
Family	15%	3%	0%	0%	79
Other for profit	27%	9%	0%	1%	204
Total	28%	12%	0%	2%	428

Panel E: Lease Adjusted Group Leverage and Group Size

Group size	Lease adjusted group leverage		
(by bed count)	Fraction with some (>0)	Median	Mean
10-100	60%	4.7%	20.6%
100-500	92%	41.5%	41.0%
500-1000	97%	41.7%	40.6%
1000-5000	100%	62.7%	61.9%
5000+	100%	83.1%	69.8%
Total	76%	27.0%	30.9%

Panel F: Lease Adjusted Group Leverage by Ownership Type

	% Leverage > 0	Mean Leverage	25th prctile	50th prctile	75th prctile	Groups
Charity	48%	9.9%	0.0%	0.0%	11.3%	196
Other non-profit	64%	18.4%	0.0%	3.5%	34.3%	55
Private Equity	100%	88.6%	79.3%	88.7%	100.0%	14
Family	95%	40.3%	25.3%	38.7%	53.6%	83
Other for profit	94%	45.6%	29.4%	46.4%	62.4%	217
Total	76%	30.9%	0.1%	27.6%	51.6%	565

Table 3. COVID-19 Mortality in England

The table shows Covid-19 mortality statistics in England, in different time periods and from different data sources. Weeks start with first week of January 2020 (week 1 is from Dec 30 2019 to Jan 5 2020). Last week (week 60) is Feb 13 to 19, 2021. Mortality from CQC data is the number of Covid death notifications (confirmed plus suspected) received by CQC. Mortality from ONS data is the number of Covid deaths (by local authority and cause of death and by place of occurrence).

		CQC data		ONS data	
	Weeks	Full sample	Working sample	Care home	Hospital
Pre-Wave	12-15	n.a.	n.a.	2,027	11,823
First-Wave	16-22	15,945	8,889	11,153	16,781
Between-Waves	23-47	4,405	2,180	3,552	12,228
Second-Wave	48-60	14,333	6,749	12,360	44,171
Total	16-60	34,683	17,818	29,092	85,003

Table 4: Death Rates and Key Care Home Characteristics

The table provides statistics on death rates per care home. Panel A shows death rate by ownership type, in different waves. In Panel B, means of death rates are shown by groups that are independently and double sorted (size x leverage) from the working sample. Death rate is defined as the number of Covid death notifications (confirmed plus suspected, received by CQC) over care home size. Care home size is the number of 'max service users' (reported to CQC). Leverage is the lease adjusted group leverage ratio.

Panel A: Death Rate by Ownership Type

	#Homes	First Wave	Between Waves	Second Wave
Working Sample				
Private Equity	618	5.52	1.46	3.25
Family	306	4.36	1.21	3.79
Other for profit	1,298	4.45	1.26	4.01
Charity	658	3.85	0.79	3.70
Other non-profit	476	4.48	1.24	3.87
	3,356	4.52	1.20	3.77
Universe				
Private Equity	623	5.51	1.46	3.23
Family	1,567	3.31	0.97	3.79
Other for profit	4,188	3.55	1.19	4.01
Charity	690	3.76	0.77	3.63
Other non-profit	517	4.52	1.18	3.86
Local governments	180	3.23	0.65	3.28
Individuals/Partnerships	847	2.09	0.83	3.13
Incorporated entities, no financial data	148	2.42	0.77	2.98
	8,760	3.55	1.08	3.76

Panel B: Mean Death Rates in Care Homes by Size and Leverage in Working Sample

	Unlevered (0%)	Low (1%-40%)	Medium (40%-75%)	High (75%+)	All
First Wave					
Small (10-25)	1.64	2.18	2.26	2.91	2.23
Q2 (26-35)	2.90	2.81	2.10	2.79	2.57
Q3 (36-55)	3.13	4.37	4.41	5.15	4.54
Q4 (56-75)	3.86	5.00	4.97	6.35	5.53
Big (76-215)	4.21	6.30	5.21	6.30	5.92
All	**2.91**	**4.21**	**4.09**	**5.55**	**4.52**
Between Waves					
Small (10-25)	0.52	1.12	0.61	1.61	0.93
Q2 (26-35)	0.32	1.18	1.10	1.61	1.13
Q3 (36-55)	0.81	1.23	0.94	1.37	1.16
Q4 (56-75)	0.70	1.41	1.28	1.50	1.39
Big (76-215)	0.46	1.21	1.51	0.96	1.18
All	**0.61**	**1.25**	**1.10**	**1.36**	**1.20**
Second Wave					
Small (10-25)	0.97	3.36	2.99	2.98	2.80
Q2 (26-35)	1.94	2.96	3.62	4.46	3.33
Q3 (36-55)	3.44	4.35	4.66	3.35	4.08
Q4 (56-75)	2.76	4.03	4.15	4.12	4.06
Big (76-215)	0.64	3.08	3.76	3.39	3.38
All	**2.36**	**3.81**	**4.10**	**3.69**	**3.77**
Number of care homes	210	1,051	1,012	1,083	3,356

Table 5: Death Rates, Ownership Type, and Leverage during the First Wave

The table reports results from Tobit robust estimations for the working sample, except for specifications (5) and (6) in Panel A, which are based on a matched sample (formed by using the closest match with replacement). In panels A and C, we run a cross-sectional analysis for the first wave (Q2-2020) whilst in panel B, we run a panel analysis from Q1-2019 to Q1-2021. The main fixed effect in panel B is either the group to which the care home belongs, or the provider to which it belongs, or the care home itself. Also, in panel B, leverage is that reported at the end of the previous accounting year. In all specifications, the dependent variable is 100 times the number of confirmed or suspected Covid-19 deaths divided by 'max service users' (Home size). Ownership type categories are defined in Table 1; Leverage is group lease adjusted leverage, with values capped at 100%; "Service: Nursing" is 1 if the primary service type includes 'Home care service with nursing' and is 0 otherwise; 'Service: Dementia" is 1 if the service user band includes Dementia, and is 0 otherwise; The death rate Q2-2019 is 100 times the number of death notifications reported to CQC in Q2-2019 divided by home size; Bad rating (if the rating in the Safe category is 'Inappropriate' or "Requires improvement"); Hospital pressure is Covid deaths in hospital per 1,000 inhabitants in the local authority area. In panel C, leverage is replaced by four dummy variables that equal one if the leverage ratio is within a given range and equal zero otherwise. We standardize continuous variables to mean zero and unit standard deviation. The T-statistics are shown in parentheses. *, **, and *** indicate statistical significance at the levels of 10%, 5%, and 1%. Other control variables are: Local competition (HHI of care home sizes), Population density (persons per hectare), Ethnic minority (100*(TotalPopulation-WhiteBritish-AllOtherWhite)/TotalPopulation). Standard errors are clustered at the group level.

