

# Tunneling and Hidden Profits in Health Care\*

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## Abstract

This study examines “tunneling” practices through which health care providers covertly extract profit by making inflated payments for goods and services to commonly-owned related parties. While incentives to tunnel exist across sectors, health care providers may find it uniquely advantageous to do so. Masking profits as costs, thereby obscuring true profitability, may dissuade regulators from imposing stricter quality standards and encourage public payers to increase reimbursement rates. Likewise, tunneling effectively “shields” assets from malpractice liability risk, by moving them off the firm’s balance sheet. Using uniquely detailed financial data on the nursing home industry, we apply a difference-in-differences approach to study how firms’ stated costs change when they start transacting with a related party, allowing us to infer by how much these payments are inflated. We find evidence of widespread tunneling through inflated rents and management fees paid to related parties. Extrapolating these markups to all firms’ related party transactions, our estimates suggest that in 2019, 63% of nursing home profits were hidden and tunneled to related parties through inflated transfer prices.

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# 1 Introduction

The government has a heavy presence in many markets as a price-setter, regulator, or purchaser. In these cases, it is crucial to establish basic financial facts—such as industry revenues, costs, and profits—to support the design of optimal public policies. The health care sector is a prime example of this reasoning, with both federal and state governments mandating detailed cost reports from a large share of health care providers. Among other purposes, these data are then used to measure the cost of providing care so as to determine reimbursement rates. Likewise, policymakers use these data to assess the feasibility of costly quality regulation.

Given the importance of this task, health care providers must accurately report their costs. However, there is reason to believe that this may not always be the case. We raise the concern that public reporting of provider costs may be overstated, as these costs often reflect providers’ purchases of services from “related parties” (entities that share common ownership with the provider) at greatly inflated prices. These artificially inflated prices allow firm owners to transfer profits from the balance sheets of closely monitored health care providers to less regulated entities. Doing so has the effect of concealing true profitability and distorting the financial landscape of the health care sector.

This form of covert profit extraction is known as “tunneling,” a term that describes the “transfer of assets and profits out of firms for the benefit of those who control them ... (as in removing assets through an underground tunnel).” Johnson et al. (2000) elaborate:

Tunneling comes in two forms...a controlling shareholder can simply transfer resources from the firm for his own benefit through self-dealing transactions. Such transactions include outright theft or fraud, which is illegal everywhere (though often goes undetected or unpunished), but also asset sales and contracts such as transfer pricing advantageous to the controlling shareholder, excessive executive compensation, loan guarantees, expropriation of corporate opportunities, and so on.

While these incentives to tunnel exist across sectors, health care providers may find the practice uniquely advantageous. Policymakers often determine public reimbursements on a ‘cost-plus’ basis, giving health care providers a direct incentive to inflate costs. Moreover, industry groups representing providers who rely heavily on public reimbursements plead poverty to advocate for higher reimbursement rates or against costly quality regulations, pointing to public cost reports that indicate artificially low or even negative profits due to tunneling. Finally, hiding profits and assets through a complex web of related entities may act as a liability shield against potential litigants, who may find it difficult to identify and make claims against assets held by related parties (Casson and McMillen, 2003).

We examine the extent of tunneling—and therefore overall profitability—in the U.S. nursing home industry. This industry, marked by decades of sub-standard quality of care, has a long history of direct quality regulation. To understand whether such quality regulations can be successful when they are unaccompanied by corresponding increases in funding, an accurate measurement of industry costs and profitability is needed. The common refrain from industry groups has been that unfunded mandates would bankrupt facilities, generate closures, and consequently reduce patients’ access to nursing home care (American Health Care Association, 2023). Thus, changes in quality mandates are often accompanied by increases in reimbursement rates or other payments to offset the cost burden of quality requirements. A natural question is whether such concessions are necessary. To what extent must the public pay greater prices for higher quality care? Or can quality increases be financed primarily out of current industry profits? If the cost report data are taken

at face-value, the industry would appear to have limited financial resources to draw upon. However, recent scrutiny of financial reports and awareness of related party transactions has caused policymakers, regulators, and the public to revisit this unquestioned assumption (Marselas, 2023; Harrington et al., 2023).

To examine this question, we turn to exceptionally rich long-term care cost report data from the state of Illinois, which has included mandatory reporting on related party transactions for more than two decades. Measuring profit tunneling through related parties requires estimating how much related party payments are marked up above their market value. Doing so is non-trivial. It may be that firms that transact with related parties simply have higher costs than their counterparts with no related parties. Our approach to measuring this markup instead relies on *adopters*: firms that begin transacting with a related party at some point in our sample. If there is no related party markup, one would expect no change in reported costs at the time of a related party adoption. Under an assumption of no simultaneous cost shocks, we can then infer the size of the related party markup by the size of the ‘jump’ in reported costs, at the time of an adoption. This research design is a staggered adoption difference-in-differences. Because in such settings two-way fixed effects estimators are known to have negative weighting issues due to problematic comparisons between early and late adopters (Goodman-Bacon, 2021; de Chaisemartin and D’Haultfœuille, 2020), we instead rely on the ‘stacking’ approach, in which we construct a separate data set of clean ‘control’ firms for each related party adoption (Cengiz et al., 2019; Deshpande and Li, 2019).

Our results suggest that such tunneling practices are widespread in the nursing home industry. We find that facilities that transact with related parties for real estate or management services pay considerably more for these services than facilities that do not engage in such transactions, while spending no more on nursing, which is the single largest line item expense. Real estate and management expenses together comprise approximately 77% of all related party spending, and are therefore the focus of our analysis. Once a facility adopts a related party for one of these services, total spending increases by 20.4% for real estate and by 24.6% for management. The case of real estate is illustrative. When a facility adopts a rental company related party — meaning they sold their building and land to an entity from which they then rent, a transaction known as a ‘sale-leaseback’ — the significant spike in rental payments offsets the decline in real estate expenses associated with facility ownership (such as depreciation, interest, and taxes), generating the large overall increase in total real estate expenditure.

To better understand the financial maneuvering involved, we turn to detailed balance sheet data on both the nursing homes as well as their related parties. We show that the rental company typically finances this acquisition via debt, though the rental company’s assets do not rise commensurate with its new mortgage. The result is that *both* the nursing home and the rental company appear to be made worse off as a result of the sale-leaseback. Although we are unable to ascertain where the new liquidity goes when it moves off the rental company’s books, it very likely goes to owners. This highlights the importance of more rigorous financial reporting from all related parties with which a nursing home engages in significant transactions.

Turning to the broader question of tunneling, these markups have considerable implications for the calculation of total industry profits. Despite the fact that 33% of firm-years in our data report no related party transactions, the long right tail for profits and reported costs mean these markups translate to substantial profit misreporting. Our estimates suggest that in 2019, 63% of nursing home industry profits flowed through a related party hidden as marked up costs. Equivalently, if one were to take reported profit at face-value, one would find only 37% of total industry profits. Note these means mask considerable heterogeneity, as many firms may have no or few hidden profits.

We argue that this headline result—that the industry is substantially more profitable than it appears—

explains several known puzzles. For instance, closures have been relatively rare for a largely for-profit industry that has reported substantial accounting losses over the past two decades; this may be rationalized by profit misreporting (Olenski, 2023). Similarly, there has been an avalanche of private equity activity in the nursing home industry (Gupta et al., 2023). Although it is natural to see more consolidation in industries where profits are *low*, there is no evidence that private investors are acquiring facilities at discounted rates. One recent report found that the mean acquisition price was \$100,000 per bed (Reiland, 2022). At a mean capacity of 100 beds, this translates to \$10 million for the typical transaction. To justify such an acquisition, an investor must believe the discounted net present value of a facility to be at least \$10 million. Straightforward accounting reveals that this implied NPV cannot be rationalized using facility-reported financials. Applying an average annual accounting profit of approximately \$106,640 and an annual exit probability of 1%, the expected rate of return to rationalize a NPV of \$10 million is less than 0.1%. This rate is markedly lower than the returns typically offered by safe assets, such as U.S. Treasury bonds, over the same period. This disparity raises questions about the accuracy of facilities’ reported financial data, which we discuss in more detail in Section 2.

To illustrate the magnitude of these hidden profits, we conduct a simple counterfactual to quantify the amount of direct care staffing that could be financed out of the tunneled profits. Because of the labor-intensive nature of the nursing home industry, higher levels of staffing are the primary means by which firms vertically choose their quality level. Put another way, this counterfactual may be interpreted as asking how much higher quality would be if hidden profits were instead reinvested into the firm. We calculate that if hidden profits were spent entirely on additional registered nurses (RNs), in 2019 the mean staffing ratio would have increased from 0.69 hours per resident-day to 0.89 hours per resident-day—a 28.9% increase. This question is of particular urgency today. A pending rule from the White House would impose a minimum staffing requirement, which many firms fail to meet as of 2023Q1 (Grabowski and Bowlblis, 2023). Our calculations suggest that if facilities financed additional staffing out of their tunneled profits, the proportion of firms that would be in compliance with the registered nurse component of the proposed policy would rise from 55.2% to 75.6%.

Finally, we examine the benefits of this type of corporate restructuring for nursing homes’ liability risk. Turning to federal data, we examine how real estate related party usage impacts total malpractice spending by firms. Consistent with the existing legal literature (Casson and McMillen, 2003; Brickley et al., 2017), we find significant malpractice benefits of this type of asset-shielding behavior. While firms report no change in paid losses, related party adoption reduces malpractice insurance premium spending by 32.4%. This reduction in malpractice spending corresponds to approximately \$25,885 in annual savings. We emphasize that this channel is only one possible benefit to firms from tunneling profits and assets through a related party.

Note that the use of related parties is not restricted to only the nursing home industry. Federal data demonstrate that related party transactions are common across the health care sector. Significant shares of firms in the hospice (31%), home health (36%), and dialysis industries (94%) report engaging in related party transactions in the 2021 report year, the most recent year with complete data. While related party use is common across industries, we focus on the nursing home industry given the availability of uniquely detailed cost report data. Nonetheless, we caution that our results on profit tunneling should not necessarily be extrapolated to these other industries. Examining the role of related parties across industries is a potential area for future research.

Our research connects to several strands of literature. The first is an economic analysis of profit tunneling

by firms, for which there exists a considerable finance literature, beginning with the canonical work of Johnson et al. (2000), La Porta et al. (2000), and La Porta et al. (2002), who establish the key theoretical foundations and legal basis for profit tunneling in the context of corporate governance. Empirical investigations have found firm behaviors consistent with profit tunneling in many contexts. Bertrand et al. (2002) show how firms in Indian business groups tunnel profits to entities in which the controlling shareholder has higher cash flow rights. Bae et al. (2002) find that firms in Korean business groups make strategic acquisitions to benefit other firms in the group. Cheung et al. (2006) find that Hong Kong-listed firms earn significant negative returns following related party transactions. Jiang et al. (2010) document examples of Chinese firms exploiting submarket intercorporate loans to siphon billions from their publicly listed counterparts. Our paper is uniquely situated relative to this existing literature, which has primarily emphasized the costs of tunneling coming from expropriation of minority shareholders. Although this concern may still be present in our setting, we also highlight the burden that profit tunneling by health care providers imposes on the public, through the form of overstating costs for public reimbursement, shielding assets from liability, and lobbying against costly quality regulations.

Second, our research connects with a vast literature exploring the finances of health care providers. Our findings speak to a well-developed literature on ownership incentives, in particular the role of private equity in health care. Close to our setting, Gupta et al. (2023) and Gandhi et al. (2023) both study the impact of private equity acquisition on nursing home behavior. Our research also connects to a much larger literature that has explored the role of ownership incentives in the hospital industry. Liu (2022) and Richards and Whaley (2023) examine the role of private equity in hospital care, while Duggan et al. (2023) and Andreyeva et al. (2023) study the impact of privatization and corporatization of hospitals, respectively. Eliason et al. (2020) examines how mergers and acquisitions in the dialysis industry impact care, finding a significant role for the adoption of the acquiring firms' practices. Our research speaks to a broader question that the U.S. must reconcile: Who should capture the rents in the health care industry? An important first step to such work is an accurate measurement of revenues and costs, which may not always be straightforward. For example, recent work has demonstrated the extent to which physicians capture rents through non-wage sources (Gottlieb et al., 2023) and has quantified previously unmeasured hassle costs (Dunn et al., 2023). Our paper demonstrates that assessing value capture in other parts of the health care industry requires measuring and understanding the extent to which owners are able to pay themselves rents using mechanisms such as related party transactions.

Finally, this paper contributes to a small but rapidly burgeoning literature on the empirical analysis of the nursing home industry, including the determinants of quality (Grabowski et al., 2008; Hackmann, 2019), patient selection (Gandhi, 2023; Hackmann et al., 2023), and quality estimation (Einav et al., 2022; Olenski and Sacher, 2023). Our paper nicely complements the existing literature, which has largely focused on the quality of care administered by nursing homes. In contrast, we focus on the financial side of operations at these facilities, the results of which have significant implications for policymakers and stakeholders interested in raising quality effectively.

The rest of the paper proceeds as follows. Section 2 reviews the key institutional details necessary for our analysis and provides some descriptive analysis of related party transactions. Section 3 provides an overview of our empirical approach and underlying assumptions. Sections 4 and 5 present the results for real estate and management related parties, respectively. Section 6 details how we convert our markup estimates into hidden profits and provides our nursing counterfactual. Section 7 provides evidence on the asset-shielding benefit from tunneling. Section 8 concludes.

## 2 Institutions, Data, and Descriptive Analysis

This paper considers the financial health and operations of skilled nursing facilities (SNFs), commonly referred to as nursing homes. In this section, we review key institutional features motivating our analysis.

### 2.1 Industry Background: Quality Concerns and Profit Accounting

Low quality of care is the hallmark issue in the nursing home industry. Nursing home residents routinely suffer harm as a result of their care (Office of Inspector General, 2014), because falls, fractures, and high levels of pain are not uncommon. For decades, researchers and policymakers have invested considerable resources into understanding the sources of – and potential remedies for – this well-documented quality shortfall. An overwhelming consensus has emerged that inadequate levels of direct care staffing are the primary drivers of low-quality care. The majority of facilities are chronically understaffed (Geng et al., 2019), which is linked to an increased probability of adverse events (Konetzka et al., 2008) and (Friedrich and Hackmann, 2021).

A variety of market failures provide explanations for the persistence of low-quality care. Consumers’ limited ability to assess quality prior to nursing home admission blunts firms’ incentives to compete on quality. Similarly, the high risk associated with nursing home transfers diminishes incumbent residents’ capacity to ‘vote with their feet.’ On the supply side, there is little scope for price competition, due to the heavy presence of public payers.<sup>1</sup> Moreover, with limited exception, reimbursement rates tend to be based on reported facility costs, rather than the quality of care received. Taken as a whole, these forces provide firms with limited incentive to undertake costly interventions to raise quality, and therefore offer a clear theoretical underpinning for direct quality regulation.

Indeed, such quality regulation is not uncommon. Given the tight connection between staffing and clinical outcomes, a variety of state and federal reforms have attempted to boost staffing levels. The most common of these reforms impose minimum staffing requirements, providing financial penalties to firms whose reported staffing levels fall below predetermined thresholds (e.g., Matsudaira, 2014). In 2023, the White House proposed a rule that would impose a federal minimum staffing requirement, which 57% of facilities did not meet as of the first quarter of 2023 (Grabowski and Bowblis, 2023).

Perhaps unsurprisingly, such costly quality regulations generate considerable opposition from industry lobbying groups. As noted, firms face minimal economic benefits from raising quality (in terms of either market shares or price-setting ability), so costly quality investments must be borne at least partially by firms. Trade organizations representing firms argue that the burden imposed by quality reforms will lead to closures (Olenski, 2023) and bankruptcy (Antill et al., 2023), thereby further limiting access to care. The common refrain from industry groups is that nursing home profit margins are too thin to afford more staff, so any regulation that mandates higher staffing levels will necessarily result in financial ruin.

The nursing home industry’s claims of poverty appear well supported in financial accounting data. Each fiscal year, every nursing home certified by the Centers for Medicare and Medicaid Services (CMS) for public reimbursement is required to submit a federal cost report, detailing its revenues and expenses by cost center. These data – referred to as the Healthcare Cost Report Information System (HCRIS) – are widely used by researchers, policymakers, and industry groups to assess the financial well-being of a range of health care providers. Turning to the HCRIS data for the nursing home industry, Figure 1 demonstrates that in 2019 – immediately prior to the pandemic – 46.6% of firms reported accounting profit losses. Over the course of the entire period, the mean profit margin was only 0.13%, with the median climbing to only 1.76%. Taken

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<sup>1</sup>One recent study found that Medicaid and Medicare comprise 44% and 40% of overall revenue, respectively (Gandhi, 2023).

at face-value, these data portray a dismal financial landscape for the state of the industry, and lend support to lobbyists' claims of the burden of costly quality regulation.

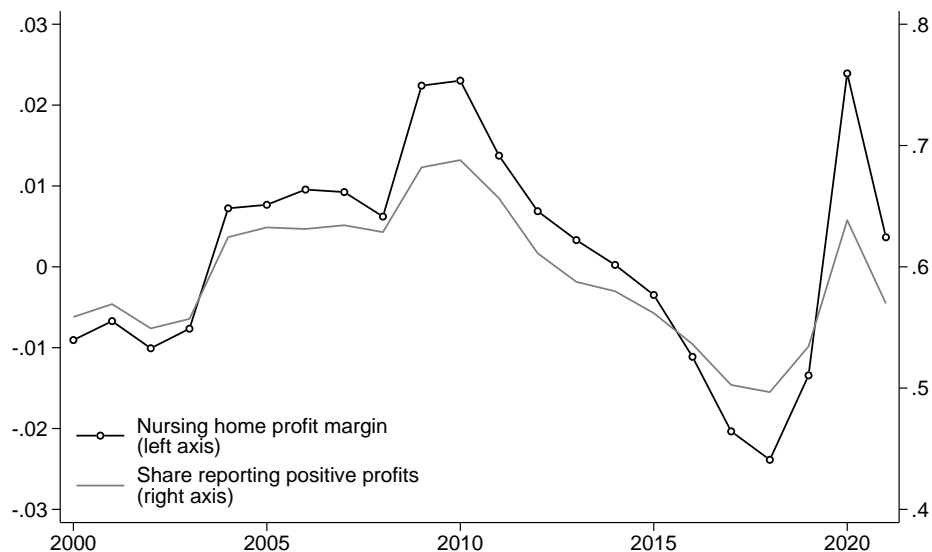


Figure 1: Nursing Home Profitability

*Notes:* Figure presents aggregate estimates of nursing home accounting profits, scaled by facility size, over time. Estimates come from federal health care Cost Report Information Systems data. All calculations are denominated in 2019 dollars.

