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# 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 hide their profits and assets by shifting them to related parties. Understating 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' self-reported costs change when they start transacting with a related party, allowing us to infer how much these payments are inflated. We find evidence of widespread tunneling through inflated rents and management fees paid to related parties. Extrapolating these estimated markups to all firms' related party transactions suggests that in 2019, 68% of nursing home profits were hidden by tunneling 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 effective 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 providers. These data are used for a variety of purposes, such as measuring the cost of providing care so as to determine appropriate reimbursement rates or assessing the feasibility of costly quality regulation.

In order for regulators and policymakers to make informed decisions based on these data, health care providers must first accurately report their costs. We raise the concern that many providers may be overstating their costs by purchasing from "related parties"—i.e., entities that share common ownership with the provider—at greatly inflated prices. Inflating transfer prices allows firm owners to move profits from the balance sheets of closely monitored health care providers to less regulated entities that they also own. Doing so has the consequence of concealing providers' true profitability and distorting the financial landscape of the health care sector.

This form of covert profit extraction through strategic self-dealing 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). While the incentive to tunnel exists across sectors, health care providers may find the practice uniquely advantageous. Policymakers often set public reimbursement rates either explicitly or implicitly on a 'cost-plus' basis, directly incentivizing health care providers to inflate costs. Moreover, industry groups often advocate for higher reimbursement rates or against new quality regulations by pleading poverty, pointing to public cost reports that indicate seemingly low or even negative profits. Finally, hiding profits and assets through a complex web of related entities may act as a liability shield against potential litigants by making it difficult to identify and make claims against assets held by related parties (Casson and McMillen, 2003).

Indeed, accusations of tunneling in health care abound. For example, providers reimbursed on a cost-plus basis—such as critical access hospitals—have been charged with using related party transactions to "obtain inflated and improper Medicare reimbursements" (U.S. Attorney's Office, 2020). Likewise, insurers have been accused of circumventing statutory minimums on medical loss ratios and increasing their effective profit margins by making inflated payments to vertically integrated providers or pharmacy benefit managers (Frank and Milhaupt, 2022, 2023). Importantly, tunneling practices are not limited to for-profit providers. For example, non-profit hospitals have been accused of systematically tunneling value to commonly owned for-profit entities that provide services such as parking or laundry (Rosenthal, 2024). Even county-owned providers have been accused of using related party transactions as part of creative financing schemes (Hackmann et al., 2024). Despite the widespread perception that tunneling is rampant in health care, there has been little empirical research on either its prevalence or impact due to the difficulty in observing and parsing related party transactions. Our study aims to fill this gap.

We examine the extent of tunneling and hidden profits in the U.S. nursing home industry. The industry has a long history of sub-standard care (Institute of Medicine, 1986; National Academies of Sciences Engineering and Medicine, 2022) and is financed primarily by reimbursements from Medicare and Medicaid. Both researchers and industry advocates often point to poor provider finances (Harrington et al., 2007) and low margins on Medicaid care (Grabowski, 2001; Hackmann, 2019) as limiting nursing homes' ability or incentives to improve quality. Likewise, while quality standards can yield improvements (Lin, 2014), these are usually met with a common refrain from industry groups that unfunded mandates would bankrupt facilities,

result in closures, and consequently reduce patients' access to nursing home care (American Health Care Association, 2023). Therefore, a key question facing regulators and policymakers is whether nursing homes are so financially constrained that the only feasible means of improving quality is to dramatically increase payments (Gandhi et al., 2024). Federal cost reports support the industry groups' concern, with facilities reporting an average profit margin of just 0.13%. However, recent scrutiny of financial reports and awareness of related party transactions has caused policymakers, regulators, and the public to question the veracity of these figures (Marselas, 2023; Harrington et al., 2023).

We study nursing home finances using exceptionally rich cost report data from the state of Illinois, which has mandated that nursing homes report related party transactions for more than two decades. Measuring profit tunneling through related parties requires determining how much related party payments are marked up above their market value. Estimating these markups is non-trivial. It may be that firms that transact with related parties simply have higher costs than their counterparts that do not. Our approach to identifying these related party markups instead relies on *adopters*: firms that begin transacting with a related party during 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, assuming there is no simultaneous shock to the true cost of the transacted goods or services. The related party markup can then be inferred from the 'jump' in the facility's reported costs when it begins transacting with the related party. In order to control for general time trends in costs, we estimate the size of these markups using a difference-in-differences estimator. We employ a stacking approach (Cengiz et al., 2019; Deshpande and Li, 2019) in order to avoid potential bias due to staggered treatment timing (Goodman-Bacon, 2021; de Chaisemartin and D'Haultfœuille, 2020).