Panel A: Main results

	Working Sample, Tobit				Propensity Score Matching	
	(1)	(2)	(3)	(4)	(5)	(6)
Leverage			0.30***	0.22***	0.17***	0.18***
			(5.26)	(3.84)	(3.17)	(3.06)
Private Equity	0.20	0.21	-0.09	-0.00	-0.12	0.00
	(1.09)	(1.47)	(-0.54)	(-0.02)	(-0.84)	(0.00)
Family	-0.04	0.06	0.09	0.15	-0.07	0.18
	(-0.27)	(0.43)	(0.69)	(1.11)	(-0.49)	(1.20)
Charity	-0.32**	0.11	0.02	0.33**	-0.00	0.31*
	(-2.16)	(0.76)	(0.14)	(2.35)	(-0.03)	(1.66)
Other non-profit	-0.05	0.12	0.12	0.25**	0.11	0.32**
	(-0.42)	(1.09)	(0.87)	(2.08)	(0.78)	(2.34)
Home size		0.26***		0.24***		0.21***
		(6.13)		(5.96)		(4.85)
Service: Nursing		0.37***		0.38***		0.35***
		(5.14)		(5.14)		(3.63)
Service: Dementia		0.55***		0.51***		0.53***
		(5.44)		(5.31)		(4.22)
Bad rating		-0.13		-0.11		-0.02
		(-1.56)		(-1.41)		(-0.19)
Death rate Q2-2019		0.18***		0.18***		0.19***
		(4.91)		(4.94)		(5.08)
Hospital pressure		0.29***		0.30***		0.27***
		(8.10)		(8.53)		(6.13)
Pseudo R^2	0.063	0.046	0.067	0.049	0.096	0.048
Other Control variables	No	Yes	No	Yes	No	Yes
Local Authority Fixed Effects	Yes	No	Yes	No	Yes	No
Number of Observations	3356	3356	3356	3356	3334	3334

Panel B: Fixed Effects – Tobit regressions

	(1)	(2)	(3)
Leverage (baseline 2019Q1)	0.12	0.12	0.05*
	(1.25)	(1.22)	(1.82)
Leverage x 2019Q2	0.03	0.03	0.02
	(1.17)	(1.09)	(0.63)
Leverage x 2019Q3	0.02	0.02	0.02
	(0.55)	(0.49)	(0.45)
Leverage x 2019Q4	0.03	0.03	0.03
	(0.95)	(0.92)	(0.80)
Leverage x 2020Q1	0.02	0.02	0.02
	(0.78)	(0.82)	(0.62)
Leverage x 2020Q2	0.13***	0.13***	0.14***
	(3.02)	(3.15)	(4.15)
Leverage x 2020Q3	-0.03	-0.03	-0.04
	(-0.77)	(-0.91)	(-1.03)
Leverage x 2020Q4	-0.01	-0.02	-0.02
	(-0.31)	(-0.34)	(-0.46)
Leverage x 2021Q1	0.01	0.01	0.02
	(0.16)	(0.15)	(0.45)
Private Equity	-7.79***	-6.98***	-0.24***
	(-19.63)	(-18.44)	(-5.39)
Family	-1.11***	-1.05***	0.07
	(-4.76)	(-4.32)	(1.39)
Charity	0.63***	0.70***	-0.03
	(2.79)	(3.08)	(-0.60)
Other non-profit	-5.67***	-5.36***	0.13***
	(-17.71)	(-17.77)	(2.88)
Home size	-0.11***	-0.12***	-0.11***
	(-7.36)	(-5.63)	(-7.18)
Service: Nursing	1.02***	1.02***	1.03***
	(24.22)	(18.76)	(33.06)
Service: Dementia	-0.04	0.00	0.09**
	(-0.95)	(0.09)	(2.50)
Bad rating	-0.12***	-0.10**	-0.13***
	(-3.02)	(-2.08)	(-3.82)
Pseudo R^2	0.125	0.144	
P-value Chi2			0.00
Year-Quarter Fixed Effects	Yes	Yes	Yes
Local Authority Fixed Effects	Yes	Yes	Yes
Entity Fixed Effects	Group	Provider	Home (Random Effect)
Number of Observations	28073	28073	28073

Panel C: Non-linearities – Tobit regressions

	(1)	(2)
Leverage is between 1%-40%	0.44**	0.40**
	(2.38)	(2.26)
Leverage is between 40%-75%	0.51***	0.40**
	(2.77)	(2.06)
Leverage is above 75%	0.97***	0.78***
	(5.04)	(3.86)
Private Equity	-0.12	-0.05
	(-0.71)	(-0.34)
Family	0.14	0.19
	(1.07)	(1.40)
Charity	-0.03	0.30**
	(-0.18)	(2.08)
Other non-profit	0.13	0.24**
	(1.20)	(2.23)
Home size		0.24***
		(6.05)
Service: Nursing		0.38***
		(5.01)
Service: Dementia		0.53***
		(5.29)
Bad rating		-0.11
		(-1.43)
Death rate Q2-2019		0.18***
		(4.90)
Hospital pressure		0.29***
		(8.27)
Pseudo R^2	0.067	0.049
Other Control variables	No	Yes
Local Authority Fixed Effects	Yes	No
Number of Observations	3356	3356

Table 6: When Leverage does not matter

This Table runs the same regressions as Table 5 Specification 3 (including care home variables). The difference is that death rates are measured either during the first wave, in between the two waves, or during the second wave; death rates may be computed with only COVID-19 deaths or with all deaths; and leverage may be computed at the provider, brand or group level, and be either adjusted for operating leases or not.

Which Wave?	First	First	First	Between	Between	Second	Second
Death type:	COVID	COVID	COVID	COVID	All	COVID	All
Leverage level:	Provider	Brand	Group	Group	Group	Group	Group
Lease adjustment:	Yes	Yes	No	Yes	Yes	Yes	Yes
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Leverage	-0.00	-0.01	0.08	0.10	0.04	0.05	0.05
	(-0.07)	(-0.22)	(1.48)	(1.25)	(0.95)	(1.00)	(1.49)
Private Equity	0.13	0.14	0.03	-0.06	-0.25***	-0.23**	-0.20***
	(1.01)	(0.99)	(0.22)	(-0.29)	(-3.56)	(-2.26)	(-3.02)
Family	0.04	0.04	0.05	0.20	-0.04	0.03	-0.00
	(0.37)	(0.34)	(0.44)	(0.96)	(-0.46)	(0.21)	(-0.04)
Charity	0.01	0.00	0.11	-0.15	-0.12*	0.09	0.08
	(0.10)	(0.01)	(0.82)	(-0.82)	(-1.85)	(0.66)	(0.89)
Other non-profit	0.09	0.10	0.13	0.14	0.03	0.07	0.05
	(0.86)	(0.83)	(1.13)	(0.82)	(0.41)	(0.58)	(0.50)
Home size	0.25***	0.26***	0.25***	0.27***	-0.03	0.10***	0.00
	(6.34)	(6.52)	(6.15)	(3.54)	(-1.24)	(2.96)	(0.11)
Service: Nursing	0.33***	0.33***	0.33***	0.09	0.48***	0.09	0.26***
	(4.84)	(4.81)	(4.89)	(0.72)	(10.09)	(1.20)	(5.28)
Service: Dementia	0.50***	0.50***	0.48***	0.20	0.08*	0.46***	0.21***
	(5.32)	(5.30)	(5.23)	(1.48)	(1.70)	(5.40)	(4.06)
Bad rating	-0.12	-0.12	-0.12	-0.42***	-0.21***	-0.10	-0.10**
	(-1.40)	(-1.41)	(-1.37)	(-3.27)	(-5.35)	(-1.26)	(-2.41)
Death rate Q2-2019	0.17***	0.17***	0.17***	0.28***	0.34***	0.16***	0.22***
	(4.74)	(4.74)	(4.81)	(4.38)	(12.13)	(4.62)	(9.71)
Pseudo R^2	0.089	0.089	0.090	0.086	0.123	0.059	0.076
LA Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	3356	3356	3356	3356	3356	3356	3356

Table 7: Leverage, Cost and Liquidity

This Table runs the same regressions as specification 3 of Table 5 (including care home variables) but the dependent variables are either (1) liquidity, (2) Total Cost, (3) Wage, (4) Rent, (5) Variable costs, or (6) number of employees. Total Cost is equal to the sum of "Cost of sales" and "Administration expenses", minus "Total amortization & impairment", and "Depreciation". Variable costs is equal to Total Cost minus "Wage" and "Rent." Cost-related variables, Total Cost, Wage, Rent and Variable Costs, are scaled by lease-adjusted total assets. Liquidity is as defined in Begley and Weagley (2023): number of days' worth of real operating expenses: the sum of "Bank & Deposits" and "Investments (Current Assets)", divided by ("Turnover" minus "EBITDA" and "Depreciation")/365). The % change is measured from the financial year ending closest to but no later than March 31 2020; to the following financial year. High leverage is a dummy variable equal to the value of one if leverage is at least 75% and zero otherwise.