The cost report data pose a handful of contradictions regarding nursing homes' financial health. Chiefly, if 46.6% of firms report accounting profit losses, why are exit rates in the industry relatively low? Olenski (2023) finds that approximately 15% of firms exited over this same period, corresponding to annual exit rates of only 0.95%. By comparison, physician turnover is approximately 4% annually (Bond et al., 2023). Across industries, the national establishment exit rate was 8.5% in 2019 (U.S. Census Bureau, 2024). Moreover, lending support to the hypothesis that nursing homes are more profitable than they appear, the past two decades have witnessed an avalanche of merger and acquisition activity and private equity investment in the industry (Gupta et al., 2023), at considerable transaction prices (Reiland, 2022). Such investment activity poses a puzzle for an industry that routinely reports accounting losses.

## 2.2 Related Parties and Incentives to Tunnel

This dismal financial landscape hinges on the assumption that the cost report data is accurate. There is reason to be concerned that this assumption may not hold: a growing share of reported costs are payments to related parties, which are organizations with at least partial ownership overlap with the nursing home. Any markup over true costs that these organizations receive appears as costs in the HCRIS data, despite being profit from the perspective of the facility owner. Understanding the magnitude of this markup (of related party costs over true costs) is therefore crucial to understanding the profitability of the nursing home industry. Accurate profit accounting is, in turn, a critical step to assessing the impact of quality regulation on firms' financial health.

There are a multitude of reasons why nursing facility owners would choose to shift profits to a related party in this way. Johnson et al. (2000) highlight one incentive to tunnel profits coming from differences in

cash flow rights between the firm and the related party. That is, an owner-operator who holds a majority (but not the entirety) of the firm, but is the sole proprietor of a related party, will find it advantageous to redirect profits through that related party, at the expense of the minority shareholders. Such self-dealing transactions may include clear-cut cases that are illegal (such as fraud and theft), but may also be conducted for legal purposes (such as advantageous transfer pricing or excessive executive compensation). Bertrand et al. (2002) provide a thorough empirical investigation of this channel operating in Indian firms.

Even when a nursing home is wholly owned, incentives to tunnel profits still exist. For instance, in states that use a cost-plus approach to determine public reimbursement rates, there is a (mechanical) positive relationship between facilities' stated costs and revenues, providing a clear incentive to overstate one's own costs. Although states commonly collect data on the *costs* of the related parties in addition to payments to these organizations, this does not resolve the problem, as direct payments to owners (or their relatives) may be passed off as costs to the related party. While the state that we study, Illinois, does not calculate their Medicaid reimbursement rate on a cost-plus basis, it is common for states to do so.

Moreover, as indicated in Section 2.1, the processes of reimbursement determination and quality regulation are inescapably political in nature, and involve repeated interactions between governments and firms (and their lobbyists) over years. Pleading poverty has traditionally provided an effective negotiating lever for the industry over the years. A widespread consensus has emerged that Medicaid rates tend to fall below a facility's average costs, even as it is recognized these costs may be difficult to interpret given the nature of related party transactions (National Academies of Sciences Engineering and Medicine, 2022). This observation has been used repeatedly to advocate for both higher rates as well as against costly quality regulation, such as minimum staffing standards.

Of course, the benefits from related party transactions also depend upon the nature of the service being outsourced. As we will demonstrate, it is increasingly common for nursing homes that own their facility to sell the asset to a related party, to which they then pay rent (which we will show is typically at a considerable markup above their prior real estate costs). Such transactions (known as 'sale-leasebacks') are common in various areas of commercial real estate, and provide various benefits. For instance, some organizational structures (such as a real estate investment trusts or real estate operating companies) have particular real estate tax advantages, such as exemption of corporate income taxation under certain conditions.

Similarly, transferring profits and assets in this way may also effectively shield providers as a form of liability protection. Nursing homes are subject to a wide array of litigation, commonly stemming from the low-quality care and abuse detailed in Section 2.1. Moving profits and assets to sister companies may protect those assets that would otherwise be subject to civil judgment. Further, masking profits as costs may act as a deterrent to such claims, by misleading potential plaintiffs into believing that there is little hope of recovering significant damages beyond what the facility's liability insurance pays. Moreover, the central issue in such claims is often whether the facility was negligent in its staffing levels. Credibly showing that a facility is more profitable than it contends may be a compelling argument that the firm was negligent in failing to hire adequate staff.<sup>2</sup> Casson and McMillen (2003) lay out the original legal framework suggesting this corporate restructuring as a way for nursing home operators to limit their liability risk by severing the firm into single-purpose entities. We present empirical evidence of this malpractice benefit in Section 7, consistent with the existing empirical legal literature (Brickley et al., 2017).

Finally, even absent these incentives, owner-operators may simply prefer to avoid the transparency as-

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<sup>2</sup>Of course, negligence claims focus on the standard of care provided, not the profitability of the facility, but financial information may be relevant, particularly in the calculation of punitive damages.



sociated with public cost reporting and instead divert line items such as executive compensation through a related organization, in an effort to avoid regulatory scrutiny. Given the diversity of incentives firms have to divert their profits in this way, it is outside the scope of the current paper to identify any particular firm’s incentive to engage in related party transactions. Instead, the focus of this paper is on estimating the average related party markup, and generating aggregate corrected measures of industry profitability which account for this markup.

Note that while this paper focuses on the use of related parties in the nursing home industry, such transactions are common across the health care sector. For example, Appendix Figure B.1 calculates the share of providers reporting non-negligible related party transactions across different health care industries in the 2021 HCRIS data, the most recent year with complete reporting on related party transactions. In each of the industries examined, significant shares of firms report payments to related parties exceeding \$10,000, ranging from approximately 31% and 36% of hospice providers and home health agencies to nearly 94% of renal dialysis facilities. These results indicate that related party transactions are widespread across the health care sector, and not specific to any industry. To examine this phenomenon in more detail, we study the nursing home industry — of which 77% of firms report related party payments in the 2021 HCRIS data — where particularly rich cost report data exist. We caution that our results on profit tunneling should not necessarily be extrapolated to these other industries where related party use is common. Instead, we raise this point to indicate that further investigation of the role of related parties in these other industries is an avenue for future work.

### 2.3 Data and Empirical Challenges

Accurately assessing the profitability of nursing homes is crucial to understanding the impact of costly quality regulations, such as those described in Section 2.1. Of course, there are a number of complications with measuring nursing home profits. The key missing ingredient to doing so is the related party markup, which is unobserved. Estimating this markup is non-trivial, and standard approaches from industrial organization for markup estimation (which typically rely on first-order conditions from profit maximization or cost minimization) are inapplicable for such self-dealing transactions. Instead, we rely on a fully reduced form approach to recover the related party markup by isolating within-facility variation in reported costs, in a window around related party adoption. We discuss our empirical approach and underlying identification assumptions in Section 3.

A second issue pertains to data quality. The federal HCRIS data on nursing homes shown in Figure 1 are notoriously unreliable and not subject to frequent audits. While sufficiently aggregated statistics from these data can be informative, the entries for individual nursing homes are often highly implausible. For example, one modest 25 bed facility reported an annual profit in excess of \$6 billion. Another nursing home reported an annual loss of \$190 million. Accordingly, the data presented in Figure 1 are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles, a practice we carry throughout this paper. Additionally, the data available on related parties in HCRIS displayed in Appendix Figure B.1 are limited (Tosh, 2021) and reported only starting in 2011. These data limitations may explain the relative paucity of research on related party transactions in health care, and especially of studies performing longitudinal analyses or decomposing related party costs.

To resolve these issues, we rely on exceptionally rich cost report data from the state of Illinois. In addition to the federal reports contained in the HCRIS data, all Medicaid-certified facilities (which include virtually all long-term care facilities) are required to submit detailed financial reports to the states in which they are located. These state Medicaid cost report data tend to be much higher quality than the HCRIS data for

nursing homes. For instance, unlike the HCRIS data, individual facilities’ records are used to help determine facility-level Medicaid rates, and so are subject to regular audit risk.<sup>3</sup> Predictably, such usage contributes to overall higher data fidelity. Indeed, the majority of Illinois cost reports are generated by paid preparers, most commonly CPAs. An additional advantage is that Illinois has uniquely detailed data on related parties, even relative to other states. Overall facility costs, payments to related parties, and the purported costs borne by related parties all follow a uniform line item classification, making it easier to identify assess the extent to which related party costs substitute for direct costs. Finally, the Illinois data collection extends back to 2000, permitting a panel length that is nearly double that available in the federal data. For these reasons, in our subsequent analyses we focus on the richer Illinois data.

## 2.4 Descriptive Analysis of Related Party Transactions

In this section, we provide some descriptive analysis of nursing home financial health, and summarize aggregate patterns of related party spending using the Illinois Medicaid cost report data. These findings motivate our empirical exercises in Section 3.

In Figure 2, we characterize the magnitude and nature of related party payments over the sample period. Aggregating across all facilities’ related party payments, we find two stark patterns. First, payments to related parties have risen sharply over the course of the sample, from \$365.8 million in 2001 to \$806.7 million in 2021. Payments to related parties have outpaced overall expenses; in 2000 they comprised about 5.5% of all expenditures, and by 2021 they had risen to 12.0%.

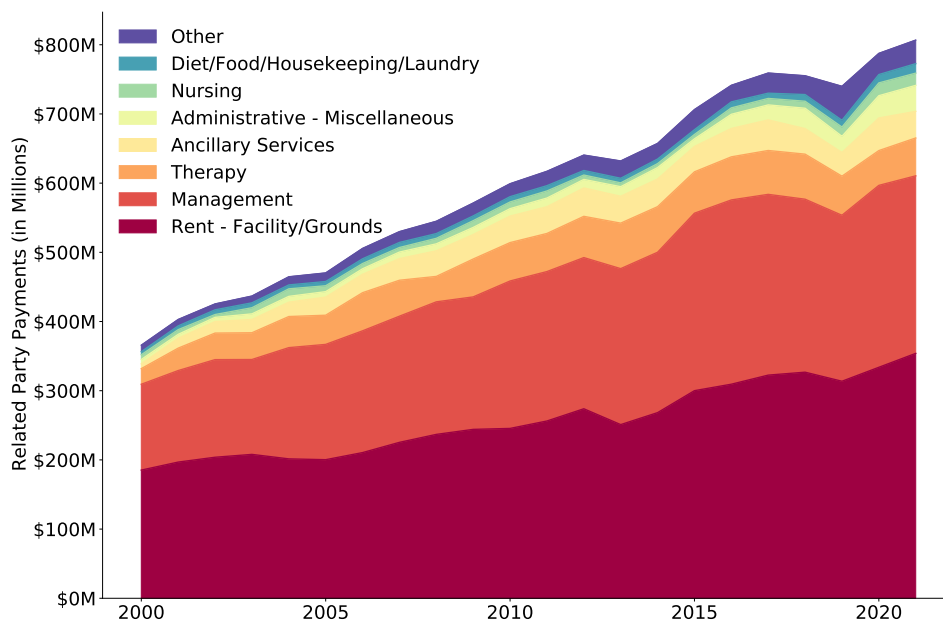


Figure 2: Amount Paid to Related Parties

*Notes:* Figure documents total payments to related parties by line item classification, using the Illinois Medicaid cost report data. The data indicate that management and rental services comprise the dominant sources of related party spending.

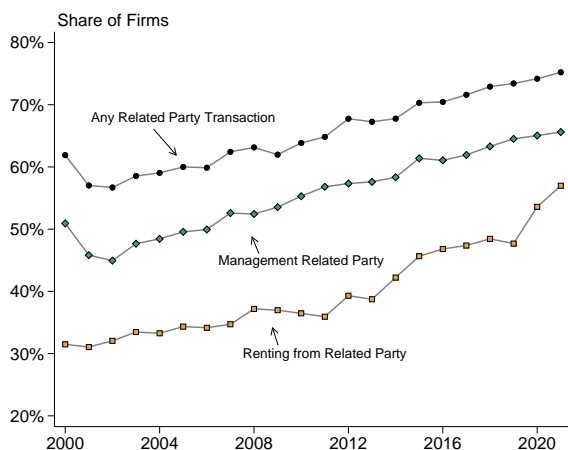
More striking than the overall growth in self-payments is the nature of the payments. Figure 2 demon-

<sup>3</sup>In practice, the risk of audit is quite low, but the threat exists nonetheless.

strates that only two services comprise a majority of related party payments: facility rents and management fees. These represent 43.1% and 34.2%, respectively, of all related party spending. This stands in contrast to how facilities allocate their total expenditures; Appendix Figure B.2 demonstrates that these line items comprise only 6.1% and 11.4% of *overall* expenses, respectively. Notably, the costliest line items – which largely pertain to direct care costs, such as nursing (32.5%) and supplementary services such as dietary, housekeeping, and laundry (12.0%) – are very rarely contracted out to a related party.

The composition of related party payments (relative to the total budget) provides suggestive evidence of the scope for tunneling. If related party transactions were solely based on operational needs, one would expect the distributions of related party expenses and total expenses across cost centers to appear more similar. Instead, we see vastly disproportionate expenditure on management and rents – both of which are appealing cost centers to ‘outsource’ to a related party if one’s intention is to tunnel profits. For instance, management services are commonly provided by the facility’s owner, and require no further sub-contracting, in contrast to, say, nursing or therapy services. Further, unlike care-related services, it is difficult to compute the ‘quantity’ of management provided – making any overpayment above market value difficult for an auditor to detect. Similarly, profits are easily moved off-book by modifying rental prices accordingly. Moreover, there may be malpractice liability benefits from conducting a sale-leaseback. Given the considerable related party spending on these two categories (management and real estate), in our subsequent analyses we focus our attention on the use and adoption of these two types of related party transactions.

(a) Share of Firms Reporting a Related Party Payment



(b) Related Party Adoptions

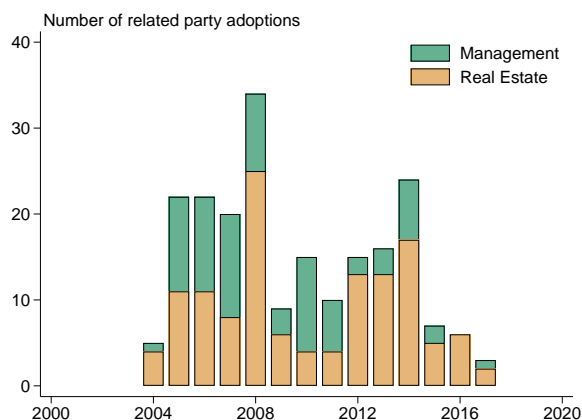


Figure 3: Growing Use of Related Parties

*Notes:* Panel (a) plots the share of facilities that have any related party transactions, transactions for management services, and transactions for facility rental payments, respectively. Panel (b) plots the number of adoptions for management services or real estate, restricting to only firms with sufficient pre- and post-adoption observations.

This overall growth in related party spending is driven at least in part by greater adoption overall (i.e., the extensive margin). Figure 3 panel (a) plots the share of firms who report any related party spending, in addition to those who report paying for management services or renting from a related party. Here, the growth in take-up is evident: only 61.9% of firms reported any related party use in 2000, rising to 75.2% in 2021. We see even sharper growth when isolating payments for management services or facility rents. These latter categories are crucial for our analytic approach, which isolates within-facility changes in costs in a

window around related party adoption. To determine which facilities rent from related parties, we identify cost reports in which the facility records a related party payment for ‘Rent - Facility & Grounds’ in excess of \$10,000.<sup>4</sup> We take a similar approach for management services, setting a threshold of \$5,000.<sup>5</sup> Panel (b) presents the number of related party adoptions for each year in our sample period. We restrict to only those firms which we observe for four years prior to and following the related part adoption. Thus, Figure 3 provides assurance that there are sufficient ‘switchers’ from whom we can estimate the related party markup.

How do firms that transact with related parties differ in their profits and costs? To ease comparison between firms that rent their facilities and those who own them, we aggregate real estate expenditures into a single comprehensive category. The cost report data make this aggregation straightforward, as each line item expense is assigned to a broader category. We include all costs that fall under ‘ownership capital expenses,’ a category which includes facility rental payments, depreciation, interest, real estate taxes, amortization, and other capital costs.<sup>6</sup> By far the largest of these costs are facility rents (for those firms that do not own their building) and depreciation (for owners). Some of these items may not strictly refer to real estate expenses. For instance, in the cost reports there is no way to separate depreciation of the building from any other capital asset. In our analysis, we assume that any non-real estate costs do not covary with real estate related party use. That is, we model them as a form of classical measurement error in the dependent variable, which would not generate bias in our subsequent regression estimates.

In Figure 4 we examine the distribution of reported costs and profits by firms’ related party status. In panel (a), we plot the distribution of total real estate costs. Firms that rent their building from a related party report considerably higher per-bed total real estate costs (\$7,094) than firms that either own their facility (and claim depreciation, pay mortgage interest and real estate taxes) or rent from a non-related party, who pay on average \$4,377 per bed. This relationship is less pronounced in the case of management costs. Panel (b) plots the distribution of per-bed management costs, both for firms that transact with a related party for management services and for firms that do not. We see that related party firms have modestly higher per-bed management costs (\$6,811), relative to non-related party firms (\$6,137).

These patterns do not indicate that firms that transact with related parties are inherently more costly. In panel (c), we plot the distributions of per-bed nursing expenditures, the largest single category of spending for any nursing home. For clarity, we pool together firms that transact with a related party for either management services or real estate. Related party firms have remarkably similar nursing expenditures (\$18,629 per bed) compared to non-RP firms (\$18,179). Perhaps given these higher management and real estate costs, it is unsurprising that in panel (d) we find that related party firms appear less profitable on paper than do non-RP firms (reporting per-bed profits of \$965 and \$2,159, respectively).

While these results are suggestive of the intention and scope for profit tunneling, they are far from conclusive, and require a thorough research design to understand whether related party payments are inflated above their true costs. To do so, we need to employ a formal research design to estimate how related party usage impacts reported costs. We describe such an approach in the following section.

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<sup>4</sup>This threshold is very low relative to the market rate rental cost of a nursing home. We implemented this low threshold to help ensure that we also capture instances in which related parties set substantially below-market or even below-cost rents. Our findings were not sensitive to alternative thresholds.

<sup>5</sup>Note that management services may be coded across several line items, and so through this paper we bundle them together as ‘management.’ These include: ‘Administrative,’ ‘Directors Fees,’ ‘Professional Services,’ and ‘General Office’ expenses. We explore the relative contributions of each in Section 5.

<sup>6</sup>A small number of facilities also report rental payments for vehicles and other equipment, which we exclude from the real estate cost category.