Our estimates suggest substantial and widespread tunneling in the nursing home industry. We focus on real estate and management expenses—approximately 77% of all related party spending—and find that transacting with a related party dramatically increases the reported costs of these services by 42.4% and 24.6%, respectively. In the case of real estate, the transition to renting from a related party typically occurs through a 'sale-leaseback' transaction in which the nursing home sells its real estate to a related party and continues operating in *the same* property as a lessee. Consistent with this, we find that facilities making this transition see a sizeable reduction in spending on the direct cost of property ownership—depreciation, interest, and taxes—however, these savings are more than offset by substantial new rents paid to the related party. This rental markup is used to tunnel an average of $1,744 per bed each year.

The sale of the property itself also presents an opportunity for tunneling. We investigate this using detailed balance sheet data covering both the nursing home and its related parties. We find that after the sale, nursing homes' assets decrease by 118% more than their liabilities. This suggests that the related party likely pays less for the facility than even its depreciated book value such that the transaction shifts an average of $32,827 of book value per bed off of the nursing home's balance sheet. Even this may underestimate the extraction if the property's market value exceeds its depreciated book value. These unfavorable terms leave many nursing homes in financially precarious circumstances, such that they are 14.7 percentage points more likely to report negative equity after the transaction. Meanwhile, the related party not only underpays for the property but also further increases liquidity by using the purchase as an opportunity to increase leverage, taking out a new mortgage that, on average, exceeds the new assets reported on its books. While some of this liquidity is used to pay down short-term liabilities, much of it disappears from the related party's balance sheet, likely being paid out to owners. This implies that regulators and policymakers interested in improving visibility on the financial returns of health care providers will need to require detailed reporting on how related parties spend down or pay out their assets.

We find similar evidence of tunneling when nursing homes start paying a related party management company. In these cases, we observe facilities substantially reducing their direct spending on management but making large new payments to related parties for management services. On average, the new related party payments exceed the reduction in direct management spending by $1,124 per bed (24.6% of the mean). Unless renting from a related party real estate company or paying a related party management company dramatically improves these services, the increases in spending we observe most likely represent tunneling to the common owner. That related parties would immediately improve either the property or management is implausible: related parties share the same owner, own the same property, and manage the same facility. Consistent with this, we do not find that utilizing either type of related party appears to dramatically change either the facility's clinical or operational outcomes.

The tunneling we observe has considerable implications for measuring total profits in the industry. Our estimates suggest that in 2019, 68% of the industry's profits were hidden through markups on related party transactions. Equivalently, if one were to take reported profits at face-value, they would find only 32% of industry profits. Note that these means mask considerable heterogeneity: while the average facility paying a related party hides $379,382, 33% of firm-years in our data report no related party transactions, and the $95^{\text{th}}$ percentile hides a staggering $1,292,657.

Our headline result that the industry is substantially more profitable than it appears explains several known puzzles. For instance, the rate of closures (Olenski, 2023) and bankruptcy liquidations (Antill et al., 2023) are relatively low given the substantial accounting losses reported in the industry over the past two decades. This may be rationalized by true profits being under-reported due to tunneling.

Similarly, there has been an avalanche of acquisitions and private equity activity (Gandhi et al., 2020, 2023; Gupta et al., 2023) in this industry. Although it is natural to see 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). To justify the acquisition of a typical 100 bed facility, an investor must believe the net present value to be at least $10 million. Straightforward accounting reveals that this implied NPV cannot be rationalized using facilities' reported finances. Applying an average annual accounting profit of approximately $106,640 and an annual observed exit probability of 1%, the internal rate of return to rationalize an investment of $10 million is less than 0.1%. This rate is markedly lower than even the returns typically offered by safe assets, such as U.S. Treasury bonds, over the same period — raising questions about the accuracy of facilities' reported financial data. Adjusting for profits hidden through related party markups increases the internal rate of return to approximately 2.4%, well within the range of returns offered by relatively safe assets over our sample period. Thus, our estimates help to rationalize the high acquisition prices paid by private equity investors.