% Change in:	Liquidity	Total Cost	Wage	Rent	Variable Costs	Employees
	(1)	(2)	(3)	(4)	(5)	(6)
High leverage (>75%)	-0.84**	-0.27	-0.06	-0.14	-0.52***	-0.41*
	(-2.35)	(-1.53)	(-0.32)	(-1.05)	(-3.09)	(-1.83)
Private Equity	0.51	-0.14	-0.46	-0.03	0.23	-0.26
	(1.29)	(-0.44)	(-1.42)	(-0.07)	(1.37)	(-0.72)
Family	-0.32	-0.33*	-0.24	0.04	-0.28	-0.25
	(-1.56)	(-1.93)	(-1.48)	(0.27)	(-1.59)	(-1.59)
Home size	0.04	-0.15***	-0.13***	0.11**	-0.13***	-0.03
	(0.87)	(-3.32)	(-2.87)	(2.18)	(-3.11)	(-0.86)
Service: Nursing	-0.13	-0.05	-0.10	-0.07	-0.01	-0.34***
	(-1.23)	(-0.60)	(-1.29)	(-0.96)	(-0.05)	(-3.01)
Service: Dementia	0.14*	0.07	0.05	0.28*	-0.03	-0.00
	(1.74)	(0.83)	(0.62)	(1.96)	(-0.37)	(-0.04)
Bad rating	0.00	0.11	0.09	-0.08	0.15*	0.05
	(0.04)	(1.40)	(1.09)	(-1.06)	(1.94)	(0.69)
2019 Q2 death rate	0.02	-0.02	-0.02	-0.00	-0.02	-0.02
	(0.79)	(-0.72)	(-0.62)	(-0.13)	(-0.74)	(-0.52)
R^2	0.367	0.337	0.359	0.229	0.306	0.405
LA Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1705	1705	1705	1705	1705	1592

Table 8: Robustness

This Table runs the same regressions as Table 5. When showing results on the universe (Panel A), two control variables are added: a dummy variable for whether the care home is run by a local government (1/0) and a dummy variable for whether the care home is run by an individual or partnership (1/0); see Table 1 for definitions. We assume that leases are zero for groups with no P&L, and zero leverage for care homes owned by local governments and individuals/partnerships. Panel A shows regression results in different samples. Panel B shows results with all death causes (COVID-19 or not) and results with confirmed COVID-19 cases only. Panel C reports OLS results when using the change in quarterly death rate in 2020, compared with the same quarter in 2019, as the dependent variable. Panel D reports results with different lease multiples. Panels E and I report results when we change the data treatment: treatment of shareholder loans and intangible assets, undoing corrections of FAME data, reclassifying non-consolidated groups (as consolidated groups or standalones), and using net debt. Panel F shows results with alternative scaling measures for leverage. Panel G adds lease intensity as a control variable. Panel H shows results within sub-samples (by leverage and size).

Panel A: Different Samples

	Universe Includes not incorporated providers			Broader Sample All incorporated providers with financial accounts		
	(1)	(2)	(3)	(4)	(5)	(6)
Leverage		0.15***			0.15***	
		(4.38)			(4.38)	
Leverage 1%-40%			0.15*			0.15*
			(1.83)			(1.80)
Leverage 40%-75%			0.26***			0.25***
			(3.13)			(2.98)
Leverage above 75%			0.41***			0.41***
			(3.81)			(3.80)
Private Equity	0.17	-0.00	0.00	0.18	0.01	0.01
	(1.13)	(-0.03)	(0.01)	(1.19)	(0.05)	(0.06)
Family	0.08	0.14**	0.14**	0.09	0.15**	0.15**
	(1.21)	(2.09)	(2.10)	(1.36)	(2.24)	(2.25)
Charity	0.13	0.25**	0.22**	0.19*	0.31***	0.28**
	(1.14)	(2.24)	(1.98)	(1.74)	(2.90)	(2.58)
Other non-profit	0.35***	0.39***	0.40***	0.35***	0.39***	0.40***
	(2.95)	(3.75)	(3.59)	(2.96)	(3.79)	(3.62)
Home size	0.38***	0.36***	0.36***	0.36***	0.33***	0.33***
	(10.42)	(9.77)	(9.77)	(9.96)	(9.33)	(9.35)
Service: Nursing	0.57***	0.56***	0.56***	0.57***	0.56***	0.56***
	(10.10)	(10.13)	(10.03)	(9.78)	(9.82)	(9.73)
Service: Dementia	0.43***	0.41***	0.41***	0.43***	0.40***	0.41***
	(6.87)	(6.67)	(6.66)	(6.26)	(6.08)	(6.08)
Bad rating	0.04	0.05	0.05	0.04	0.04	0.04
	(0.77)	(0.90)	(0.87)	(0.57)	(0.68)	(0.65)
Death rate Q2-2019	0.14***	0.14***	0.14***	0.15***	0.14***	0.14***
	(5.78)	(5.76)	(5.74)	(5.65)	(5.63)	(5.60)
Local governments	0.30	0.49**	0.50**			
	(1.30)	(2.02)	(2.06)			
Individuals/Partnerships	-0.11	0.06	0.09			
	(-1.13)	(0.64)	(0.80)			
Pseudo R^2	0.089	0.090	0.090	0.087	0.089	0.089
LA Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	8760	8760	8760	7585	7585	7585

Panel B: All Death Causes

	All deaths		Confirmed COVID-19 deaths	
	Working Sample	Broader Sample	Working Sample	Broader Sample
	(1)	(2)	(3)	(4)
Leverage	0.14***	0.08***	0.25***	0.16***
	(4.60)	(4.21)	(4.48)	(3.82)
Private Equity	-0.14**	-0.12**	-0.24**	-0.05
	(-2.57)	(-1.98)	(-2.20)	(-0.46)
Family	0.18**	0.15***	0.15	0.15*
	(2.37)	(4.13)	(1.09)	(1.83)
Charity	0.10	0.06	0.22*	0.31***
	(1.31)	(0.99)	(1.74)	(2.74)
Other non-profit	0.10	0.11**	0.18	0.42***
	(1.56)	(2.23)	(1.42)	(3.59)
Home size	0.09***	0.11***	0.27***	0.38***
	(3.48)	(5.05)	(6.30)	(8.84)
Service: Nursing	0.42***	0.53***	0.32***	0.56***
	(9.27)	(15.69)	(3.55)	(7.86)
Service: Dementia	0.30***	0.23***	0.38***	0.42***
	(6.12)	(6.48)	(3.56)	(5.11)
Bad rating	-0.08*	0.02	-0.02	0.09
	(-1.84)	(0.61)	(-0.18)	(1.26)
Death rate	0.21***	0.19***	0.20***	0.16***
Q2-2019	(9.00)	(11.38)	(4.66)	(5.09)
Pseudo R^2	0.095	0.079	0.094	0.084
LA Fixed Effects	Yes	Yes	Yes	Yes
Number of Observations	3356	7585	3356	7585

Panel C: Changing Dependent Variable -- Difference in Death Rates 2020 vs Same Quarter in 2019