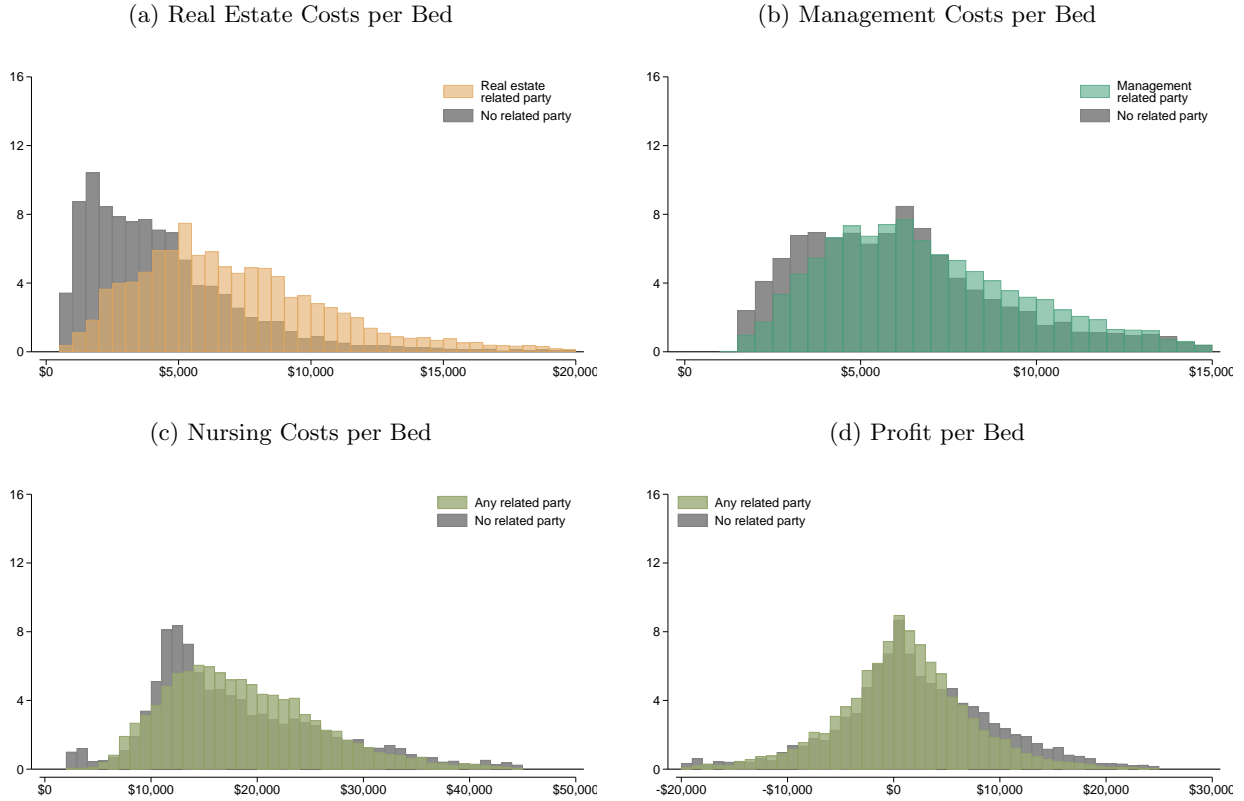


Figure 4: Costs and Profits by Related Party Status

*Notes:* Figure presents histograms of per-bed costs and profits, by related party status. Panel (a) presents total real estate expenses for firms that have adopted a rental company related party against those that have not. Panel (b) presents the corresponding figure for management service expenditures. Panel (c) presents nursing expenditures, pooling firms that have adopted either a management or a real estate related party and those that have neither. Panel (d) presents profits, also pooling related party firms.

### 3 Estimating the Impact of Related Party Adoption

Section 2.4 documents a number of differences between nursing homes that transact with related parties and those that do not. However, these differences need not be driven by the use of related parties. While nursing homes using related parties tend to have higher levels of total management and real estate spending, it may be that these facilities have higher costs for other reasons. For instance, firms that rent their facilities from related parties are significantly more likely to be based in Chicago (17.3% of firms) than firms that own their own buildings or rent from non-related parties (5.1% of firms). Geographic differences in land values and managerial labor markets could therefore explain the significant differences in spending. Even insofar as we control for observable differences, there may be unobserved ways in which nursing homes utilizing related parties have great costs.

Therefore, our empirical approach takes advantage of the fact that many facilities do not initially utilize related parties for particular services but start to do so during our sample period. Specifically, we leverage a difference-in-differences approach that compares changes in outcomes around the adoption of a related party to the contemporaneous changes for control nursing homes that did not adopt a related party. Crucially,

this approach allows us to exploit only *within-facility* variation in reported costs, rather than relying on the naïve cross-sectional comparison of costs across facilities in Section 2.4.<sup>7</sup> The necessary “parallel trends” assumption for such an approach is that contemporaneous average changes in control facilities’ outcomes reasonably represent the average changes in outcomes that would have occurred for related party adopters if they had not adopted related parties.

Because treatment events—i.e., the adoption of related parties in a given cost category—are staggered throughout our sample period (Figure 3), we employ a stacked difference-in-differences approach (Cengiz et al., 2019; Deshpande and Li, 2019) that avoids issues of negative weighting due to dynamic treatment effect heterogeneity (Goodman-Bacon, 2021). To do this, we first construct a separate cohort dataset for each treatment event that tracks an index treated facility and all eligible control facilities over an event window of four years before until four years after the index facility’s adoption of a related party. To avoid issues of negative weighting, facilities are only eligible as controls in a cohort if they still had not adopted a related party in the given service line by the end of the cohort’s event window. Finally, we ensure the panel is balanced by requiring that both the index facility and eligible controls report data for the full event window. This construction leaves us with 129 rental company adoptions and 79 management company adoptions. We then ‘stack’ the datasets and perform our analyses separately for related party rental company and management company adoption events.

We then estimate the following event study difference-in-differences regression equation on our stacked datasets:

$$y_{itm} = \beta_{t-\tau_m} RP_{im} + \alpha_{im} + \gamma_t + \varepsilon_{itm}, \quad (1)$$

where  $i$  indexes facility,  $t$  indexes calendar year,  $m$  indexes adoption event, and  $\tau_m$  gives the year of the adoption event. The variable  $y_{itm}$  denotes an outcome such as reported costs for nursing home  $i$  in year  $t$ . Recognizing that facilities differ in their mean outcome values—for instance, due to geographic differences in wages and land values—we include facility-by-cohort fixed effects  $\alpha_{im}$ . That these fixed effects also vary by cohort allows for the possibility that given the length of our sample period, the same facility may have different mean outcomes during different event windows. To flexibly account for industry-wide trends, we also include year fixed effects  $\gamma_t$ .

The variable  $RP_{im}$  is an indicator for whether facility  $i$  is the index (i.e., treated) facility for adoption event  $m$ , so that the vector  $\beta_{t-\tau_m}$  captures the treatment effect in event-time period  $t - \tau_m$  of adopting a related party in event-time period 0. Therefore, the evolution of  $\beta_{t-\tau_m}$  for  $t - \tau_m \geq 0$  shows the dynamic treatment effect of related party adoption. Examining the evolution of  $\beta_{t-\tau_m}$  for  $t - \tau_m < 0$  helps assess the plausibility of the parallel trends assumption. Note that in presenting our results, we omit the indicator corresponding to the period immediately prior to treatment (i.e., event-time -1) so that our coefficients can be interpreted as effects relative to this baseline period.

We cluster all our analyses at the firm-level, as this is the level of our treatment variation (Abadie et al., 2023). Additionally, because our stacking approach involves the same firm-year appearing multiple times in the data—for instance, the ‘never-treated’ firms appear as controls in all datasets)—clustering at the firm-level is crucial to account for the duplicate observations.

**Interpreting our Estimates** The difference-in-differences approach permits us to evaluate the impact of related party adoption on the outcomes that we study. Many of these outcomes are *reported* costs.

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<sup>7</sup>Note that the key disadvantage in employing this approach is that it precludes us from analyzing the considerable number of firms that were already transacting with a related party prior to the start of our sample.

Interpreting the impact of related party adoption on these costs requires additional assumptions on how firm costs evolve over time. The estimated changes in costs might reflect a material change to the type or quantity of inputs (i.e., changes in ‘true’ costs) or they may simply reflect variation in transfer prices (in which case the cost changes are only ‘on paper’). The assumption underlying our subsequent analysis is that the estimated changes in reported costs reflect the latter channel: transfer pricing rather than simultaneous cost shocks.

While this assumption is untestable — as ‘true’ costs are unobserved — there are reasons to believe it is plausible in this case. The adoption of a related party should not, on average, lead to changes in costs attributable to quantity or type of service that are substantially different than the contemporaneous average changes in the reported costs of control facilities. Even absent a control group, large year-over-year changes in true costs are implausible for many of the cost centers we consider. For example, it is unusual for real estate costs to jump considerably from one year to the next. When a nursing home that previously owned its land and buildings sells them to a related party real estate company and begins renting them back, the capital does not suddenly become more valuable. Indeed, one would normally expect firms ‘outsourcing’ services to do so because they generate cost *savings*, rather than cost hikes.

Nevertheless, one way to test this assumption is to assess whether we detect real changes in economic activity following related party adoption. If changes in reported costs correspond to simultaneous real cost shocks, rather than advantageous transfer pricing, then one would anticipate seeing an impact of related party adoption on the quantity or quality of care delivered. Similarly, one might expect such simultaneous cost shocks to be correlated across cost centers. Testing for ‘spillovers’ of a related party adoption onto other cost centers is another check for the validity of this assumption.

## 4 Real Estate Related Party Adoption

In this section, we assess the impacts of adopting a rental company related party—i.e. renting from a related party—on a facility’s costs and quality of care. We accomplish this by employing a stacked difference-in-differences approach to study the 129 instances in which a nursing home starts renting from a related party during our sample.

Table 1 summarizes the treatment and control facilities in the year prior to the index facility starting to rent from a related party. As in Section 2.4, we see that firms that adopt related party landlords tend to report lower profits and modestly higher real estate expenses – even prior to related party adoption. Adopting firms tend to be larger, significantly more likely to have a for-profit ownership, and are slightly more likely to operate in Chicago. Note that this imbalance in covariates between the treatment and control firms does not violate the necessary assumptions of our research design. The critical identification assumption for our difference-in-differences approach is that of parallel *trends*, rather than levels.

Sections 4.1 and 4.2 leverage our difference-in-differences approach to estimate the impact of renting real estate from a related party on a firm’s reported costs and balance sheet, respectively. In addition to studying the nursing home’s finances, we also inspect the balance sheet of the related party, as we find that analyzing both together sheds light on how related parties are being used to ultimately confer a financial advantage for owners.

	Adopting Firms	Control Firms
	(1)	(2)
<i>Per-Bed Financials (\$)</i>		
Revenue	54,725.2	63,787.6
Expenses	53,067.5	62,038.2
Profit	1,089.0	1,773.5
<i>Per-Bed Expenses (\$)</i>		
Nursing	17,031.0	19,704.8
Total Real Estate	4,792.8	4,420.8
<i>Facility Characteristics</i>		
Beds	123.9	79.6
For-Profit, %	76.7	28.7
Occupancy, %	78.1	85.6
Medicaid Share, %	67.3	70.9
Chicago, %	6.2	5.3
Number of Firms	129	517

Table 1: Comparison of Rental Company Related Party Firms and Control Firms

*Notes:* Table provides a comparison of facilities in the year prior to a rental company related party adoption and the firm-years that are selected as clean controls.

#### 4.1 Impact on Real Estate Costs

The typical way in which a nursing home adopts a real estate related party is through a transaction known as a “sale-leaseback.” As the name suggests, in a sale-leaseback, a firm sells its real estate but continues operating in the property through a lease. Note that sale-leasebacks need not involve related parties. Arms-length sale-leasebacks are a common way for firms to convert illiquid ownership of real estate into liquid capital that can be invested, used to pay debts, or be distributed to shareholders. However, in a related party sale-leaseback, both parties share a common owner that does not gain any net liquidity. This suggests that there must be other advantages or implications of the transaction. This section therefore studies the reported costs of both nursing homes and their related parties to better understand the implications of renting from a related party.

When a nursing home starts to rent from a related party, the nature of the facility’s real estate spending changes. Beforehand, the facility would typically have incurred direct costs of owning the real estate, such as depreciation, real estate taxes, and mortgage interest. Afterward, the facility would primarily be paying rent to the related party. Accordingly, our main focus in this section is on total real estate spending, i.e. the sum of these component parts.

We examine these impacts on a facility’s real estate spending using our stacked difference-in-differences approach in Figure 5. Panel (a) shows our event study estimates of the effect of related party adoption on a nursing home’s total spending on real estate. Reassuringly, there is no indication of diverging trends between the treatment facilities and those in the control group. There is, however, a marked jump in total real estate spending in the year of the rental company adoption. In the first year that a nursing home reports a rental payment to a related party, total reported real estate costs rise by \$823 per bed. Pooling the entirety of the post-adoption window, real estate costs rise by \$1,003. This corresponds to an 20.4% increase in spending, relative to the pre-adoption mean.



In panel (b), we decompose the total effect into changes to direct spending on real estate by the nursing home and rental payments made to the related party. The estimates do suggest that in renting from a related party, the facility is substituting the direct costs of ownership for related party rental payments. As already shown in Panel (a), these two effects do not perfectly offset one another. In other words, the additional rent paid to the related party substantially exceeds the savings from having fewer direct costs of real estate ownership.

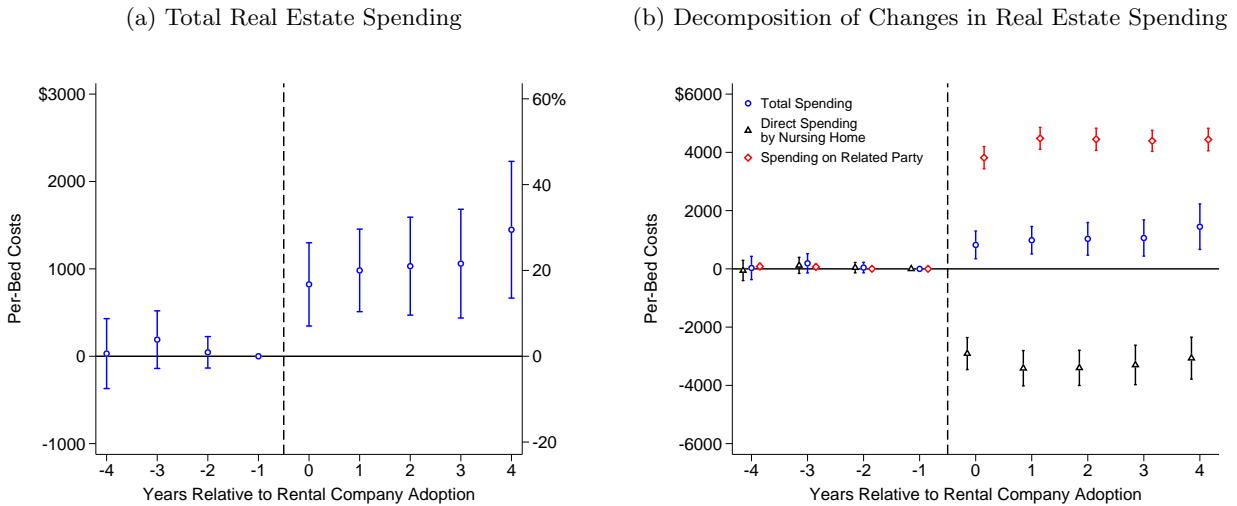


Figure 5: Real Estate Expenses Around Rental Company Adoption

*Notes:* Figure presents event studies of real estate costs around the time a nursing home adopts a rental company related party. Panel (a) presents the overall impact on real estate costs per bed. The right-axis denotes the percent effect relative to the pre-adoption mean for the treatment group. Panel (b) decomposes the total effect into direct and related party components. Each point corresponds to an estimate of the  $\beta^T$  parameters from equation (1). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

Therefore, the primary impact on a nursing home of renting real estate from a related party is to increase the facility's real estate costs. Given that these sale-leasebacks are typically purely financial transactions, it is difficult to rationalize the increased real estate costs as justified by material improvement to the real estate. Put simply, our estimates imply that when a nursing home begins to rent from a related party, it begins to pay more for the same real estate.

Figure 6 provides an alternative decomposition. Here, we disaggregate the largest components of total real estate spending (i.e., summing both direct and related party expenditure). These include rental payments (for those firms that rent their facility), as well as the large direct costs of facility ownership, which include depreciation, interest, and real estate taxes. As predicted, we observe a large increase in rental payments, and smaller declines in the direct costs of property management. Rental payments increase by \$3,063 per bed. These are partially offset by large declines in depreciation expenses (\$1,003), interest payments (\$944), and real estate taxes (\$272), but notably these declines sum to less than the overall hike in rents, again generating the increase in total real estate spending reported in Figure 5.

To explore this, we briefly shift focus from payments made to related parties to the consolidated costs reported by these entities. Our analysis so far has restricted attention only to payments made by the nursing homes to related parties, but the data also contain reported costs borne by these entities as well. Recall from

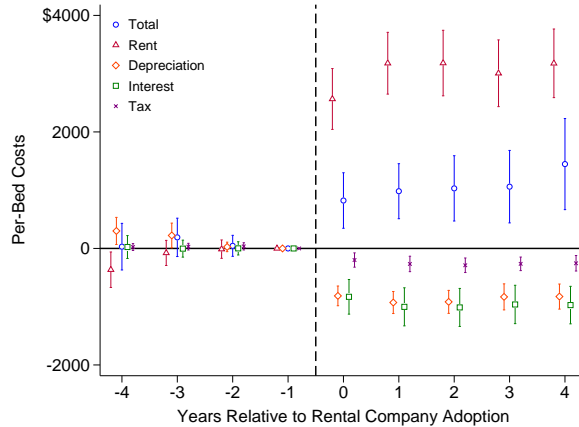


Figure 6: Components of Real Estate Costs

*Notes:* Figure presents event study of real estate costs in a window around a rental company related party adoption, decomposing the total effect into components coming from rent, depreciation, interest, and real estate taxes. Each point corresponds to an estimate of the  $\beta^r$  parameters from equation (1). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

Section 2.2 that these reported costs of related parties may be less reliable (for instance, they themselves may reflect inflated salaries to owners and relatives), hence the aim of our paper to estimate the related party markup using only changes in reported facility costs. Nonetheless, these reported costs borne by related parties are still instructive for understanding how the owner may extract the new rental payments.

By considering the reported costs of related parties, we can discern a strategic dimension to these transactions that extends beyond cost allocation. A critical aspect of this strategy is the ‘resetting’ of the depreciation clock. Depreciation, as a deductible non-cash expense, offers significant tax advantages. By transacting with related parties, firms effectively refresh the base value of their assets, allowing them to claim higher depreciation expenses over time. Hence, this maneuver serves a dual purpose: In addition to masking the true profitability of the firm by inflating expenses, and it strategically utilizes the tax code to reduce taxable income.