Which quarter(s)?	2020Q2 vs 2019Q2		2020Q3 vs 2019Q3		2020Q4 vs 2019Q4	
Sample:	Working	Broader	Working	Broader	Working	Broader
	(1)	(2)	(3)	(4)	(5)	(6)
Leverage	0.10***	0.05***	-0.03	0.00	-0.03	-0.01
	(3.39)	(2.84)	(-1.41)	(0.26)	(-1.10)	(-1.02)
Private Equity	-0.12**	-0.09**	-0.02	-0.08**	-0.07	-0.13**
	(-2.29)	(-1.99)	(-0.60)	(-2.40)	(-1.13)	(-2.24)
Family	0.17**	0.09***	-0.04	-0.02	-0.11	-0.06*
	(2.25)	(2.66)	(-0.67)	(-0.71)	(-1.47)	(-1.84)
Charity	0.09	0.04	-0.02	-0.01	0.01	0.02
	(1.38)	(0.81)	(-0.56)	(-0.43)	(0.19)	(0.44)
Other non-profit	-0.00	-0.01	-0.00	0.02	-0.13*	-0.10*
	(-0.05)	(-0.15)	(-0.12)	(0.48)	(-1.79)	(-1.67)
Home size	0.08***	0.09***	0.01	0.01	0.00	0.01
	(3.50)	(5.16)	(0.77)	(0.77)	(0.12)	(0.95)
Service: Nursing	0.03	0.10***	-0.10***	-0.08***	-0.33***	-0.24***
	(0.52)	(3.03)	(-3.49)	(-3.39)	(-6.93)	(-7.79)
Service: Dementia	0.31***	0.22***	0.04	0.06**	0.07	0.04
	(5.95)	(5.99)	(1.30)	(2.54)	(1.56)	(1.51)
Bad rating	-0.08	0.04	-0.05*	0.00	-0.08**	-0.05*
	(-1.60)	(1.10)	(-1.67)	(0.20)	(-2.04)	(-1.70)
R^2	0.152	0.096	0.098	0.043	0.127	0.067
LA Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	3240	7248	3240	7248	3240	7248

Panel D: Changing Lease Multiples

Lease Multiple:	5x	5x	10x	10x	15x	15x
Sample:	Working	Broader	Working	Broader	Working	Broader
	(1)	(2)	(3)	(4)	(5)	(6)
Leverage	0.16***	0.13***	0.18***	0.14***	0.19***	0.14***
	(2.73)	(3.57)	(3.29)	(3.93)	(3.63)	(4.11)
Private Equity	-0.02	0.02	-0.03	0.02	-0.04	0.01
	(-0.16)	(0.15)	(-0.26)	(0.11)	(-0.33)	(0.09)
Family	0.10	0.13*	0.12	0.14**	0.12	0.14**
	(0.86)	(1.96)	(1.00)	(2.07)	(1.07)	(2.12)
Charity	0.20	0.29***	0.21*	0.29***	0.21*	0.29***
	(1.50)	(2.67)	(1.66)	(2.73)	(1.72)	(2.75)
Other non-profit	0.18	0.38***	0.19	0.38***	0.19	0.38***
	(1.51)	(3.55)	(1.60)	(3.64)	(1.64)	(3.66)
Home size	0.24***	0.34***	0.24***	0.34***	0.24***	0.34***
	(6.05)	(9.58)	(6.04)	(9.55)	(6.05)	(9.53)
Service: Nursing	0.34***	0.56***	0.34***	0.56***	0.34***	0.56***
	(4.98)	(9.81)	(5.03)	(9.82)	(5.05)	(9.83)
Service: Dementia	0.47***	0.41***	0.47***	0.40***	0.47***	0.40***
	(5.15)	(6.14)	(5.15)	(6.12)	(5.14)	(6.12)
Bad rating	-0.11	0.04	-0.11	0.04	-0.10	0.04
	(-1.31)	(0.64)	(-1.27)	(0.65)	(-1.25)	(0.66)
Death rate Q2-2019	0.17***	0.14***	0.17***	0.14***	0.17***	0.14***
	(4.76)	(5.60)	(4.76)	(5.59)	(4.76)	(5.59)
Pseudo R^2	0.090	0.088	0.091	0.089	0.091	0.089
LA Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	3356	7585	3356	7585	3356	7585

Panel E: Changing Treatment of Shareholder Loans and Gross Intangible Assets

Shareholder Loans Treated as Equity:	Yes	Yes	No	No	Yes
Type of Intangible Assets:	Net	Net	Gross	Gross	Gross
Sample:	Working	Broader	Working	Broader	Working
	(1)	(2)	(3)	(4)	(5)
Leverage	0.13**	0.14***	0.21***	0.15***	0.12**
	(2.49)	(4.38)	(3.98)	(4.35)	(2.31)
Private Equity	0.05	0.04	-0.08	-0.00	0.05
	(0.35)	(0.23)	(-0.63)	(-0.03)	(0.33)
Family	0.09	0.14**	0.13	0.15**	0.09
	(0.80)	(2.14)	(1.10)	(2.23)	(0.77)
Charity	0.15	0.28***	0.24**	0.31***	0.14
	(1.18)	(2.69)	(1.98)	(2.88)	(1.10)
Other non-profit	0.16	0.37***	0.21*	0.39***	0.15
	(1.36)	(3.54)	(1.75)	(3.80)	(1.33)
Home size	0.24***	0.33***	0.24***	0.33***	0.24***
	(6.08)	(9.43)	(6.07)	(9.35)	(6.09)
Service: Nursing	0.34***	0.56***	0.34***	0.56***	0.34***
	(4.96)	(9.81)	(5.04)	(9.85)	(4.97)
Service: Dementia	0.48***	0.41***	0.46***	0.40***	0.48***
	(5.19)	(6.11)	(5.14)	(6.07)	(5.18)
Bad rating	-0.11	0.04	-0.10	0.04	-0.11
	(-1.30)	(0.65)	(-1.22)	(0.68)	(-1.31)
Death rate Q2-2019	0.17***	0.14***	0.17***	0.14***	0.17***
	(4.77)	(5.60)	(4.80)	(5.63)	(4.77)
Pseudo R^2	0.090	0.089	0.091	0.089	0.090
LA Fixed Effects	Yes	Yes	Yes	Yes	Yes
Number of Observations	3356	7585	3356	7585	3356

Panel F: Alternative Scaling Measure for Leverage

	Winsorize outliers		Exclude outliers	
Lease-adjusted debt scaled by:	Revenue	EBITDAR	Revenue	EBITDAR
	(1)	(2)	(3)	(4)
Leverage	0.09*	0.08*	0.10*	0.13**
	(1.80)	(1.88)	(1.74)	(2.12)
Private Equity	0.20	0.13	0.06	-0.02
	(1.57)	(0.88)	(0.81)	(-0.23)
Family	0.12	0.10	0.11	0.07
	(1.02)	(0.88)	(0.89)	(0.53)
Charity	0.19*	0.07	0.21*	0.23**
	(1.71)	(0.55)	(1.94)	(2.06)
Other non-profit	0.13	0.13	0.33**	0.15
	(0.85)	(0.86)	(2.27)	(0.91)
Home size	0.24***	0.25***	0.26***	0.26***
	(5.75)	(5.74)	(5.70)	(5.59)
Service: Nursing	0.34***	0.33***	0.38***	0.39***
	(4.51)	(4.50)	(4.58)	(4.91)
Service: Dementia	0.46***	0.48***	0.43***	0.46***
	(4.39)	(4.48)	(4.07)	(3.93)
Bad rating	-0.17*	-0.18*	-0.16	-0.21*
	(-1.79)	(-1.91)	(-1.57)	(-1.94)
2019 Q2 death rate	0.18***	0.18***	0.20***	0.17***
	(4.08)	(4.12)	(3.98)	(3.75)
Pseudo R^2	0.096	0.096	0.101	0.100
LA Fixed Effects	Yes	Yes	Yes	Yes
# Observations	2788	2788	2524	2411

Panel G: Lease intensity versus Leverage

	(1)	(2)	(3)	(4)
Lease / Debt	0.11***	0.07*		
	(3.15)	(1.68)		
Lease / Total Asset			0.07*	-0.00
			(1.80)	(-0.03)
Leverage		0.14**		0.21***
		(2.31)		(3.11)
Private Equity	0.09	-0.03	0.17	-0.06
	(0.71)	(-0.25)	(1.22)	(-0.44)
Family	0.09	0.12	0.10	0.13
	(0.80)	(0.97)	(0.85)	(1.06)
Charity	0.04	0.19*	0.06	0.24**
	(0.39)	(1.67)	(0.54)	(1.99)
Other non-profit	0.07	0.14	0.14	0.21*
	(0.66)	(1.31)	(1.32)	(1.76)
Home size	0.24***	0.23***	0.25***	0.24***
	(5.95)	(5.85)	(6.07)	(6.04)
Service: Nursing	0.31***	0.31***	0.33***	0.34***
	(4.51)	(4.63)	(4.85)	(4.99)
Service: Dementia	0.48***	0.46***	0.50***	0.46***
	(4.86)	(4.85)	(5.30)	(5.15)
Bad rating	-0.12	-0.11	-0.11	-0.10
	(-1.37)	(-1.33)	(-1.27)	(-1.22)
Death rate Q2-2019	0.18***	0.18***	0.17***	0.17***
	(4.73)	(4.79)	(4.73)	(4.84)
Pseudo R^2	0.091	0.092	0.090	0.091
LA Fixed Effects	Yes	Yes	Yes	Yes
Number of Observations	3147	3147	3356	3356

Panel H: Regression analysis within sub-samples (by leverage and size)

Leverage:	75%-85%			85%-100%		
Size:	10-50	50-70	>70	10-50	50-70	>70
	(1)	(2)	(3)	(4)	(5)	(6)
Private Equity	0.73	-0.78***	1.03**	0.31	-0.13	0.36**
	(1.22)	(-3.30)	(2.40)	(0.65)	(-0.69)	(2.35)
Home size	0.58*	-0.26	-0.04	1.16**	1.30***	0.14
	(1.83)	(-0.64)	(-0.26)	(2.30)	(3.39)	(0.74)
Service: Nursing	0.64*	-0.30	-0.08	-0.15	0.39	-0.14
	(1.88)	(-1.10)	(-0.22)	(-0.40)	(1.09)	(-0.37)
Service: Dementia	0.45*	-0.22	5.65***	0.32	0.80*	0.45**
	(1.86)	(-0.77)	(8.94)	(0.68)	(1.77)	(2.09)
Bad rating	0.29	0.74***	0.08	-0.35	-0.03	-0.38***
	(0.58)	(4.59)	(0.17)	(-0.67)	(-0.24)	(-3.24)
2019 Q2 death rate	-0.32*	0.60***	0.20	0.21	0.20**	0.15
	(-1.77)	(2.93)	(0.96)	(1.15)	(2.12)	(0.73)
Pseudo R^2	0.290	0.397	0.363	0.404	0.330	0.427
LA Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
# Observations	187	143	94	186	278	195

Panel I: Change Data Treatment

Adjustment:	Undo FAME changes	Keep commonly owned as standalone		Netting cash from debt	
Sample:	Working	Working	Broader	Working	Broader
	(1)	(2)	(4)	(3)	(5)
Leverage	0.19***	0.22***	0.16***	0.19***	0.13***
	(3.80)	(4.01)	(4.94)	(3.51)	(3.92)
Private Equity	-0.04	-0.06	-0.01	-0.03	0.03
	(-0.32)	(-0.50)	(-0.05)	(-0.26)	(0.23)
Family	0.10	0.13	0.14**	0.13	0.14**
	(0.92)	(1.11)	(2.15)	(1.09)	(2.16)
Charity	0.20*	0.24**	0.30***	0.21*	0.28***
	(1.70)	(1.99)	(2.92)	(1.74)	(2.64)
Other non-profit	0.20*	0.21*	0.38***	0.20*	0.39***
	(1.70)	(1.76)	(3.74)	(1.71)	(3.58)
Home size	0.24***	0.24***	0.33***	0.24***	0.33***
	(6.05)	(6.07)	(9.42)	(6.04)	(9.31)
Service: Nursing	0.34***	0.34***	0.56***	0.34***	0.56***
	(4.97)	(4.99)	(9.80)	(4.95)	(9.77)
Service: Dementia	0.46***	0.46***	0.40***	0.47***	0.41***
	(5.25)	(5.16)	(6.13)	(5.18)	(6.10)
Bad rating	-0.10	-0.10	0.04	-0.10	0.04
	(-1.22)	(-1.22)	(0.71)	(-1.23)	(0.66)
Death rate Q2-2019	0.18***	0.17***	0.14***	0.17***	0.14***
	(4.91)	(4.80)	(5.62)	(4.76)	(5.59)
Pseudo R^2	0.091	0.091	0.089	0.091	0.088
LA Fixed Effects	Yes	Yes	Yes	Yes	Yes
# Observations	3356	3356	7585	3356	7585

Table 9: Propensity Score Matching

Panel A shows the mean of the five control variables used in the subsequent regression analysis. The statistics are first shown across the whole working sample. Next, the same statistics are shown for the group of low-leveraged care homes that have been matched to a high-leveraged care home. We use two different matching approaches, one in which each low-leveraged care home can only be matched once with a high-leveraged one, and another approach in which we allowed for replacement in the matched sample (up to three times). Panel B shows the results from the Tobit estimation, separately for the two matching approaches.

Panel A: T-test for the variables used in the PSM, split by leverage

	Low leverage	High leverage	Difference (Low-High)	t-statistic (Difference)
	Working sample			
Home size	3.80	3.96	-0.16	-10.57***
Service: Nursing	0.48	0.63	-0.15	-8.87***
Service: Dementia	0.70	0.80	-0.10	-6.66***
Bad rating	0.20	0.25	-0.05	-2.91***
Death rate Q2-2019	1.72	1.91	-0.19	-6.04***
	PSM sample with no replacement (number of observations is 731)			
Home size	3.92	3.90	0.01	0.51
Service: Nursing	0.59	0.59	-0.00	-0.16
Service: Dementia	0.77	0.76	0.01	0.43
Bad rating	0.22	0.25	-0.03	-1.36
Death rate Q2-2019	1.86	1.90	-0.04	-0.77
	PSM sample with up to three replacements (number of observations is 1343)			
Home size	3.94	3.93	0.01	0.46
Service: Nursing	0.59	0.61	-0.02	-0.95
Service: Dementia	0.81	0.78	0.03	1.67*
Bad rating	0.22	0.24	-0.02	-1.33
Death rate Q2-2019	1.87	1.90	-0.03	-1.06

Panel B: PSM regression analysis

	No replacement (1)	Up to three replacements (2)
Leverage	0.20***	0.20***
	(3.18)	(3.68)
Private Equity	-0.18	-0.06
	(-1.28)	(-0.48)
Family	0.05	0.15
	(0.36)	(1.10)
Charity	0.37**	0.39***
	(2.45)	(2.63)
Other non-profit	0.18	0.22*
	(1.15)	(1.67)
Home size	0.20***	0.22***
	(4.87)	(5.66)
Pseudo R^2	0.132	0.120
Other control variables	Yes	Yes
LA Fixed Effects	Yes	Yes
Number of Observations	1462	2686