To examine how the consolidated entity (both the firm and the related party) claims depreciation, we combine the direct depreciation expenses of the nursing home with the reported depreciation claimed by the related party. We then re-estimate equation (1) using this alternative cost construct as the dependent variable. Figure 7 panel (a) contains the results. We find a large increase in net reported depreciation costs following the rental company adoption; the consolidated entity’s depreciation expenses rose by 22.4% in the post-adoption window. This increase in depreciation follows mechanically from an increase in the transaction price of the asset, as well as a ‘resetting’ of the straight-line depreciation clock. The related party entity can then report this higher level of depreciation as a means to reduce its overall tax bill.

We find a comparable increase in total interest payments in Figure 7 panel (b). As with depreciation, this increase in interest payments—corresponding to a significant 40.5% increase over the pre-period mean—is tax deductible. Perhaps more importantly, the fact that the total interest payments from the joint entity are increasing suggests that the sale-leaseback is actually increasing the total leverage of the joint-entity. Specifically, it indicates that the related party may be taking out a larger mortgage on the real estate than

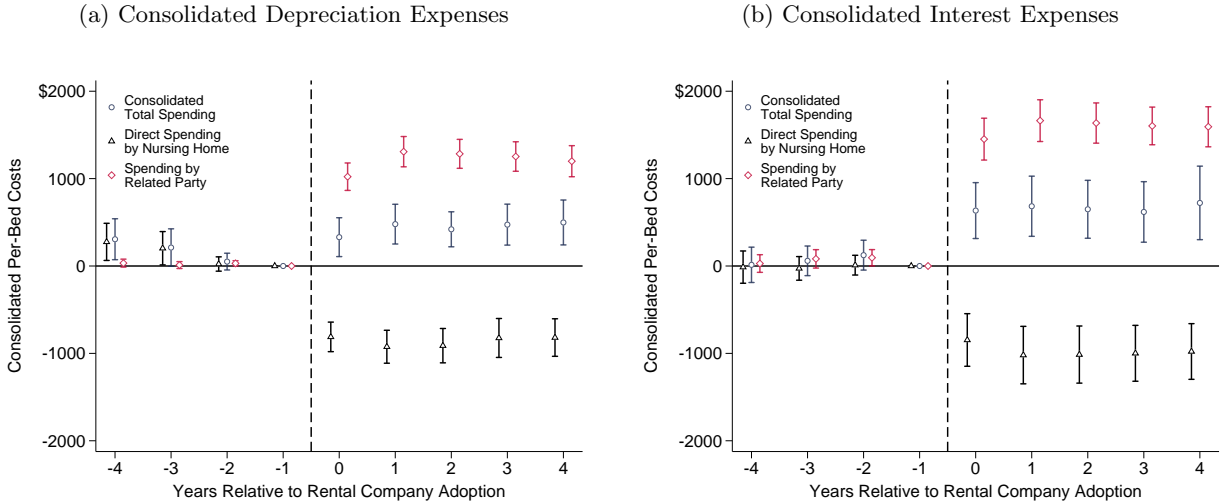


Figure 7: Incorporating Costs Reported by Related Parties

*Notes:* Figure presents event studies of consolidated spending on two components of real estate expenses. Panel (a) considers depreciation expenses, both direct and those borne by the related party. Panel (b) considers interest expenses, also direct and paid by the related party. Each point corresponds to an estimate of the  $\beta^\tau$  parameters from equation (1). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

was originally held by the nursing home. We investigate this additional leverage further in Section 4.2 below.

We also examine the robustness of our analysis to several alternative specifications. Costs are commonly right-skewed, and so we examine the sensitivity of our results to a log transformation. In Appendix Figure B.6 panel (a), we plot estimates of equation (1) with a logged dependent variable, and find very similar estimates. Turning to alternative estimators, we find that a standard two way fixed effects regression (i.e., without stacking our events) provide similar estimates and no evidence of differential pre-trends (Appendix Figure B.7). This similarity is not unexpected, as the stacking approach addresses the negative weighting concerns by ensuring each comparison is only between treated facilities and ‘clean’ controls.

## 4.2 Impact on Balance Sheets

The hike in consolidated interest payments (and the new debt they imply) indicated in Figure 7 panel (b) raises an additional question around the overall financial health of the consolidated entity (i.e., the nursing home and its related parties). To examine this, we turn our focus next to detailed balance sheet data that are also contained in the annual cost reports. As part of Illinois’ efforts to boost financial transparency in its nursing home industry, facilities must also provide a consolidated balance sheet, which is the sum of the assets and liabilities of the nursing facility as well as any related parties with which the firm reports a transaction. Using these data, we construct new balance sheets for the related parties themselves, which we define as the difference between the consolidated and direct lines.

Using these three series (direct, related party, and the consolidated balance sheet), we can examine the implications of a related party adoption on the financial health of not only the firm but the consolidated entity as well. To do so, we re-estimate equation (1), replacing the dependent variable with various balance sheet line items. As with all outcomes, we normalize each item by the number of beds in a facility. We estimate separate regressions for the balance sheets of the nursing facility, the related party, and the consolidated

(total) entity.

Figure 8 presents the results. Panel (a) presents the results for total assets per bed. As the building transfers from direct ownership by the firm to the related party, assets reported by the firm fall, with an accompanying rise in assets reported by the related party. Surprisingly, we find that the related party jump does not perfectly offset the dip for directly held assets, such that the total assets held by the consolidated entity fall by 49.0% after a rental company adoption.

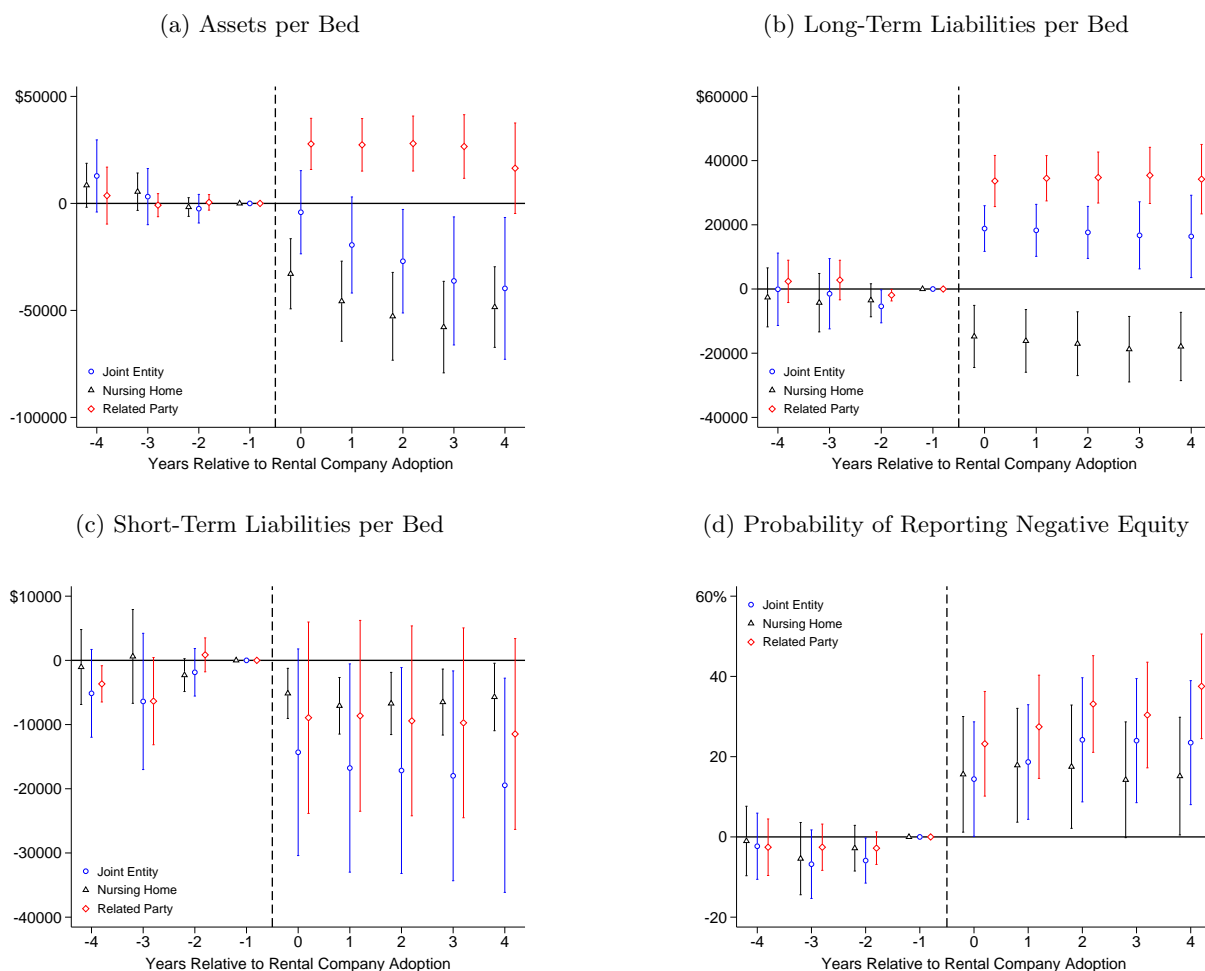


Figure 8: Change in Balance Sheet

*Notes:* Figure presents event studies of balance sheet line items in a window around a rental company related party adoption. Each point corresponds to an estimate of the  $\beta^T$  parameters from equation (1) with a different dependent variable. The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

The decline in total assets does not necessarily suggest a below-market transaction value of the building, nor that the firm is necessarily made worse off. For instance, it might be that the firm uses the capitalization opportunity to pay down other liabilities. We explore this possibility in panels (b) and (c), which examine the long- and short-term liabilities of each entity. The results are striking. Consistent with Figure 7 panel (b), which reported an increase in consolidated interest payments, here we see a 88.6% increase in long-term liabilities for the consolidated entity, driven entirely by increases in liabilities owed by the related

party. This increase in liabilities is driven entirely by an increase in mortgages (Appendix Figure B.4), revealing that the related party is indeed financing its acquisition of the building through debt.<sup>8</sup> We also find that directly owed long-term liabilities fall slightly, consistent with the firm using the opportunity to pay off any remaining mortgage debt. The large increase in long-term liabilities presents the question of where the newfound liquidity is going. Panel (c) suggests that both the firm and the related party are using this liquidity to pay down short-term liabilities, the total of which falls by 55.7% of the mean in the post-adoption window. However, these decreases in short-term liabilities are insufficient to offset the large increase in long-term liabilities taken on by the related party.

Indeed, when we examine either the direct firm, the related party, or the consolidated entity, we find that the total book-value of equity—i.e. total assets net of total liabilities—of *each* entity declines significantly, such that the probability total liabilities exceed book assets (i.e., negative equity) for the consolidated entity rises by 24.7 percentage points. For the nursing facility, this increase is 18.4 percentage points; for the related party the probability rises by 32.3 percentage points.

That the book-value of the nursing home decreased suggests that the purchase price related parties pay nursing homes for facility’s real estate in a sale-leaseback is lower than the book-value of the real estate. While it could be that the book-value of the real estate on nursing homes’ balance sheets could exceed its true value, this would seem to be inconsistent with the fact that related parties also typically charges nursing homes a premium to lease the space rather than own it (Figure 7). Taken together, this suggests tunneling either or both by related parties underpaying for nursing homes’ real estate or over-charging nursing homes to lease back the real estate.

The decrease in book-values of related parties is perhaps even more revealing. It implies that any value tunneled from the nursing home is not held on the balance sheet of the related party. Since our estimates show related parties are taking out substantial debt that exceeds any corresponding increase in assets, it must be that related parties are spending or paying out this difference to shareholders via dividends, share-buybacks, or other means. Unfortunately, nursing home owners are not required to divulge such payments from related parties to shareholders. This lack of mandated transparency may also represent a key advantage to tunneling, since nursing homes’ dividends and other payments to owners must be reported to the government and can be scrutinized by the public.

### 4.3 Impacts on Patient Care

Our results thus far suggest substantial changes in reported costs. This raises the question of whether these costs translate meaningfully to changes in patient care. Examining outcomes that reflect real economic activity – such as changes in quantity (i.e., patient days), quality (patient health outcomes), or capacity (total beds) – serves multiple purposes. For instance, one approach to assess the validity of our identification assumption is to examine whether there are large simultaneous changes in any of these variables that might reflect significant cost shocks, such as an expansion in capacity. Alternatively, one might worry that increases in real estate costs might generate reductions in nurse staffing, thereby diminishing patient health outcomes.

To assess changes in these other non-cost measures, we turn to the LTCFocus data, which provide annual data on characteristics, labor inputs, and patient outcomes for the near universe of nursing homes.<sup>9</sup> For each outcome measure we study, we re-estimate a version of equation (1) using the new dependent variable,

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<sup>8</sup>Note that this increase in long-term liabilities exceeds the increase in interest payments, suggesting that in general this new debt is on comparatively favorable terms to pre-existing debt.

<sup>9</sup>LTCFocus is sponsored by the National Institute on Aging (1P01AG027296) through a cooperative agreement with the Brown University School of Public Health.

but now collapse the relative time indicators to a single post-adoption dummy, for brevity. Moreover, to ease comparison across outcomes, we express each treatment coefficient as a percentage of the pre-treatment standard deviation.

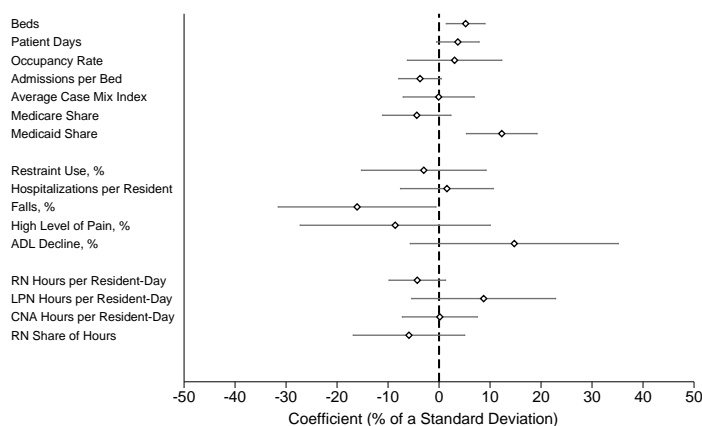


Figure 9: Clinical Outcomes and Rental Company Adoption

*Notes:* Figure presents a forest plot of different non-financial outcomes. Each point presents an estimate from a variant of equation (1) with a different dependent variable, and the relative time dummies collapsed to a post-adoption indicator for whether the firm has adopted a rental company related party indicator. For ease of comparison, all coefficients are scaled by the standard deviation across non-treated observations. The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Standard errors are clustered by facility.

Our findings are summarized in Figure 9. We find no evidence of meaningful changes (considering both economic and statistical significance) in any of the outcomes studied. Firms report no meaningful changes in beds, total patient days, patient case mix, payer composition, use of restraints, hospitalizations, patient outcomes (although these are measured with considerable noise), nor in their use of either skilled nurse or nurse aide staffing. These null results lend support to the identification assumption that true costs evolve smoothly over the event window – as it suggests that the transactions reported here only reflect profit tunneling rather than changes in real economic activity – and they alleviate concern that firms are shirking on their key labor inputs.

#### 4.4 Discussion

Taken as a whole, these results paint a worrying portrait of the use of real estate related parties. From the vantage point of the nursing home, there appears to be little upside. When a facility sells its building to a related party, its new rental payments outstrip its prior real estate expenditures, generating an increase in annual fixed costs. Although this could be rationalized as a strategic sale-leaseback transaction, where the firm may need to generate liquidity immediately, the evidence does not support this notion. Instead, the firm’s assets fall substantially more than its liabilities, generating a sharp increase in the probability of reporting negative equity. The financial implications are twofold: Not only do real estate costs increase, but the nursing home also loses its current book value. Put another way, the nursing home pays a premium today for the privilege of paying higher rent in the future. This pattern of transactions appears counterintuitive and financially unwise from the firm’s perspective, and it is difficult to rationalize these actions as being beneficial for the nursing home entity.

Instead, these results suggest that the related party is extracting shareholder equity from the nursing

home’s balance sheet. The related party takes on a significant mortgage to acquire the building, which in addition to providing an opportunity to ‘reset’ the depreciation clock, provides it with a steady revenue stream of inflated rental payments. Now heavily leveraged with mortgage debt, this related party also has little book value, and many report negative equity values. This pattern therefore implies that related parties are transferring the new revenues off-book, likely to their shareholders. This could involve liquidating assets and disbursing them to owners in a manner obscured by the cost report data, such as dividend payments or share buybacks. Unfortunately, the extent to which our data can speak to this possibility is limited. While we do find that the related party appears to be paying off its own short-term liabilities, detailed financial information on the related parties themselves would be necessary.

These findings are crucial for policymakers. We highlight that the problem of related party adoption extends beyond a single layer and involves complex, multi-layered financial transactions. Addressing this type of asset extraction requires comprehensive strategies, either by preventing related parties from such extractions or by enforcing more detailed documentation and rules. These measures should focus on preventing related parties from shifting payments to shareholders, especially when the facility is financially insolvent or has negative equity, posing risks to the state and its patients. Another implication is the inadequacy of limiting liability solely to nursing homes and related parties. As noted, one advantage to a firm owner from transferring profits to a related party is to shield them from liability, and so a natural implication is to extend liability to any related parties as well. Our analysis of related party balance sheets suggest that even this may be inadequate, if the related parties are themselves so over-levered as to appear destitute, and instead policymakers should consider extending liability to the ultimate (human) owner of both.

## 5 Management Services Related Party Adoption

The descriptive analysis of Section 2.4 indicates that after rent, management services is the second largest category of related party spending. Together, these two cost centers comprise the lion’s share of all related party spending, and are therefore the focus of our analysis. We adopt an identical approach to estimating the impact of management services related party adoption; that is, we estimate a variant of equation (1), in which we consider management company related party adoption, and consider total per-bed management costs as our main outcome.

Table 2 presents summary statistics for our set of management company adopting firms that we study and their corresponding control group. Compared to our analysis of real estate related parties, we see that there are slightly fewer adopting firms that meet the continuous coverage requirement. Our analysis includes 79 adopting firms (events). As before, for each treatment and control facility, we examine values from the year prior to the index related party adoption. These patterns are broadly similar to those reported in Table 1. Adopting firms tend to be larger, significantly more likely to have a for-profit ownership, and are more likely to operate in Chicago. These firms appear much less profitable, however – the mean management company adopting facility reports roughly similar levels of management spending, but reports an overall operating loss.

### 5.1 Impact on Management Costs

As before, while we see a similar persistent imbalance between our adopting and control firms in Table 2, our difference-in-differences approach relies on the parallel trends assumption. To assess the validity of this

	Adopting Firms	Control Firms
	(1)	(2)
<i>Per-Bed Financials (\$)</i>		
Revenue	58,361.9	60,840.0
Expenses	59,127.8	58,409.1
Profit	-345.1	2,677.7
<i>Per-Bed Expenses (\$)</i>		
Nursing	18,959.5	18,423.7
Management	5,956.9	6,492.3
<i>Facility Characteristics</i>		
Beds	141.5	61.6
For-Profit, %	55.7	26.2
Occupancy, %	79.2	88.2
Medicaid Share, %	66.0	79.3
Chicago, %	13.9	6.9
Number of Firms	79	372

Table 2: Comparison of Management Related Party Firms and Control Firms

*Notes:* Table provides a comparison of facilities in the year prior to a management company related party adoption and the firm-years that are selected as clean controls.

assumption, we can examine the leading  $\beta^\tau$  terms from equation (1), estimated over our management related party sample, and considering management costs as the dependent variable.

Our primary results are shown in Figure 10. In panel (a) we plot the estimates of  $\beta^\tau$  from equation (1), with total per-bed management costs as the dependent variable. On the right axis we present the corresponding percentage effects, where the  $\beta^\tau$  estimates are scaled by the pre-adoption average cost among the adopting firms. Reassuringly, we find no evidence of differential pre-trends; the estimates remain close to zero and show no indication of increases prior to adoption. In the year of adoption, however, management spending spikes significantly by \$1,124 per bed. Management spending then continues to climb slightly, such that the post-adoption mean is approximately 25% above the pre-adoption mean. In panel (b), we plot a parallel decomposition as in Figure 5 panel (b). These results illustrate the mechanism at play: a facility adopts a management company related party and direct management spending falls as the firm substitutes for management services provided by a related party. However, the substitution is not one-for-one, so the rise in related party spending more than offsets the decline in direct spending, generating the overall increase in management spending documented in panel (a).

To classify management fees, we bundle several separate line items from the cost report data, just as we do with total real estate costs. These include ‘Administrative,’ ‘Directors Fees,’ ‘Professional Services,’ and ‘General Office Expenses.’ Firms are not uniform in how they categorize management services: Each of these groups contain related party transactions that are labeled as management fees, and so to be exhaustive we include each of them. Unfortunately, these categories may cover payments for services unrelated to management. Directors fees include payments to members of the board of directors, who are unlikely to be involved in daily management decisions. Professional services can encompass fees paid for legal services, accounting, data processing as well as management. Administrative includes gross salaries and wages of general administrative personnel, chiefly the facility administrator, whereas general office expenses cover



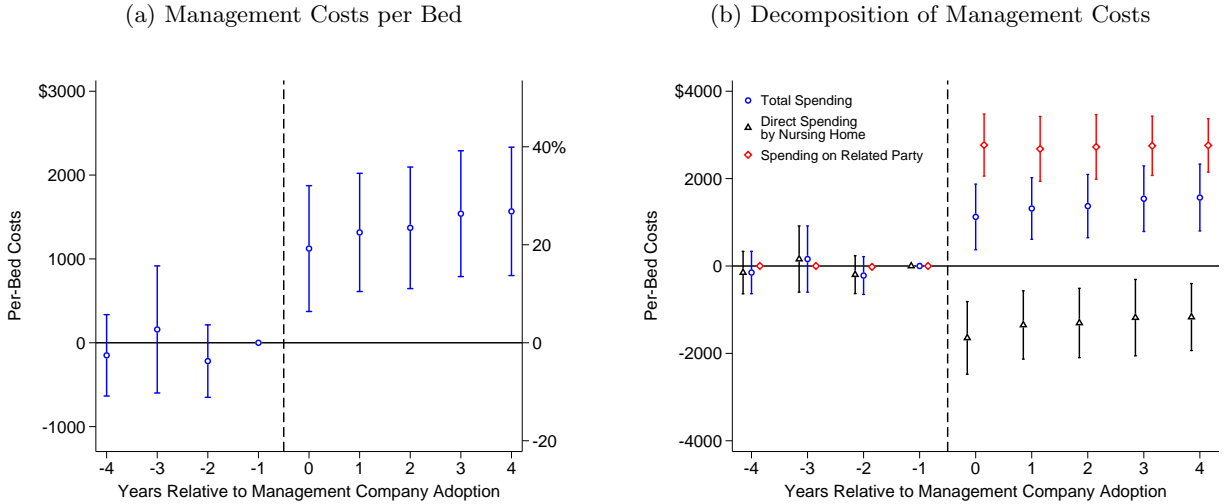


Figure 10: Management Expenses around Related Party Adoption

*Notes:* Figure presents event studies of management costs around the time a nursing home adopts a management company related party. Panel (a) presents the overall impact on management costs per bed. The right-axis denotes the percent effect relative to the pre-adoption mean for the treatment group. Panel (b) decomposes the total effect into direct and related party components. Each point corresponds to an estimate of the  $\beta^T$  parameters from equation (1). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

the salaries and wages of (primarily) clerical staff. As with real estate, we may decompose the overall management effect into each of these categories separately.

Figure 11 contains the results. The entirety of the total effect documented in Figure 10 is driven by administrator salaries. This allows us to rule out the possibility that what we are documenting is instead, say, an adoption of a related accounting or legal firm due to the inability of the data to separate management from other professional services. That we find no meaningful increase in clerical salaries (termed ‘general office’ in the figure) is also revealing about the nature of the related party adoption. A concern that runs throughout our analysis of management expenses is that a management company adoption might correspond with some improvement in either the quantity or quality of management. If this were the case, one might expect to find increases in the quantity or quality of their support staff as well, but these results indicate no change in clerical salaries. Instead, the increase in ‘management’ spending appears to indeed be entirely driven by increases in salary for the facility administrator.

One natural concern is that related party adoption might coincide with an ownership transition. If a facility’s ownership changes hands, one might expect that the provision of management services to change as well. This is difficult to separately identify from profit tunneling. Our view is that greater management provision that does not generate changes in any real economic variables (as discussed in Section 5.3) is not so conceptually different from the straightforward tunneling we have discussed. Nonetheless, in Figure B.8 panel we re-examine our main results, restricting to the subset of 55 facilities that did not have a change in ownership in the year of or immediately prior to a management company related party adoption. While these terms are estimated with more noise, the point estimates are quite similar.

As with our analysis of real estate costs in Section 4.1, we also examine the robustness of our analyses to several alternative specifications. In Appendix Figure B.6 panel (b) we plot estimates of equation (1) with a

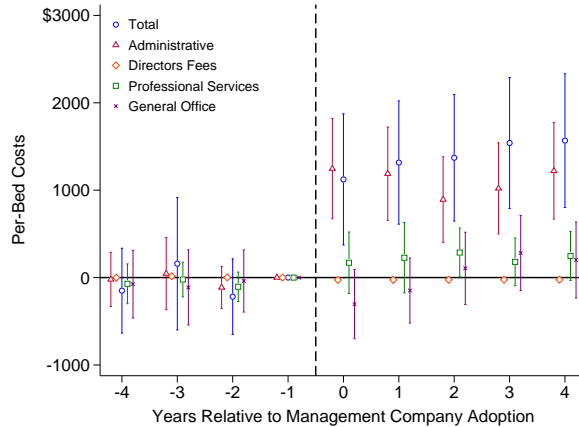


Figure 11: Management Cost Decomposition

*Notes:* Figure presents event study of management costs in a window around a management company related party adoption, decomposing the total effect into components coming from administrator salaries, directors fees, professional service, and general office/clerical salaries. Each point corresponds to an estimate of the  $\beta^T$  parameters from equation (1). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

logged dependent variable, and find very similar estimates. We again find similar estimates using a standard two way fixed effects approach (Appendix Figure B.7 panel (b)).

## 5.2 Ownership Compensation

We cannot directly rule out the possibility that related party adoption corresponds to a greater provision of management services, rather than just a related party markup over existing services. Indirectly, we may attempt to assess this possibility by examining how spending in non-management categories changes around a management company related party adoption. For example, one might anticipate that greater provision of management services by a related party would generate changes in other inputs, such as nursing expenses. In Appendix Figure B.5, we examine each of the other cost centers in our data, re-estimating equation (1) for each cost  $s$ . Of the 8 other cost centers we examine, the only area in which management company adoption generates a statistically significant increase in spending is ‘provider participation fees,’ which are paid directly to the government and exhibit strong pre-trends, suggesting they do not reflect simultaneous cost shocks. The null effects in areas such as nursing and food, housekeeping, and laundry also provide assurance that what we are capturing is not a re-coding of expenses, such as paying a related party for ‘management’ services, which then provides management and housekeeping services bundled together.

Instead, we argue that these related party management costs at least partially reflect direct payments to owners. This is difficult to assess using only the data available in the cost reports, but one area we can probe is reported ownership compensation. In the cost report data, facilities are required to report all compensation to owners and their relatives, as well as members of the boards of directors for non-profit firms. Turning to this data, we can re-estimate equation (1) using reported ownership compensation for management services as the dependent variable. The results, in Figure 12, are noisily estimated, but suggest that reported direct management compensation to owners by the firm falls by 24.8%, albeit we cannot reject this difference is statistically different from zero. This result provides suggestive evidence that at least some of the increase

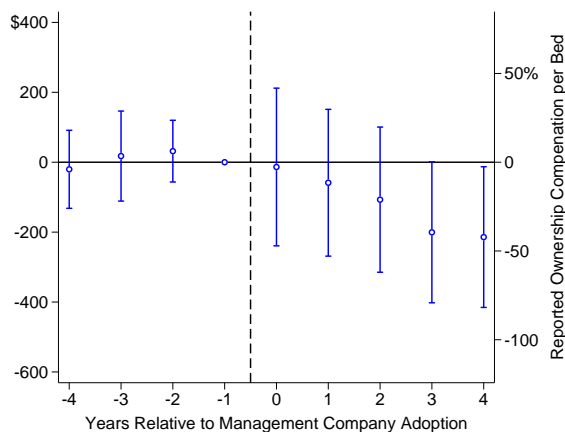


Figure 12: Reported Ownership Compensation for Management Services

*Notes:* Figure presents event study of reported ownership compensation for management services around the time a nursing home adopts a management company related party. The right-axis denotes the percent effect relative to the pre-adoption mean for the treatment group. Each point corresponds to an estimate of the  $\beta^T$  parameters from equation (1). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

in management costs reported in Figure 10 may be ownership compensation in disguise, supporting the hypothesis of related parties facilitating profit tunneling by firms.

### 5.3 Impacts on Patient Care

Turning to the same clinical outcomes data studied in Section 4.3, we can conduct a comparable analysis of the impact of management company adoption on patient care. If increases in management spending substitutes resources away from direct care staffing, one might expect to see decline in patient care, and so this analysis is of independent interest. However, our analysis of direct care resources and patient outcomes is also informative for our research design. We are unable to examine the ‘quantity’ or ‘quality’ of management services using the cost report data. Instead, we can examine the ‘outputs’ of such hypothetical management services, such as whether care improves in a measurable way. Absent any changes in these outcomes, we may conclude that any additional management services provided by the related party at the very least provided no measurable clinical benefit.

Figure 13 presents the results. We find no evidence of significant changes in any of the outcomes studied. Firms report no meaningful changes in beds, total patient days, patient case mix, payer composition, use of restraints, hospitalizations, patient outcomes (although these are measured with considerable noise), nor in their use of either skilled nurse or nurse aide staffing. Our measures of patient outcomes are particularly noisy, and we are unable to reject potentially meaningful impacts on variables such as hospitalizations and falls. However, notice that these estimates move in opposite directions: we find (statistically insignificant) positive point estimates for hospitalizations per resident, but (insignificant) declines in falls, which are inconsistent with one another. This incongruity suggests that statistical noise, rather than quality improvements/declines, is driving these results.

These null results lend support to the identification assumption that true costs evolve smoothly over the event window – as it suggests that the transactions reported here only reflect profit tunneling rather than

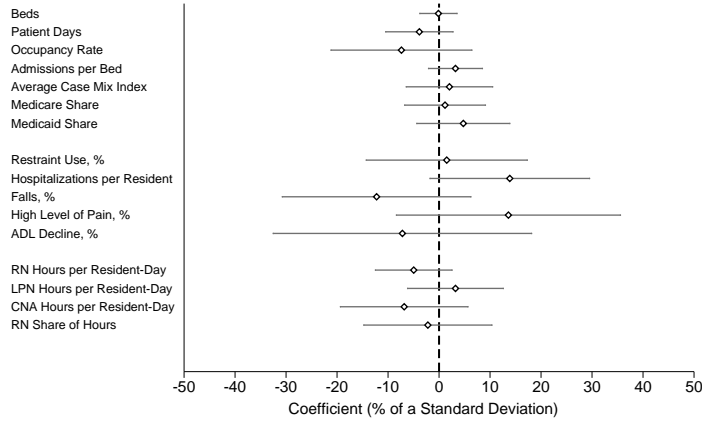


Figure 13: Clinical Outcomes and Management Company Adoption

*Notes:* Figure presents a forest plot of different non-financial outcomes. Each point presents an estimate from a variant of equation (1) with a different dependent variable and the relative time dummies collapsed to a post-adoption indicator for whether the firm has adopted a management company related party indicator. For ease of comparison, all coefficients are scaled by the standard deviation across non-treated observations. The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Standard errors are clustered by facility.

changes in real economic activity – and they alleviate concern that firms are further shirking on their key labor inputs as a result of the related party adoption.

## 6 Calculating Unreported Profit

The event study results in Sections 4 and 5 reveal that related party adoption is associated with an increase in total reported expenditures. Accurate profit accounting requires deflating these related party expenditures accordingly. In this section we apply our research design to construct an alternative measure of nursing home profit adjusted for the inflated costs hidden by related party transactions. As with our preceding analysis, given the variance in size across firms, all costs and revenues are expressed in per-bed terms, though for ease of exposition we omit repeating this point below.

### 6.1 Conceptual Framework

In this section, we describe our conceptual framework for calculating hidden profits. Intuitively, a \$1 increase in related party spending should be completely offset by a \$1 decline in direct spending. That is, the usual justification for firms to ‘outsource’ services is to *reduce* total costs; the results of Sections 4 and 5 suggest that such ‘outsourcing’ to a related party in fact *increases* total costs spent on those services. The exercise in this section is to calculate the size of the markup over providing these services ‘in-house.’

Formally, extending the notation from Section 3, for each firm  $i$  and year  $t$ , we observe reported revenues  $r_{it}$  and reported costs, where total costs  $c_{it}$  can be written as the sum of costs  $c_{it}^s$  across each service  $s$  (such as management or real estate):  $c_{it} = \sum_{s \in \mathcal{S}} c_{it}^s$ . A straightforward profit accounting, under accurate cost reporting, would be the familiar  $\pi_{it} = r_{it} - c_{it}$ . The issue is that *reported* costs  $c_{it}$  may differ from *true* costs  $\tilde{c}_{it}$ . The aim of this section is to estimate true costs  $\tilde{c}_{it}$ , using changes in observed costs  $c_{it}$ , with which we can construct ‘true’ profits as  $\tilde{\pi}_{it} = r_{it} - \tilde{c}_{it}$ .

We begin by partitioning reported costs  $c_{it}^s$  into two components: reported related party costs,  $p_{it}^s$ , and direct costs paid by the facility, defined as  $d_{it}^s \equiv c_{it}^s - p_{it}^s$ . The wedge between reported and true costs is driven by this related party cost term  $p_{it}^s$ , which may be artificially inflated above the true cost of the service provided. Let us denote this deflated true cost as  $\tilde{p}_{it}^s$ . Assuming a service-specific inflation factor common across facilities, we may then write  $\tilde{p}_{it}^s = \theta^s p_{it}^s$ , where  $\theta^s$  provides the deflation factor for cost service  $s$ , which is constant across facilities and time.<sup>10</sup>

Recall the aim is to recover deflated total costs  $\tilde{c}_{it}^s$ :

$$\tilde{c}_{it}^s = d_{it}^s + \tilde{p}_{it}^s = d_{it}^s + \theta^s p_{it}^s$$

Notice that from the definition of direct costs, we have  $d_{it}^s = c_{it}^s - p_{it}^s$ , which is just an accounting identity. Plugging this into our expression for true costs  $\tilde{c}_{it}^s$  yields:

$$\tilde{c}_{it}^s = d_{it}^s + \theta^s p_{it}^s = c_{it}^s - p_{it}^s + \theta^s p_{it}^s = c_{it}^s + (\theta^s - 1)p_{it}^s$$

We must make a functional form assumption on the evolution of true costs  $\tilde{c}_{it}^s$ , which is of course unobserved. The difference-in-differences equation (1) from Section 3 implies that true costs are additively separable in facility and time components and a mean-zero iid error:  $\tilde{c}_{it}^s = \alpha_i + \gamma_t + \varepsilon_{it}$ . Rearranging terms, this yields the following equation:

$$c_{it}^s = (1 - \theta^s)p_{it}^s + \alpha_i + \gamma_t + \varepsilon_{it} \quad (2)$$

For each category  $s$ , equation (2) shows how deflation parameter  $\theta^s$  relates related party prices and reported costs.

## 6.2 Empirical Approach

Equation (2) provides the basis for our estimating equation, which is a difference-in-differences design with continuous treatment in the amount of related party spending ( $p_{it}^s$ ). In such a regression, the coefficient on  $p_{it}^s$  would give an estimate of  $(1 - \theta^s)$  and characterize the extent to which related party transfer prices are inflated.

Note that unlike our difference-in-differences approach in Section 3, equation (2) leverages all conditional covariation between  $c_{it}^s$  and  $p_{it}^s$ , including for facilities that have long employed related parties. To better mirror Section 3 in leveraging only variation due to the new adoption of a related party, our primary specification is:

$$c_{it}^s = (1 - \theta^s)RP_{it}^s \times \bar{p}_i^s + \alpha_i + \gamma_t + \varepsilon_{it}, \quad (3)$$

where  $RP_{it}$  is an indicator for facility  $i$  having adopted a related party in service area  $s$  by  $t$ , and  $\bar{p}_i^s$  is the average post-adoption related party spending for facility  $i$ .<sup>11</sup> Because equation (3) disregards any variation in  $p_{it}^s$  after related party adoption, it identifies related parties' inflation of transfer prices exclusively using the

<sup>10</sup>Note that this simple model could accommodate time- or facility-varying deflation factors (under an alternative distributional assumption), but for simplicity in estimation we keep the model parsimonious.