Figure 1. UK Regulators and Legal Formats

Primary regulator and source of financial accounts	Legal forms
Companies House	Companies limited by shares
	Limited liability partnerships
	Companies limited by guarantee (CLG)
Charity Commission	Charitable incorporated organisations
	Royal Charter companies
	Unincorporated trusts and associations
Financial Conduct Authority	Registered societies (RS)

Figure 2. Schematic Diagram showing the Relationships Between Different Actors

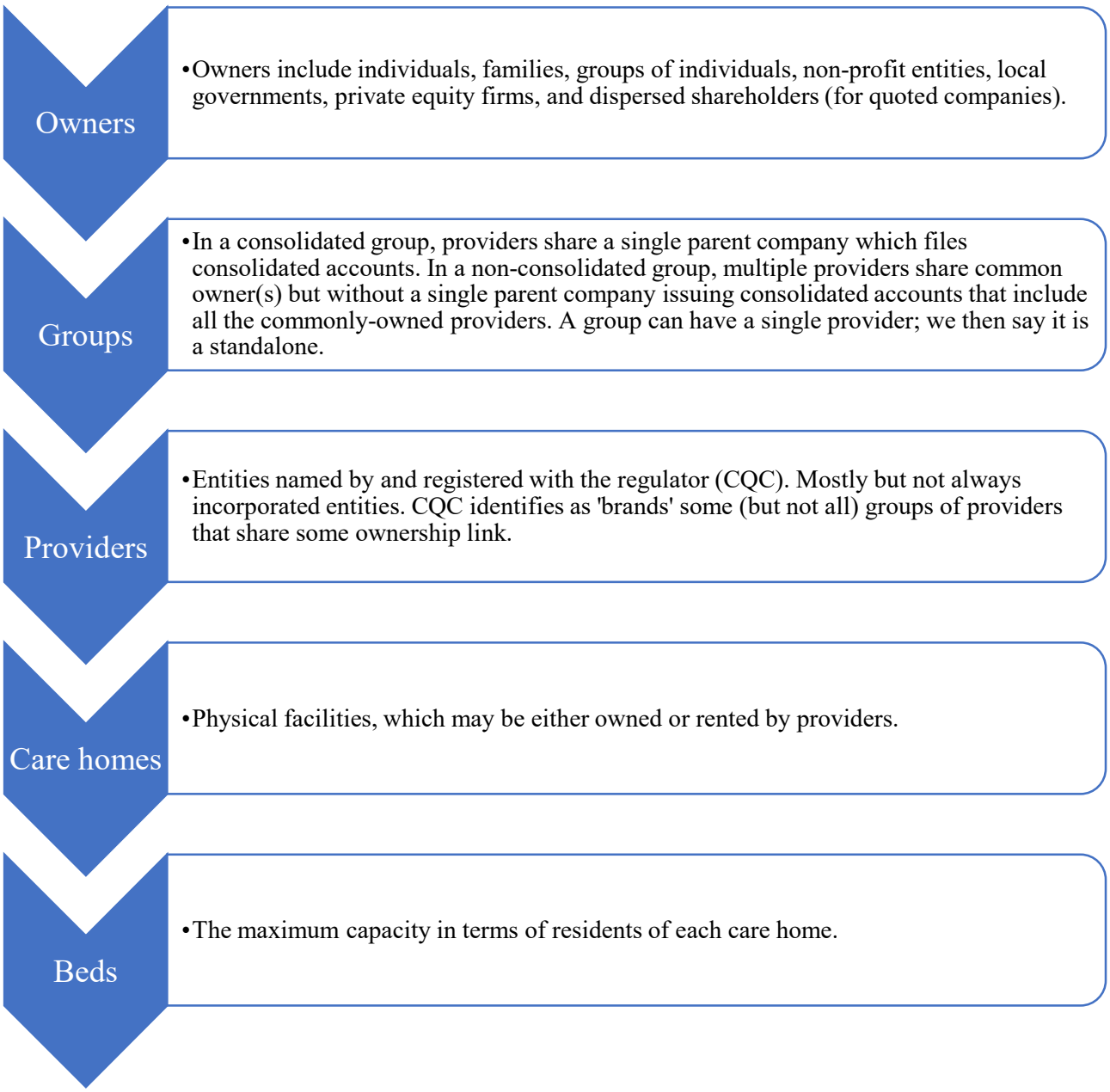
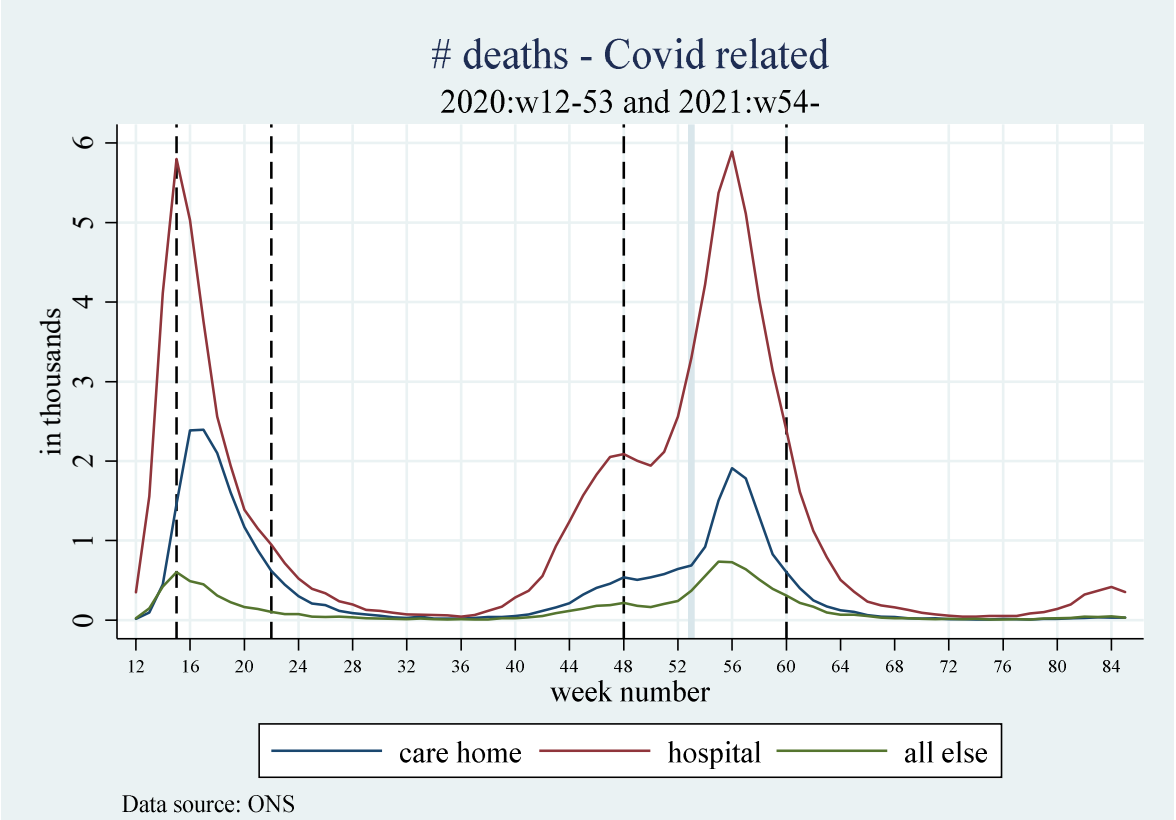
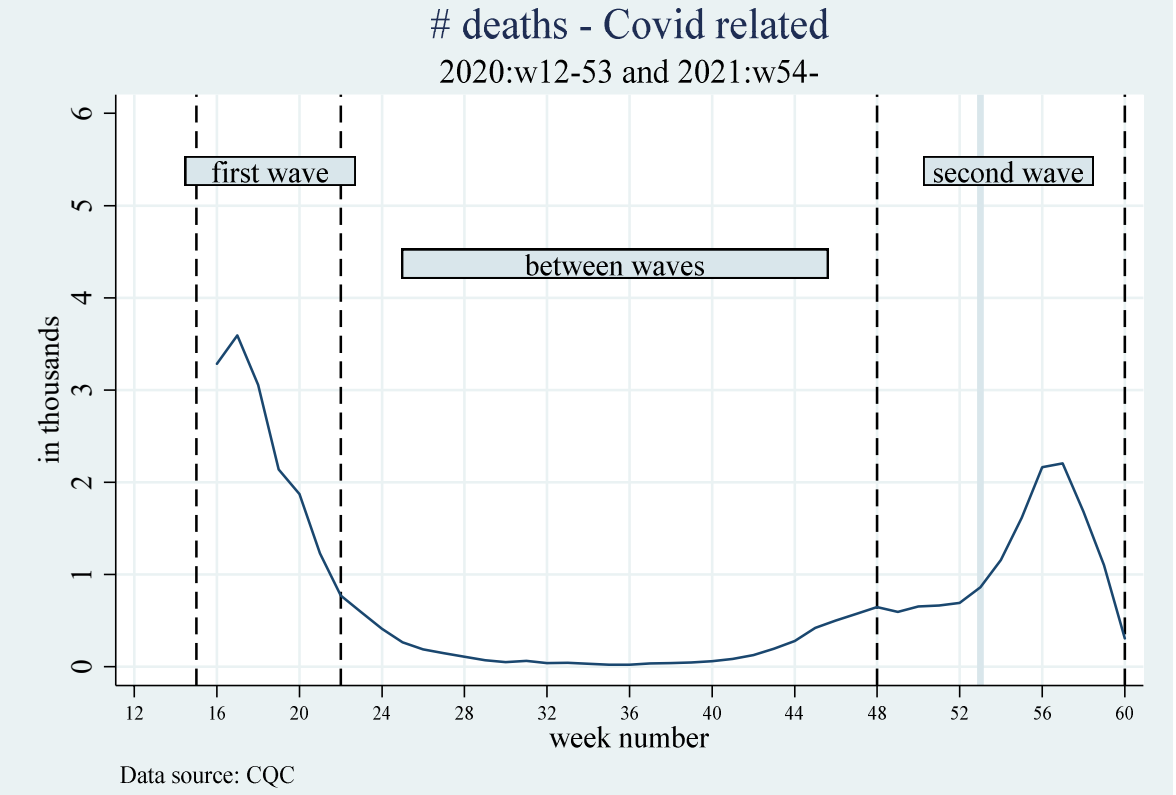


Figure 3. COVID-19 Mortality in England

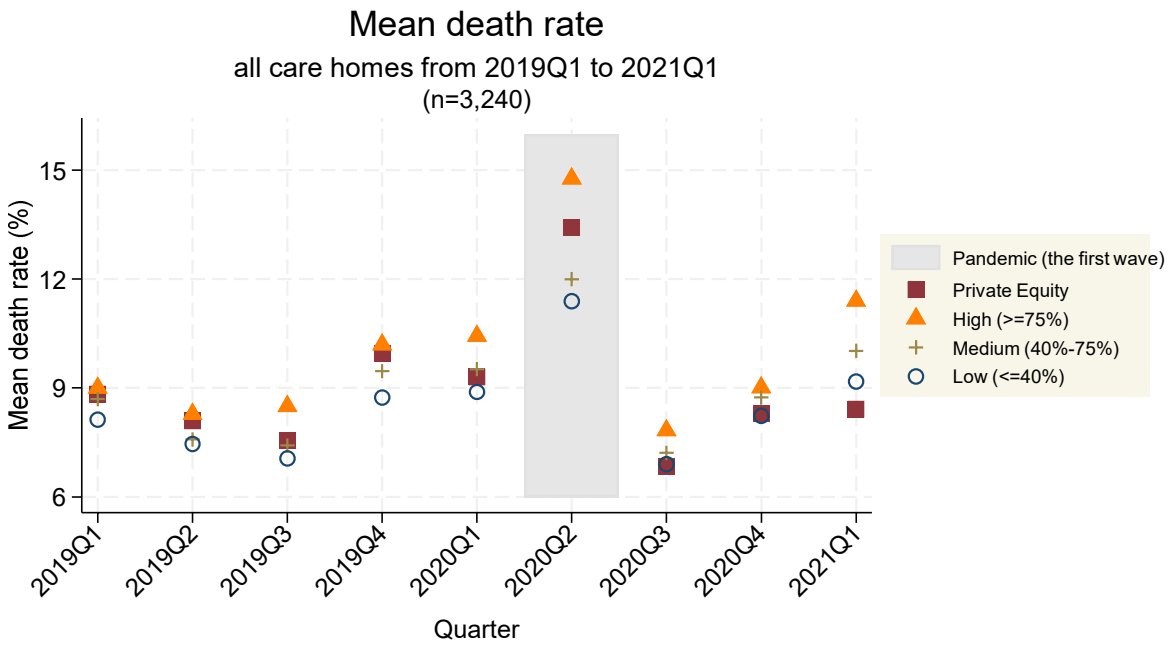


Data source: ONS



Data source: CQC

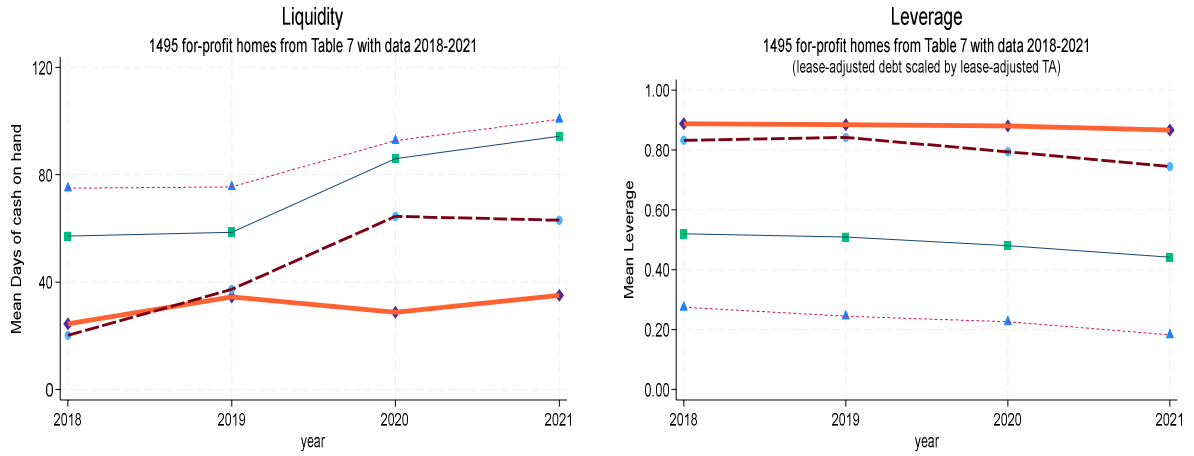
Figure 4. Leverage and Death Rate around the first wave