<sup>11</sup>Prior to related party adoption in service line  $s$ ,  $RP_{it}^s \times \bar{p}_i^s$  takes a value of 0, and after adoption, it takes the value of the facility's average post-adoption related party spending on service  $s$ . It is always zero for facilities that never adopt a related party for service line  $s$ .

adoption of new related parties. While still a difference-in-differences with continuous treatment, equation (3) enforces that all variation in non-zero treatment can be thought of as dosage size. While this approach has been employed before (Acemoglu and Finkelstein, 2008), it requires the assumption of parametric linearity of treatment effect in dosage size (Callaway et al., 2024).<sup>12</sup> Under this assumption, we can estimate  $(1 - \theta^s)$  by applying regression equation (3) to our stacked dataset.<sup>13</sup>

With the full set of deflation parameters  $\theta^s$  in hand for each cost center  $s$ , we can then calculate the amount of ‘hidden’ nursing home profit that flows through a related party:

$$\begin{aligned} \Delta\pi_{it} &= \tilde{\pi}_{it} - \pi_{it} = -\tilde{c}_{it} + c_{it} \\ &= \sum_{s \in \mathcal{S}} -(d_{it}^s + \theta^s p_{it}^s) + (d_{it}^s + p_{it}^s) \\ &= \sum_{s \in \mathcal{S}} (1 - \theta^s) p_{it}^s \end{aligned} \tag{4}$$

Hence, we can calculate hidden profits using only the deflation factors and reported related party costs. Notice that a deflation factor of  $\theta^s = 1$ , corresponding to zero related party markup and therefore zero hidden profit, would yield the result that true and reported costs are equal:  $c_{it}^s = \tilde{c}_{it}^s$ .

### 6.3 Results

The majority of related party spending is for real estate and management services (Figure 2). However, for two other cost categories  $s$  (therapy and ancillary services), related party spending comprises a non-trivial share of spending (at least 5% of total costs for that category). As such, we also estimate deflation parameters  $\theta^s$  for each of these four categories. That is, we also construct corresponding stacked datasets for therapy and ancillary service related party adoption, over which we estimate equation (2) to recover the corresponding  $\theta^s$ .

Cost	Percent of Spending on Related Parties	Deflation Factor $\hat{\theta}^s$	Implied Related Party Markup (%)
Total Real Estate	30.9	0.780 (0.634, 0.926)	22.0 (7.4, 36.6)
Management	25.4	0.583 (0.280, 0.885)	41.7 (11.6, 71.9)
Therapy	12.4	0.978 (0.762, 1.194)	2.2 (-19.3, 23.8)
Ancillary Service	6.3	0.625 (0.142, 1.108)	37.5 (-10.7, 85.7)

Table 3: Estimates of Deflation Factors  $\theta^s$

*Notes:* Table presents estimates of the deflation factor  $\theta^s$  for each cost category considered. Each line corresponds to a regression estimate of equation (2). The implied markup is given by  $1 - \theta^s$ . The share of spending for category  $s$  that goes to a related party is provided in the last column. All models include year and facility-by-event fixed effects. Standard errors are clustered at the facility-level. 95% confidence intervals presented in parentheses.

Estimates of the deflation parameters are presented in Table 3. Consistent with our findings in Sections 4 and 5, we find significant deflation factors for real estate and management services. For ease of interpretation,

<sup>12</sup>In general, two-way fixed-effects difference-in-difference estimates suffer from both selection bias and negative weights when treatment is continuous. However, assuming linearity of treatment effects in dosage implicitly assumes away issues from negative weights, and identification purely from comparisons of treated units to untreated units avoids selection bias (Callaway et al., 2024).

<sup>13</sup>Note that here we omit the  $n$  subscript for ease of exposition.

we also present the implied related party markup for each service, which is simply  $1 - \theta^s$ .<sup>14</sup> The implied markup for real estate services provided by a related party is 22.0%; the corresponding figure for management services is 41.7%. The only other category with significant spending (more than 10%) going to a related party is for therapy services, a category for which we are unable to reject the null of no related party markup (i.e.,  $\theta^s = 1$ ). The final cost category we consider contains salary, supply, and other expenses of ‘ancillary services’ related to the facility. These are services that are not explicitly mandated by licensing requirements, and include items such as physician, dental, and pharmacy services. Our estimate of the related party deflation factor (and, correspondingly, the implied markup) is noisy, and we again cannot reject the null of no related party markup, likely reflecting the relatively low share of spending flowing to related parties. Given their relatively low importance, these other cost categories will not significantly impact our estimates of hidden profits  $\Delta\pi_{it}$ . We report the corresponding event studies for each cost category (analogues to those estimated in Sections 4 and 5) in Appendix Figure B.9.

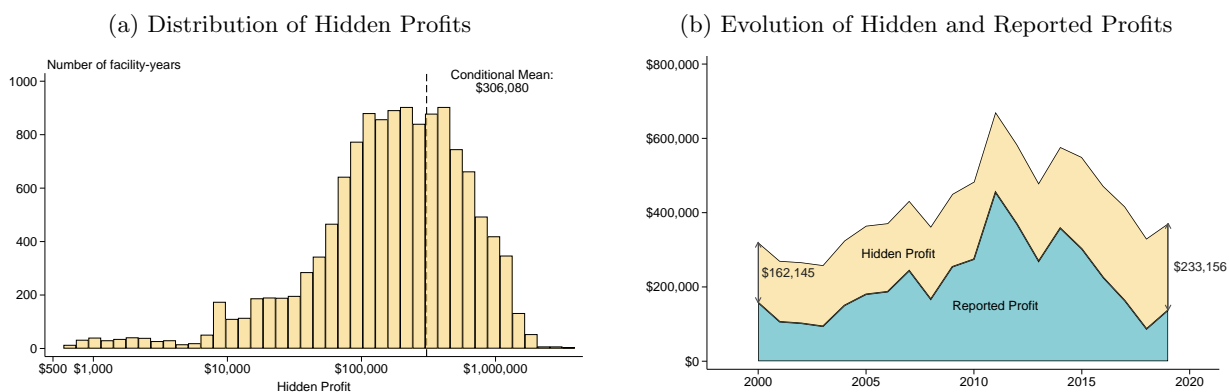


Figure 14: Hidden and Reported Profits

*Notes:* Figure presents the results of the hidden profit calculation in equation (4). Panel (a) presents the histogram of hidden profits. Note that we exclude the 33.5% of facility-years that have zero related party transactions. Panel (b) presents the unconditional mean of both reported and hidden profits across all facilities for each year. All series are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. We exclude 2020 onward due to the Covid-19 pandemic.

Figure 14 presents the profit calculations based on our deflation factor estimates. Panel (a) plots the distribution of hidden profits  $\Delta\pi_{it}$  across cost report years. To ease interpretation, we report the total hidden profit, rather than the per-bed hidden profit. Here we exclude the 33.5% of reports that have zero related party transactions, and hence no hidden profits by definition. The estimates suggest there is a considerable mass of hidden profits, with the mean related party facility collecting \$203,081. Without conditioning on any related party transaction, the mean across all facilities is \$306,080 hidden profit. Note also the log-scale: The distribution has a long right tail; the median and interquartile range are \$187,161, \$81,834, and \$415,379, respectively, with a staggering 95<sup>th</sup> percentile of \$1,028,920. These results suggest that while many facilities have zero hidden profits, there is a considerable tail of facilities masking substantial profits as related party costs. Appendix Figure B.10 panel (a) contains the analogous distribution for per-bed profits.

Panel (b) presents the mean reported profit ( $\pi_{it}$ ) and hidden profit ( $\Delta\pi_{it}$ ) over our sample period. As with the federal HCRIS data from Section 2.4, we see a peak in reported profits around 2011 before a steady

<sup>14</sup>Following convention, we calculate the markup as  $\frac{p_{it}^s - \tilde{p}_{it}^s}{p_{it}^s} = 1 - \theta^s$ , or the share of reported related party payments that are hidden profits.

decline through 2019.<sup>15</sup> Accounting for hidden profits increases the mean total profit of a facility to \$370,788 by 2019; this corresponds to a 169% increase over the reported profit for this year. Equivalently, 62.9% of total profits in 2019 flowed through a related party. Reflecting the significant growth in the use of related parties documented in Section 2.4, this share was only 50.7% in 2000, suggesting that firms are increasingly using related parties as a means to tunnel profits. Appendix Figure B.10 panel (b) contains the analogous distribution for per-bed profits. Additionally, to confirm that our estimates of hidden profits are insensitive to the inclusion of therapy and ancillary services, in Appendix Figure B.11, we replicate Figure 14, but impose  $\theta^s = 1$  for services other than real estate and management. Reflecting the small share of spending these other categories comprise, the patterns are highly similar: The mean hidden profit for related party firms falls only slightly, and we find a similar empirical pattern in the time series.

These results suggest that a staggering share of nursing home profits go unreported, instead flowing through related parties. As noted, firm owners face liability incentives to mask their profits so as to shield them from potential litigants. Our estimates suggest that a raw accounting of facility profits will substantially understate true profits, though the balance sheet analysis in Section 4.2 and subsequent discussion raises the point that simply extending liability to include related parties may nonetheless be insufficient.

There are several caveats to this analysis. First, it is possible that some of the increases in costs we have captured may reflect simultaneous cost shocks, of the type our analysis assumes away. Our interrogation of patient outcomes in Sections 4.3 and 5.3 suggest this concern is minimal, but by nature this assumption is untestable. Second, our calculations of hidden profits hinge on the assumption that we may extrapolate from the set of ‘switchers’ we have studied to *all* related party firms, namely the 61.9% of firms that were already transacting with a related party at the beginning of our sample. It is plausible that this set of ‘early adopters’ have related party markups that are either higher or lower than the ones we estimate here. For instance, early adopters may have had more to gain from adoption (hence why they adopted faster), thereby understating the size of hidden profits.

## 6.4 Counterfactual Staffing Levels

From a regulatory standpoint, these hidden profits are quantitatively meaningful. One concrete way to assess the magnitude of tunneled profits is to calculate how many additional direct care staff hours each firm’s tunneled profits could purchase. We are quick to caution that this exercise should be viewed as a thought experiment intended to illustrate the magnitude of tunneled profits implied by our estimates. We abstract away from concerns such as labor supply effects or capital flight, but these should be of course considered when assessing any substantive policy change.

Specifically, we engage in the following exercise. For each facility, we calculate the number of additional RN and CNA hours respectively that their hidden profits  $\Delta\pi_{it}$  translate to. To do so, we calculate the market prices of RN and CNA hours using the 2019 HCRIS data for facilities in Illinois. Note that we use the federal HCRIS data because the Illinois data do not break out nursing expenditure by staff type. An RN hour costs an average of \$39.54, while a CNA hour costs \$18.99; these terms are inclusive of salary and fringe benefits, and include both direct and contract staff. Therefore, these values reflect the marginal cost to a firm of raising their staff hours, abstracting from any movements along the labor supply curve. Following convention, we normalize the number of staff hours by resident-days.

To compare the marginal staff hours gained under this allocation with their initial levels, we combine

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<sup>15</sup>Note that the federal HCRIS cost report data cover all facilities, not just those in Illinois. This, in conjunction with potential HCRI misreporting, explains the divergence in reported profits between Figures 1 and 14.



our estimates with data from the Payroll Based Journal (PBJ) program. These data contain administrative shift-level microdata for the near-universe of care workers at nursing homes.<sup>16</sup> We use the PBJ data to calculate the observed RN and CNA staffing ratios for all Illinois nursing homes in 2019.

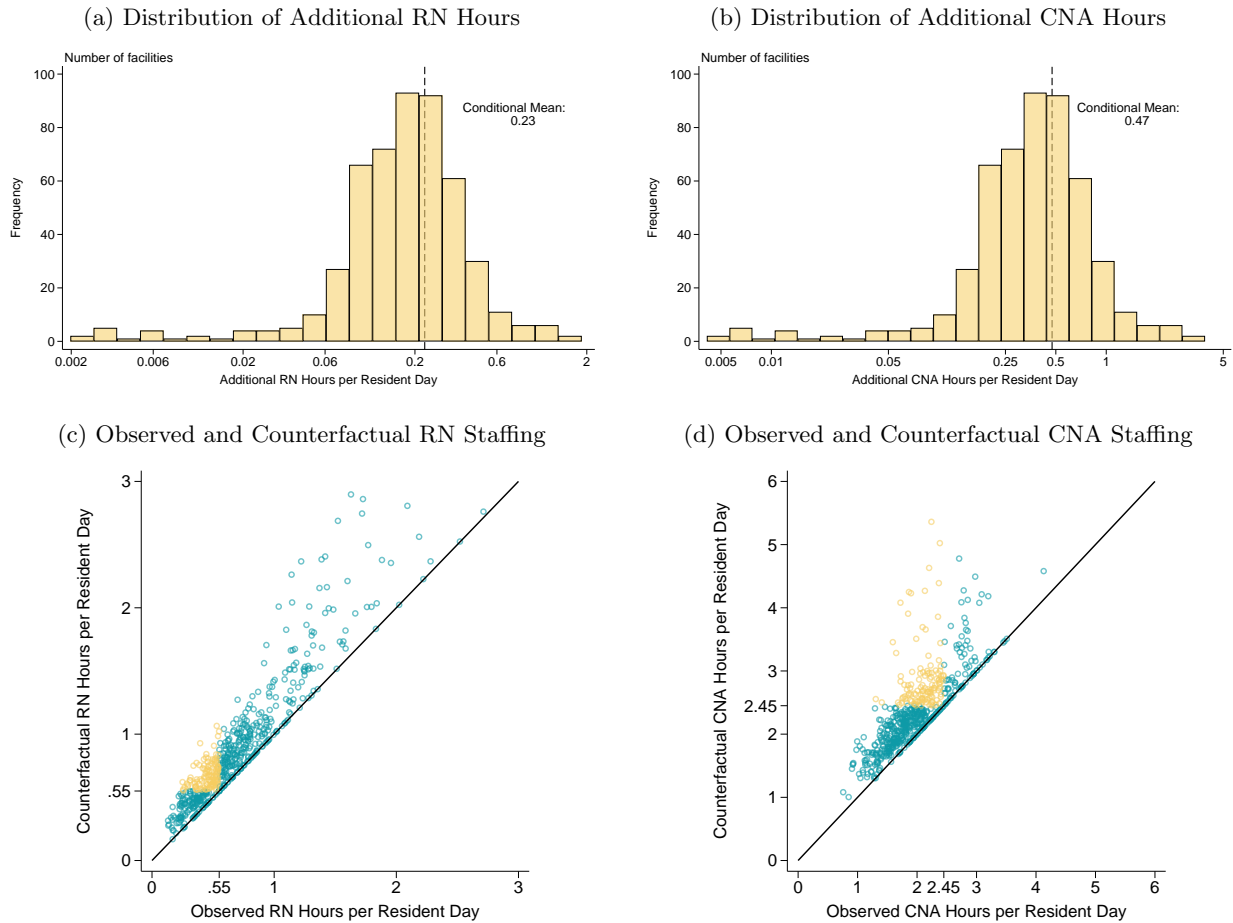


Figure 15: Counterfactual Direct Care Staffing

*Notes:* Figure presents the results of the staffing counterfactual calculations. Panel (a) presents a histogram of the additional RN hours gained if the facility spent its hidden profits on RN hours. Panel (b) presents a corresponding figure for CNA hours. Panel (c) presents a scatter plot of the observed RN staffing from 2019 by the counterfactual ratio under the counterfactual allocation. Panel (d) presents a corresponding scatter plot for CNA hours. Yellow points indicate firms whose compliance with proposed staffing minimums would flip under the counterfactuals.

We plot the distributions of additional RN and CNA hours per resident day gained in Figure 15 panels (a) and (b), respectively. These estimates indicate that, among the firms with non-zero hidden profits, RN hours would rise by nearly 0.23 hours per resident day. Similarly, these same hidden profits would translate to an additional 0.47 additional CNA hours per resident day. These increases are sufficiently large that the mean staffing ratios statewide (i.e. including the non-related party firms) would increase 28.9% and 21.0%, respectively.

<sup>16</sup>These data, which are typically automatically submitted to the Centers for Medicare and Medicaid Services (CMS) via payroll software, are used to monitor staffing levels for the purposes of constructing quality scores and compliance with various staffing requirements, and are widely used by both researchers and policymakers.

In panels (c) and (d), we plot the joint distribution of observed staffing ratios by their counterfactual levels. To illustrate the policy relevance of this calculation, we consider how firm compliance with a pending White House rule (Grabowski and Bowblis, 2023) would change under the counterfactual staffing we simulate. If facilities instead reinvested their tunneled profits on additional direct care staff, we calculate that statewide compliance with the RN standards (if applied to their 2019 levels) would rise from 55.2% to 75.6%. Similarly, we find that compliance with the CNA standard of 2.45 hours per resident day would rise from 15.3% to 36.1%. To illustrate this, we identify firms that would flip their compliance status in yellow in the scatter plots. It is worth noting that the proposed rule requires *joint* compliance; in the counterfactuals considered here, we have considered how compliance would change if the entirety of  $\Delta\pi_{it}$  were translated into either RNs or CNAs, and so overstates the share of firms who could easily comply.

## 7 Incentives to Tunnel: Asset Shielding

Section 2.2 outlines several theoretical benefits of using related party transactions to tunnel profits and assets in the nursing home industry. In this section, we provide empirical evidence of one such benefit: asset shielding from malpractice claims. This exercise is *not* meant to be an exhaustive analysis of firms' motivations to tunnel profits. Rather, the aim of this section is to empirically investigate one such channel.

Nursing homes face considerable malpractice risk. One study found that even the highest quality facilities faced a 40% annual lawsuit risk (Studdert et al., 2011), with lower quality providers facing heightened risk. Successful malpractice lawsuits can be financially damaging for providers. For instance, Zhao et al. (2011) report a strong negative correlation between malpractice paid losses and financial performance. Accordingly, like other health care providers, nursing homes face unique incentives to move sizable real estate assets off-book, so as to diminish their potential malpractice liability. Our paper is not the first to point out this incentive. Casson and McMillen (2003) lay out the legal framework in which nursing home operators limit their liability through corporate restructuring. Specifically, the authors recommend that nursing home operators sever their operations and real estate so as to mitigate risk:

Dividing the nursing home business into real-estate investment and nursing home operations will reduce the nursing home company's exposure to risks associated with owning and operating one or more nursing homes. The degree to which this reduction of risk can be maximized will be a function of how elaborate a corporate structure the particular company is willing to create. The ultimate structure would consist of forming a real property single-purpose entity to hold each piece of real estate, as well as a separate operating single-purpose entity for each nursing home business. Thus, a nursing home company currently owning and operating ten nursing homes would form twenty entities: ten real property entities that would own and lease the real estate to the ten nursing home operating companies that would obtain the licenses and Medicare and Medicaid certifications.

Indeed, an existing empirical study examines this behavior in the nursing home industry. Brickley et al. (2017) investigate the prevalence and causes of asset-shielding in the nursing home industry, chiefly through the sale of buildings to smaller more 'judgment-proof' owners, as Casson and McMillen (2003) recommend. The authors establish two sets of empirical results relevant to our analysis. First, they document an increasing trend of asset-shielding in the nursing home industry from 1998-2004 — consistent with our findings over a longer period. Second, employing a difference-in-differences regression leveraging changes in malpractice

risk induced by state-level tort reforms, the authors find that nursing homes exposed to more favorable legal environments engaged in less asset-shielding behavior.

To connect these findings with our own results, we can examine how malpractice spending changes in response to real estate related party adoption. Unfortunately, the Illinois cost report data do not contain sufficient information on malpractice premiums and risk. Instead, to explore this possibility, we turn to the federal HCRIS cost report data, which contain information on both related party usage as well as malpractice premiums and paid losses. We construct analogous stacked samples of real estate related party adopters in the HCRIS data, and estimate our models over this sample. Because HCRIS contains nationwide data, our sample of adopters grows considerably to 1,336 facilities over the period 2012-2021. For details on the construction of the HCRIS sample, see Appendix A.

Using the HCRIS data, we can construct several measures of malpractice costs. The data contain information on both malpractice insurance premiums and costs associated with self-insuring, as well as malpractice paid losses. As with our prior analysis, we construct per-bed transformations of each and winsorize the non-zero values at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. We then estimate our primary difference in differences specification, equation (1), over the HCRIS sample.

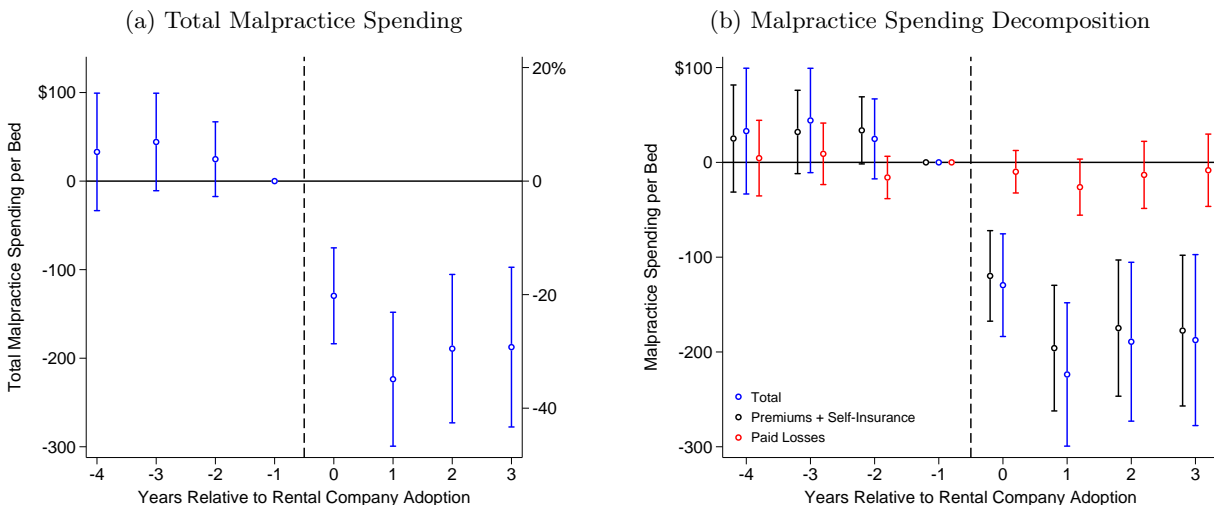


Figure 16: Malpractice Risk and Real Estate Related Party Adoption

*Notes:* Figure presents event study estimates of malpractice spending in a window around rental company related party adoption. Panel (a) presents the effect on total spending. Panel (b) presents a decomposition of the total effect.

The results are shown in Figure 16. Panel (a) presents the results for total malpractice spending (the sum of premiums/self-insurance and paid losses). We see no evidence of a parallel trends violation, and a considerable decline in per-bed spending of 32.4% following rental company adoption. For a facility of typical bed size (125 beds), this decline represents annual savings of \$25,885. In panel (b), we decompose this overall decline into paid losses (i.e., amounts paid out following successful malpractice claims) and insurance premiums/self-insurance costs. This decomposition reveals that the entirety of the decline is owed to malpractice insurance premium savings. Firms face virtually no change in their total paid losses, despite spending considerably less on their premiums. While we do not observe the insurance contracts themselves, this decline is likely driven by a reduction in covered amounts, as the firm has less in total assets to insure. Finally, as discussed in Section 2.3, the HCRIS data are known to contain considerable noise,

driven by outliers and erroneous data entries. If this noise can be appropriately characterized as a form of classical measurement error in the related party spending variables (from which we generate our event time indicators), then the bias this measurement error creates will attenuate our treatment effect estimates towards zero, suggesting our point estimates present lower bounds.

## 8 Conclusion

This paper studies profit tunneling in the health care sector. Specifically, we analyze the use of related party transactions as a form of profit extraction in the nursing home industry. Using a stacked difference-in-differences approach, we document that services purchased from related parties are substantially inflated.

Our findings reveal that the lion's share of related party spending is on real estate and management services, which are the focus of our analysis. We find that the adoption of related party entities by nursing homes correspond to substantial increases in costs for these two services. Under the assumption that related party adoption does not coincide with simultaneous cost shocks, we are then able to estimate the size of the related party markup. Importantly, we are able to do so *without* relying on related parties' stated costs.

We find that related party implied markups are substantial. These large markups correspond to staggering hidden profits. Our estimates suggest that reported nursing home profits reflect only 37.1% of total profits as of 2019. It is important to note that this includes substantial heterogeneity. We find that 33.5% of facility-years have no related party transactions. Among firms with positive hidden profits, the interquartile range covers \$81,834 to \$415,379. These results suggest that the scope for hidden profits in this industry is massive, and require much more detailed financial data on not only the nursing homes but their related parties as well to uncover exactly where the money flows.

Our results indicate that a considerable benefit from the form of asset tunneling we study here (sale-leasebacks) comes from a reduction in malpractice spending, driven by reduced malpractice premiums. While this is not the only benefit to firms from transacting with related parties in this way, it is one that we are able to assess empirically with the data available, and is consistent with the existing literature.

The findings of this study have far-reaching policy implications. Our calculations of hidden profit suggest that firms may be substantially understating their profitability. This has implications for the design of quality regulations as well as reimbursement schemes that rely on a cost-plus basis. Moreover, from a litigation perspective, our study suggests that limiting liability solely to nursing homes can substantially mislead potential plaintiffs, who might believe that a facility has no greater ability to pay than what their liability insurance covers, and therefore may be dissuaded from litigation altogether. Our results suggest this is likely far from the case, but that even extending liability to include related parties may be insufficient. Because profits are ultimately moved off the related party's books, it is important to extend liability to the ultimate owner of both. Finally, our results highlight the urgency for other states to follow Illinois in collecting detailed, audited data on related party transactions. Such data is vital for policymakers, regulators, and stakeholders to understand the financial dynamics within the industry and to formulate policies that promote financial integrity and transparency. The profit tunneling exhibited here may not only affect the economic viability of nursing homes but also have implications for the quality of care and the welfare of a vulnerable population. As population aging further increases the need for long-term care, it is imperative that financial practices within nursing homes are aligned with the overarching goal of providing high-quality, sustainable care.

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# A HCRIS Sample

In this section, we describe the HCRIS sample used to investigate the changes in malpractice premiums and risk following real estate related party adoption in Section 7.

As outlined in Section 2.3, the HCRIS data contain information on the universe of Medicare and Medicaid-certified nursing homes. That is, the data are national, and not restricted to only Illinois. However, the data contain information on related party usage beginning only in 2011. For this reason, in conjunction with concerns with misreported values, our primary analysis focuses on the Illinois cost report data.

However, the HCRIS data do contain a number of variables not included in the Illinois cost report data. Crucially, these include the total amount of malpractice paid losses in each year, along with the annual premiums in each year. As a result, to examine any malpractice benefits of related party adoption, we turn instead to the HCRIS data, and replicate our analytic framework in this dataset, considering the impact of related party adoption on malpractice spending.

Doing so requires identifying related party usage in the HCRIS data. Given concerns over data fidelity in HCRIS, we first confirm that the aggregate patterns of related party spending are comparable to those found in Illinois. Specifically, we construct analogous graphs to Figure 2. In HCRIS, each related party transaction has a free text description (such as ‘rent,’ ‘administrator salary,’ or ‘therapy services’). We use a large language model (GPT version 4) to classify each of these transactions into the same categories used in the Illinois cost report data.

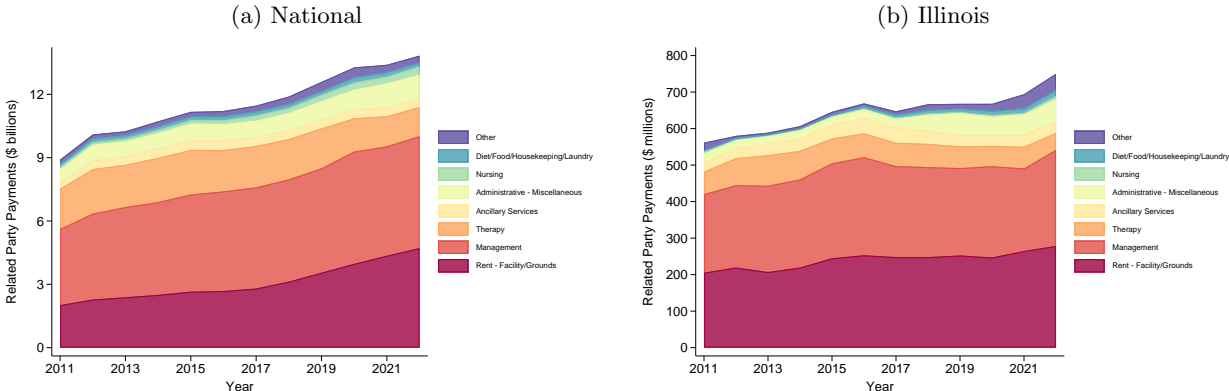


Figure A.1: Amount Paid to Related Parties (HCRIS)

Figure A.1 contains the results. We see that the broad patterns of increasing related party payments holds in the national sample, depicted in panel (a). While the two largest categories of related party spending continue to be management and rental payments, their order is reversed from what the Illinois cost report data found: nationwide, we see that management slightly edges out rental payments, though the two are comparable in magnitude. To ease comparison with the Illinois cost report data, in panel (b) we consider the subset of Illinois facilities in the HCRIS data. Reassuringly, here we find both similar magnitudes of overall related party spending as well as the same rank-order of real estate and management spending as in the state-level cost report data.

Next, we construct a comparable set of real estate related party adopters. We follow the procedure described in the main text: any facility with a related party rental payment in excess of \$10,000 is determined to be a related party renter. We identify the first year a facility reports such a rental payment to construct

a sample of related party ‘adopters.’

To ensure the comparability with our primary analysis, we construct datasets to mimic our stacked difference-in-differences approach with the balanced panel requirement.<sup>17</sup> Doing so leaves us with a final HCRIS sample of 1,336 related party adopters and 6,916 never-adopters. With our stacked dataset in hand, we estimate equation (1) using per-bed malpractice spending as the dependent variable. The results of this regression are described in Section 7.

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<sup>17</sup>Given the significantly larger sample in the national HCRIS data, to ease the computational burden we instead stack across adoption years, rather than facility-level adoption events as we do in our main analysis.



## B Additional Tables and Figures

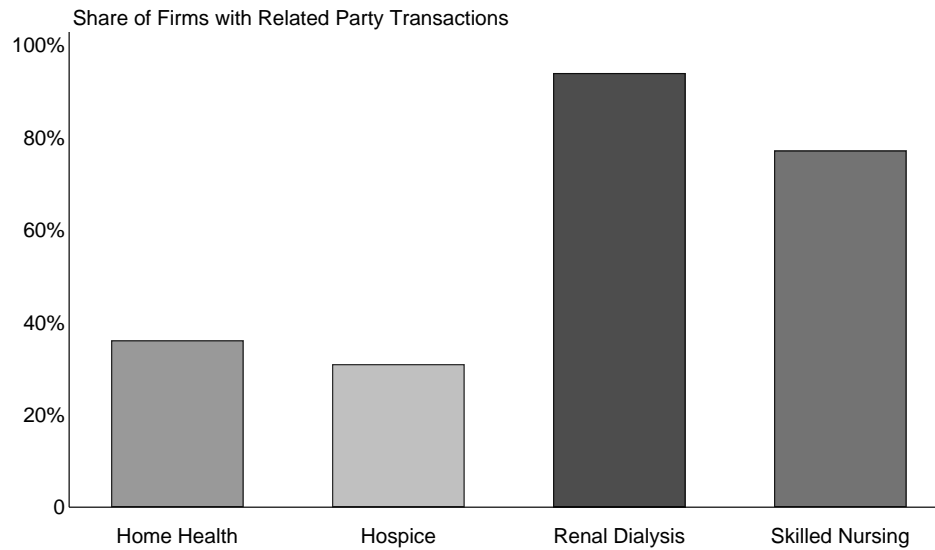


Figure B.1: Related Party Transactions Across Industries

*Notes:* Figure reports share of establishments reporting significant related party transactions, defined as total spending exceeding \$10,000. Calculations are derived from the 2021 HCRIS cost reports for each industry. Data include reports on 7,631 renal dialysis facilities, 7,331 home health agencies, 4,188 hospice facilities, and 14,381 skilled nursing facilities.

Distribution of Nursing Home Expenses

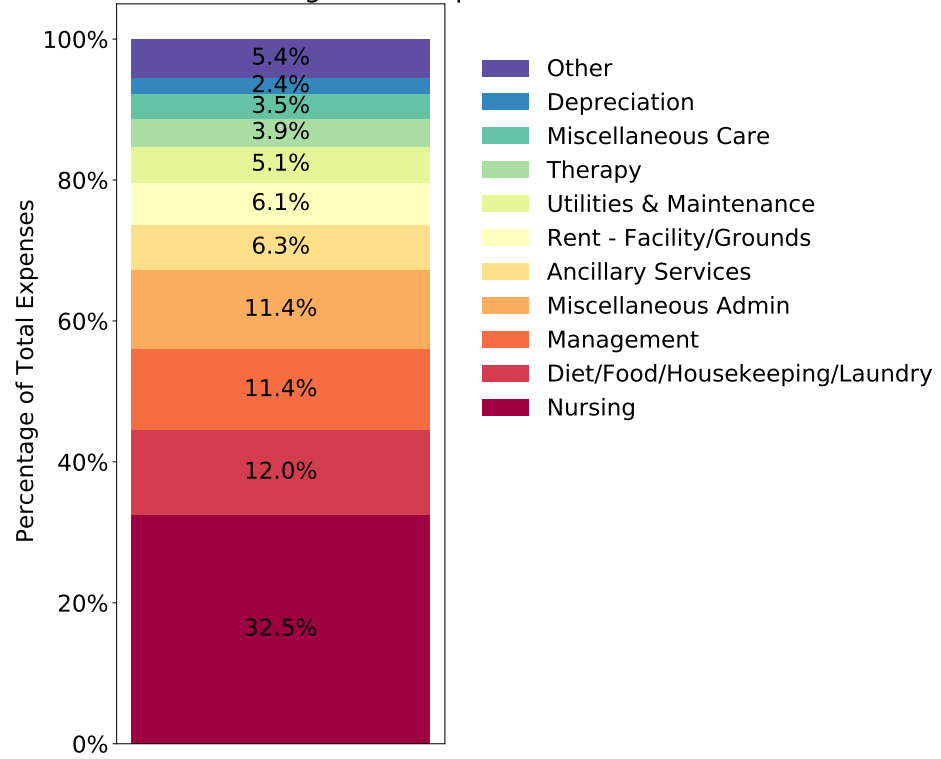
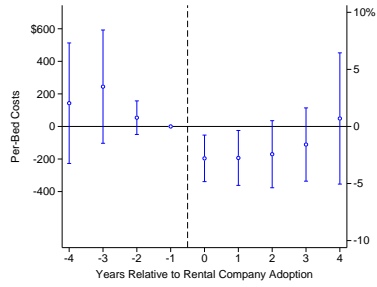


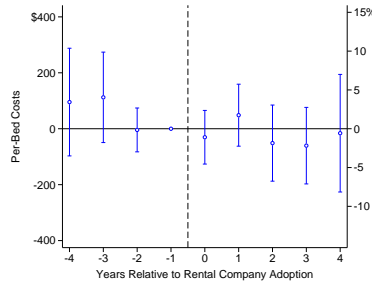
Figure B.2: Total Nursing Home Expenses

*Notes:* Figure plots total nursing home expenses by line item classification. For each line item we present the percentage of total expenses spent on that cost category. Data are aggregated across the entire sample period.