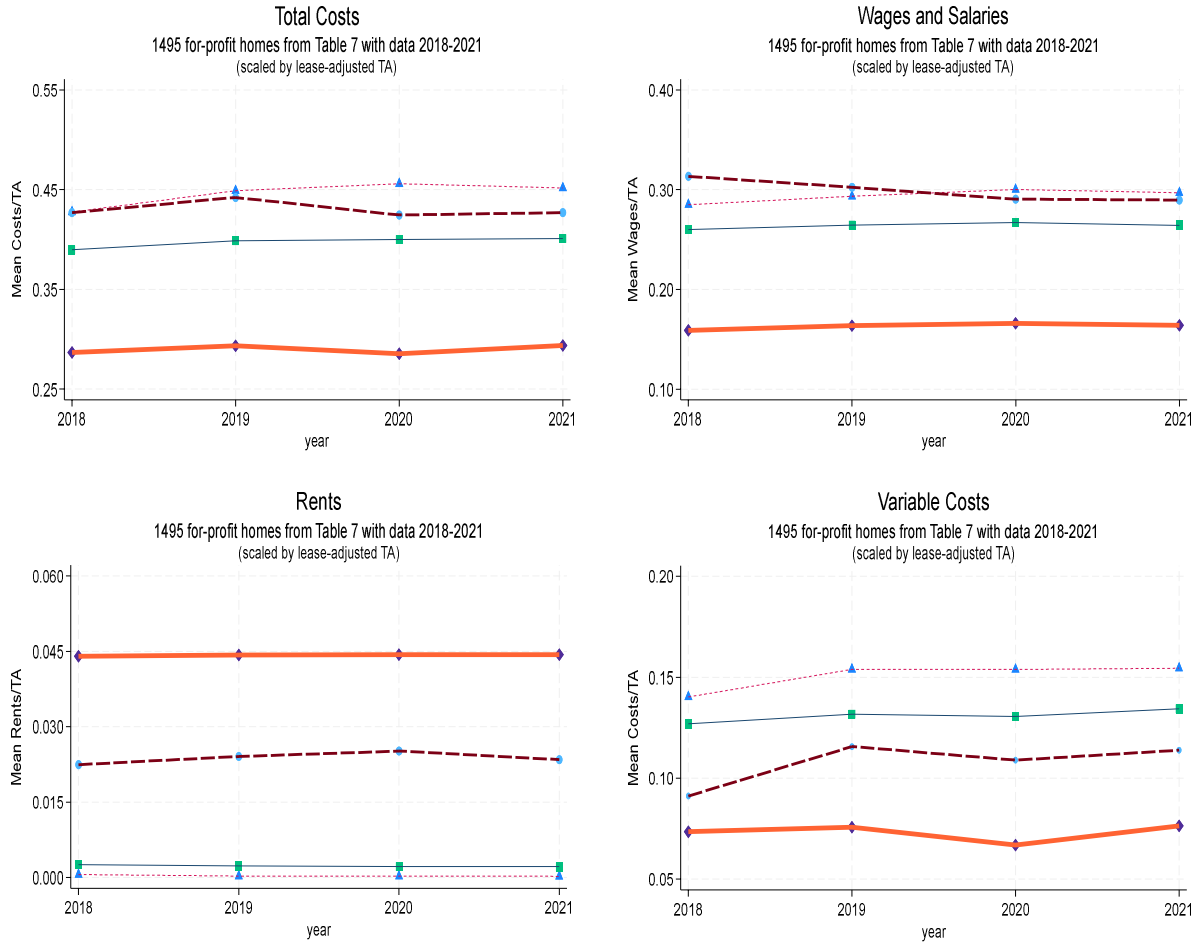
Note: 1206, 979, 447 homes are owned by Low, Medium, High levered groups, 608 homes by PE.

Figure 5. Liquidity, Leverage, Costs, Wages, Rents and other costs from 2018 to 2021

Panel A: Liquidity and Leverage

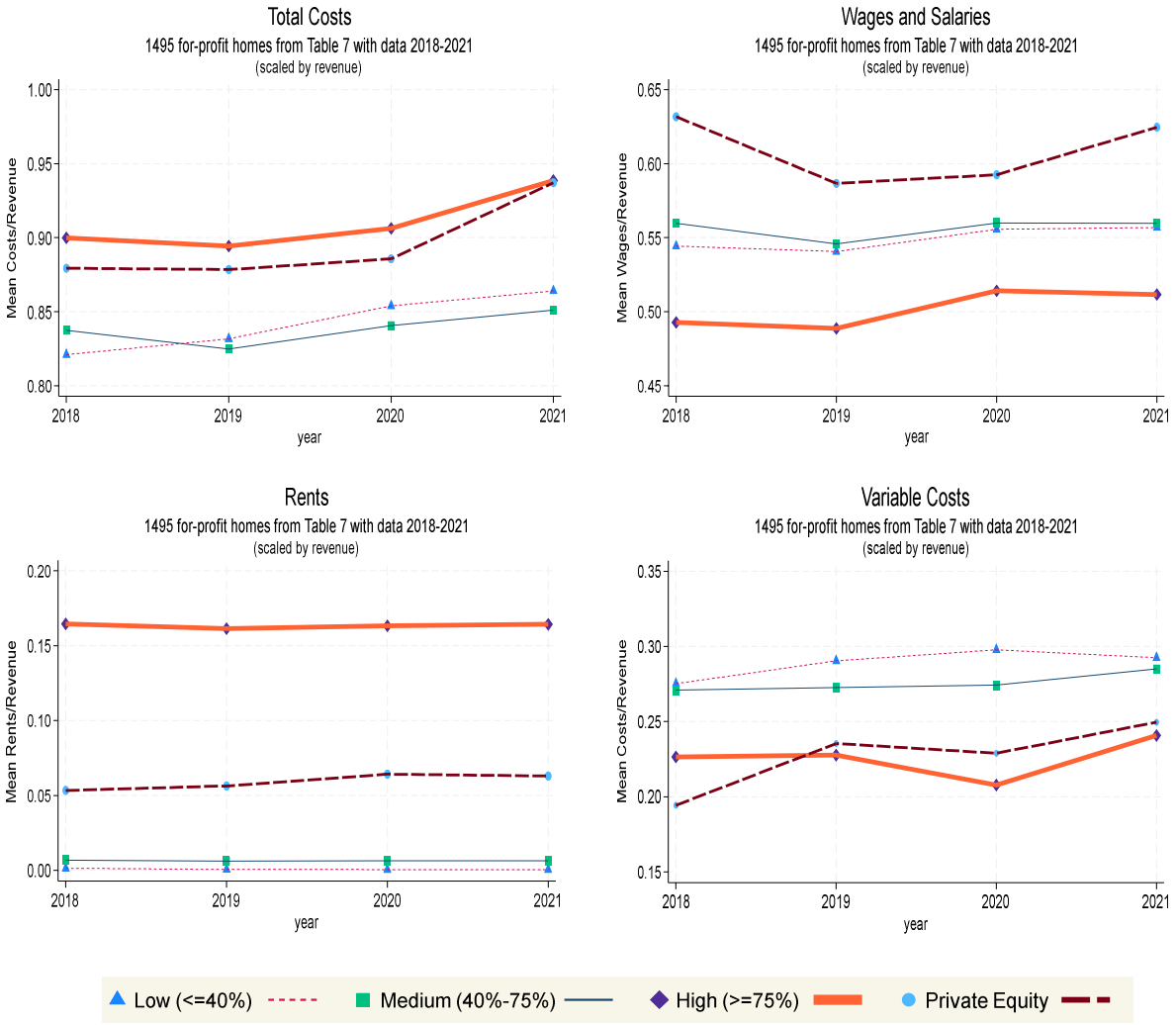


Panel B: Costs over Total Assets



Note: 302, 426, 359 homes are owned by Low, Medium, High levered groups, 408 homes by PE.

Panel C: Costs over Revenue



Note: 302, 426, 359 homes are owned by Low, Medium, High levered groups, 408 homes by PE.