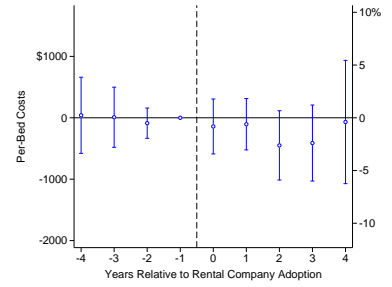
(a) Diet/Food/Housekeeping/Laundry



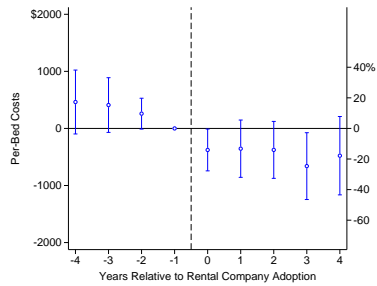
(b) Utilities & Maintenance



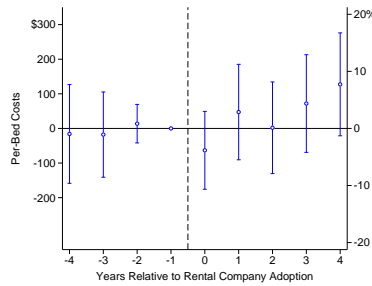
(c) Nursing



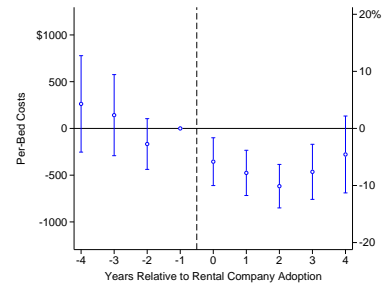
(d) Therapy



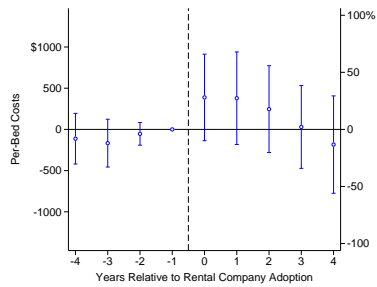
(e) Miscellaneous Care



(f) Miscellaneous Administrative



(g) Ancillary Services



(h) Provider Participation Fees

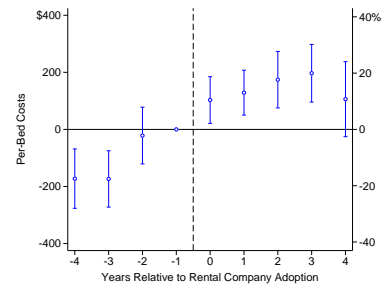


Figure B.3: Rental Company Adoption: Spillovers to Other Cost Categories

*Notes:* Figure presents event studies of different costs around the time a nursing home adopts a rental company related party. The right-axes denotes the percent effect relative to the pre-adoption mean for the treatment group. Each point corresponds to an estimate of the  $\beta^T$  parameters from equation (1). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

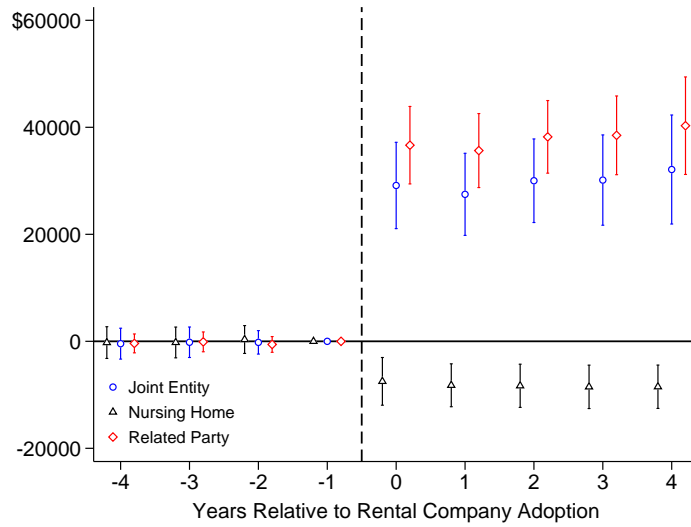
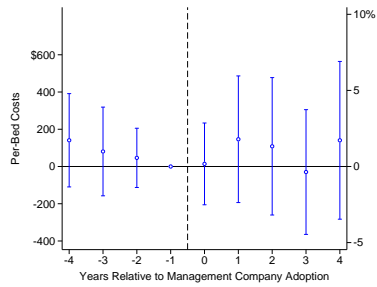


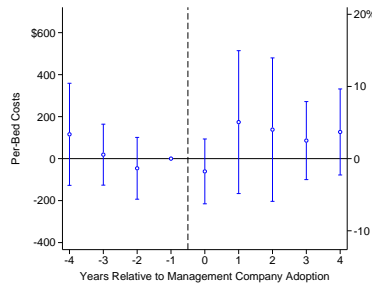
Figure B.4: Total Mortgage Liability

*Notes:* Figure presents event study of mortgage liability as reported on firm and related party balance sheets in a window around a rental company related party adoption. Each point corresponds to an estimate of the  $\beta^T$  parameters from equation (1) with a different dependent variable. The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

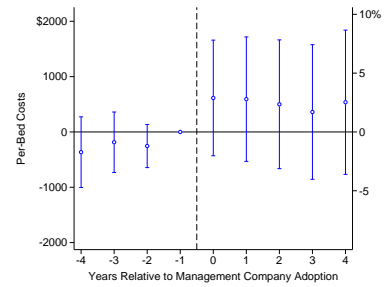
(a) Diet/Food/Housekeeping/Laundry



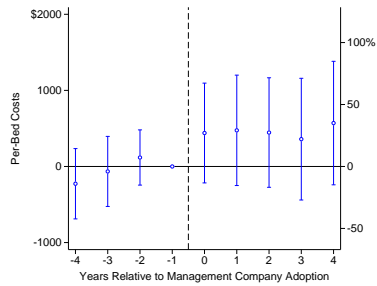
(b) Utilities & Maintenance



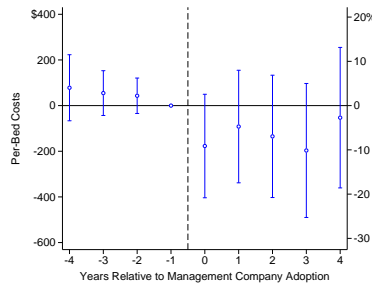
(c) Nursing



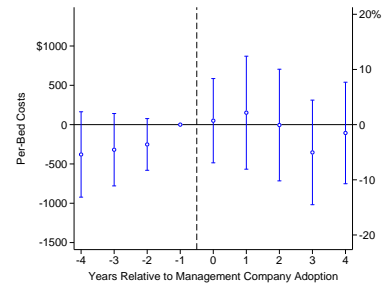
(d) Therapy



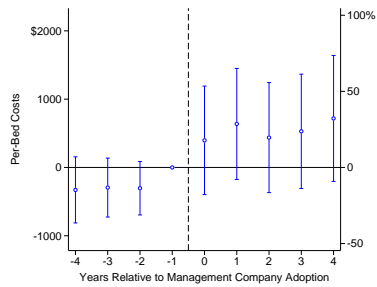
(e) Miscellaneous Care



(f) Miscellaneous Administrative



(g) Ancillary Services



(h) Provider Participation Fees

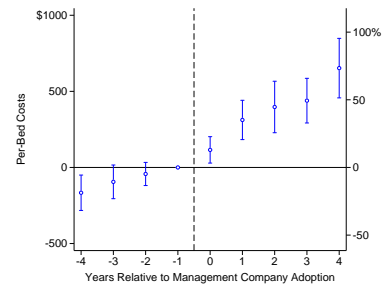
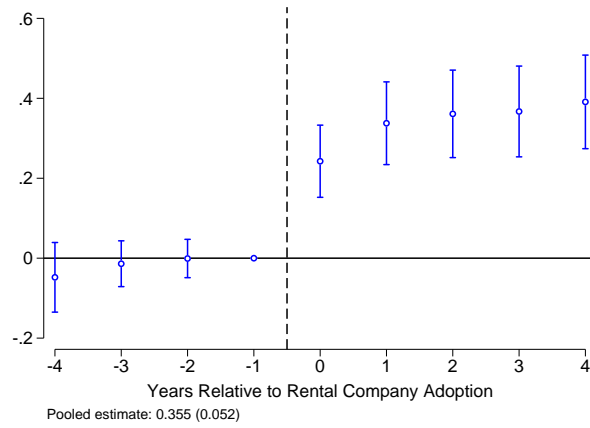


Figure B.5: Management Company Adoption: Spillovers to Other Cost Categories

*Notes:* Figure presents event studies of different costs around the time a nursing home adopts a rental company related party. The right-axes denotes the percent effect relative to the pre-adoption mean for the treatment group. Each point corresponds to an estimate of the  $\beta^T$  parameters from equation (1). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

(a) Log Real Estate Costs



(b) Log Management Costs

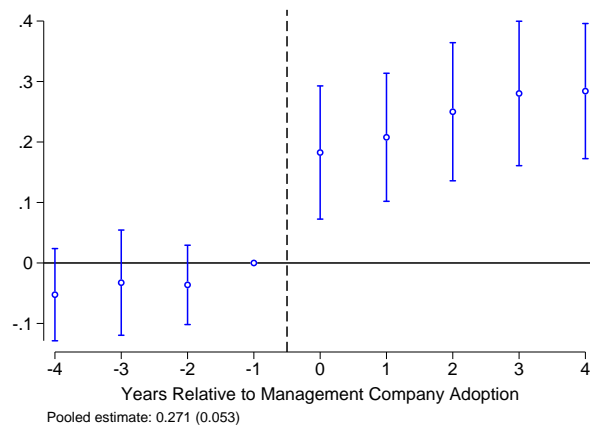
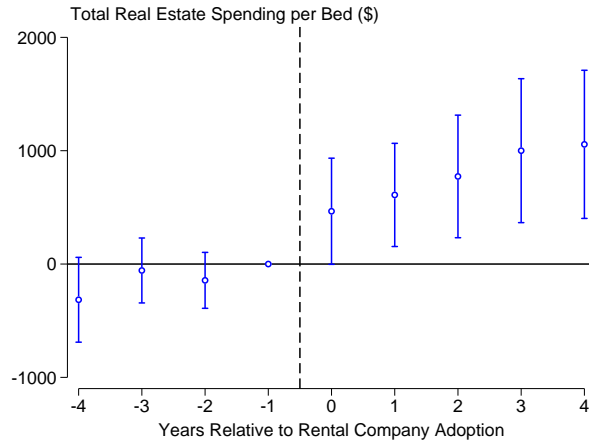


Figure B.6: Log Expenses and Related Party Adoption

*Notes:* Figure presents event studies of real estate and management costs around the time a nursing home adopts a rental/management company related party following a log transformation. Panel (a) presents the results for real estate costs. Panel (b) presents the results for management costs. Each point corresponds to an estimate of the  $\beta^T$  parameters from equation (1). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

(a) Real Estate Spending



(b) Management Spending

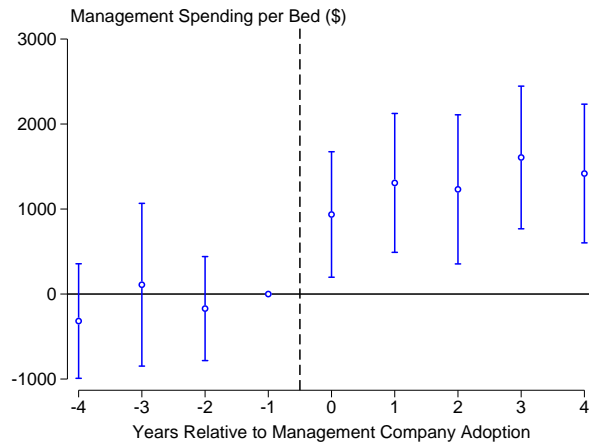
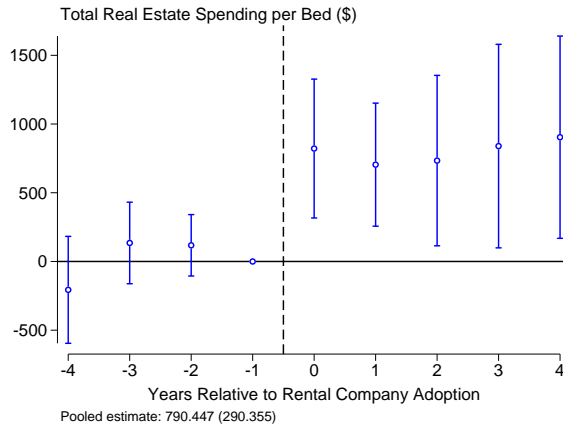


Figure B.7: Total Expenses and Related Party Adoption: Two-Way Fixed Effects

*Notes:* Figure presents event studies of real estate and management costs around the time a nursing home adopts a rental/management company related party using a two-way fixed effects specification (i.e., there is no dataset stacking). Panel (a) presents the results for real estate costs. Panel (b) presents the results for management costs. Each point corresponds to an estimate of the  $\beta^\tau$  parameters from equation (1). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

(a) Real Estate Spending



(b) Management Spending

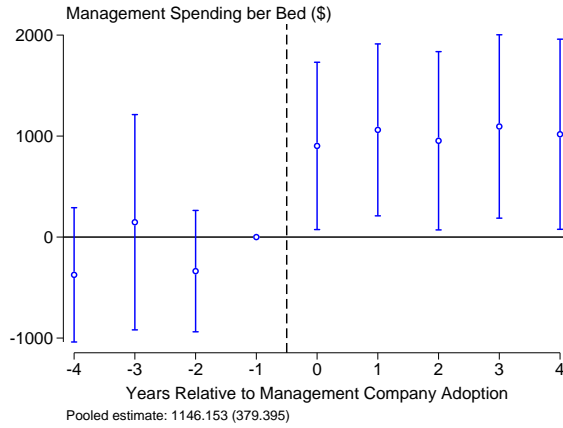
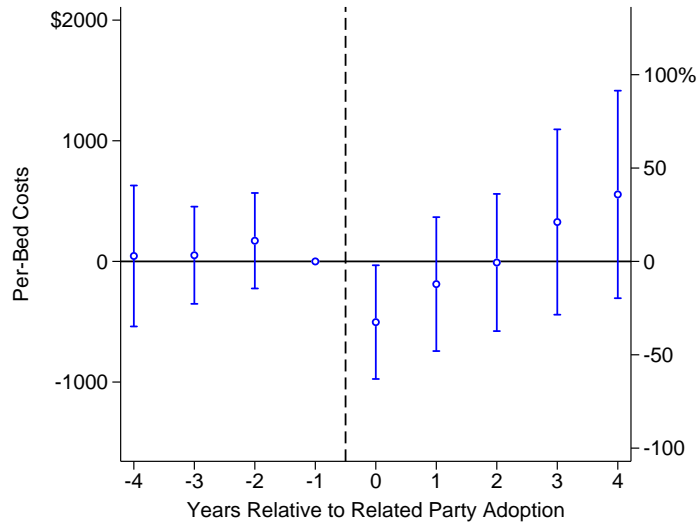


Figure B.8: Reported Expenses and Related Party Adoption: Excluding Ownership Transitions

*Notes:* Figure presents event studies of real estate and management costs around the time a nursing home adopts a rental/management company related party, excluding the facilities that have an ownership transition in the year of or prior to a related party adoption. Panel (a) presents the results for real estate costs. Panel (b) presents the results for management costs. Each point corresponds to an estimate of the  $\beta^T$  parameters from equation (1). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.



(a) Therapy Per-Bed Costs



(b) Ancillary Services Per-Bed Costs

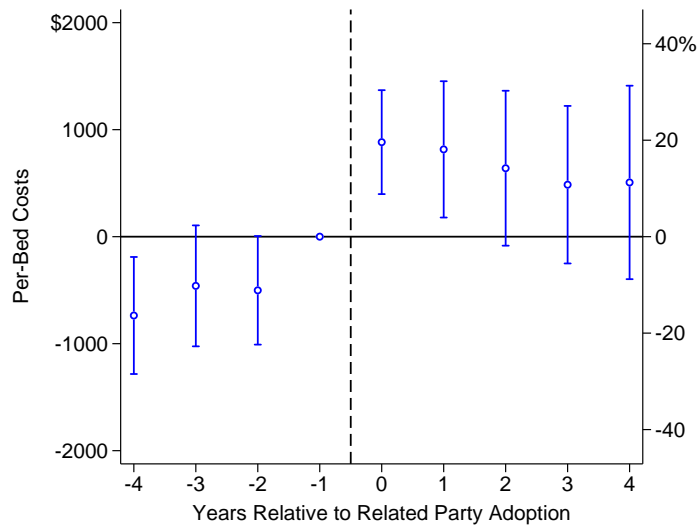


Figure B.9: Other Cost Category Related Party Adoption

*Notes:* Figure presents event studies of per-bed therapy and ancillary services costs around the time a nursing home adopts a therapy or ancillary services related party, respectively. Panel (a) presents the results for therapy costs following therapy related party adoption. Panel (b) presents the results for ancillary services costs following ancillary services related party adoption. Each point corresponds to an estimate of the  $\beta^\tau$  parameters from equation (1). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. Standard errors are clustered by facility.

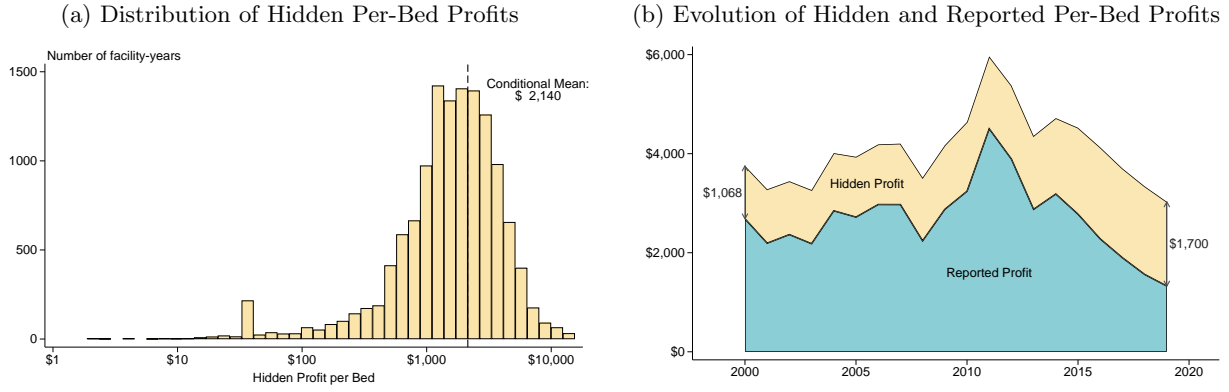


Figure B.10: Hidden and Reported Per-Bed Profits

*Notes:* Figure presents the results of the hidden profit calculation in equation (4), in per-bed terms. Panel (a) presents the histogram of hidden per-bed profits. Note that we exclude the 33.5% of facility-years that have zero related party transactions. Panel (b) presents the unconditional mean of both reported and hidden per-bed profits across all facilities for each year. All series are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. We exclude 2020 onward due to the Covid-19 pandemic.

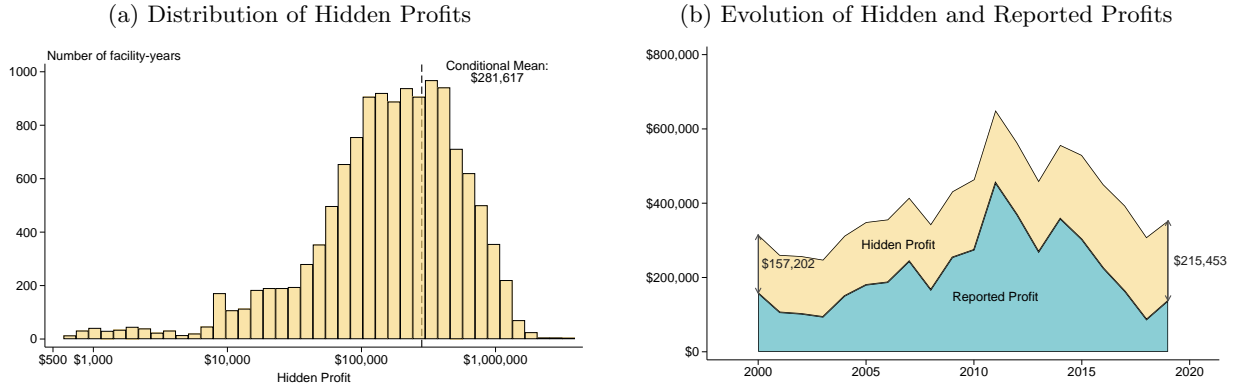


Figure B.11: Hidden and Reported Profits: Only Real Estate and Management

*Notes:* Figure presents the results of the hidden profit calculation in equation (4), in which we consider only real estate and management services. Panel (a) presents the histogram of hidden profits. Note that we exclude facility-years that have zero related party transactions. Panel (b) presents the unconditional mean of both reported and hidden profits across all facilities for each year. All series are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentiles. We exclude 2020 onward due to the Covid-19 pandemic.