To illustrate the magnitude of these hidden profits, we quantify the amount of direct care staffing that could be purchased using tunneled profits. Because of the labor-intensive nature of the nursing home industry, staffing levels are considered a primary measure of quality (Friedrich and Hackmann, 2021). As such, this exercise illustrates 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), the mean staffing ratio across all facilities—including those without related parties—would have increased from 0.69 hours per resident-day to 0.93 hours per resident-day, a 35.7% increase.

These findings have considerable implications for public policy. Industry-wide profitability figures are particularly important to policymakers and regulators, who often weigh the implications for health care providers' financial health when considering proposed policies, payments, and regulations. For example, the

regulatory commissions that provide recommendations on the design of Medicare and Medicaid reimbursements explicitly consider providers' accounting profits when advising on payments (e.g. Gerhardt et al., 2024; MACPAC, 2024).

Our study is particularly relevant to the on-going debate surrounding new federal minimum staffing requirements for nursing homes (Grabowski and Bowblis, 2023). The rule, which comes into effect in 2026, has been with met with resistance by advocacy groups for both for-profit (AHCA, 2024) and non-profit (LeadingAge, 2024) nursing homes, who have released statements that few facilities could afford to comply and warning that many facilities might "ultimately close altogether." Low accounting profit margins play a key role in this debate. For example, in its public comment and lawsuit to repeal the new rule, the American Health Care Association (an industry advocacy group) cites a study of Medicare cost report data finding that "nearly 60% of facilities have negative operating margins" (AHCA v Becerra, 2024). The government is also cognizant of the industry's seemingly poor profitability; an earlier CMS analysis of the proposed rule explicitly assesses the trade-off between improving quality and the financial burden to facilities (White et al., 2023). While the new minimums significantly exceed many facilities' current staffing levels, our calculations suggest that facilities have much more financial cushion than their cost reports would suggest. If facilities devoted just their hidden profits to improving RN staffing, the proportion of Illinois nursing homes that would be in compliance with the registered nurse component of the new policy would rise from 55.2% to 78.8%.[1]

Many of the benefits to hiding profits—such as aiding in lobbying efforts against regulation or to increase reimbursements—are difficult to measure. One benefit of tunneling that we can measure is a reduction in the nursing home's malpractice liability risk. To do this, we turn to federal data detailing facilities' spending on malpractice insurance premiums and paid losses. Consistent with the predictions of the legal literature (Casson and McMillen, 2003; Brickley et al., 2017), we find renting from a related party shields a nursing home's valuable real estate assets and thereby reduces spending on malpractice insurance premiums by 32.4%. This corresponds to approximately $25,885 in annual savings.

Finally, researchers should also note the difficulties with interpreting providers' cost report data we highlight. Such data are widely used by researchers across many fields to characterize health care providers' finances, capital structure, investment decisions, and resource allocation. Indeed, Google Scholar returns more than 3,800 articles that analyze or reference Medicare or Medicaid cost reports. The prevalence of misreporting and manipulation that we find suggests that researchers should proceed with caution when analyzing these data, even when interpreting basic figures such as firms' costs or profitability. Note that the use of related parties is not restricted to the nursing home industry. Federal data show that related party transactions are common across the health care sector, with large fractions of the hospice (31%), home health (36%), and dialysis industries (94%) engaging in related party transactions. While these data suggest the practice is common across industries, we focus on the nursing home industry given the availability of uniquely detailed cost report data in Illinois. Examining how the role of related parties differs across the health care sector is likely to be a fruitful 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

[1] We caution that these calculations simply illustrate the magnitude of hidden profits, *not* that all these facilities could easily and costlessly adjust their staffing overnight.

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. Finally, a growing literature on the role of institutional investors in firm conduct (*i.e.*, the 'common ownership' hypothesis) argues such ownership patterns can create tunneling incentives (Matvos and Ostrovsky, 2008; Backus et al., 2021). Our paper leverages uniquely rich data on related party transactions, which are not measured in many financial databases in the U.S. This allows us to observe tunneling between specific firms with a rare degree of detail. Moreover, our work is uniquely situated relative to this existing literature, which has primarily emphasized the costs of tunneling coming from the expropriation of minority shareholders. While this concern may still be present in our setting, we instead emphasize the role of hiding profits and assets from regulators and claimants, akin to multinational firms shifting profits to tax havens (Davies et al., 2018). Moreover, our health care setting highlights the burden that these practices place on the public when hidden profits can result in excessive public spending, under-regulation, and the weakening of threats from civil litigation.

Second, our research connects with a broad literature exploring the finances of health care providers, including how owners' financial incentives affect care. This includes work on privatization (Duggan et al., 2023), corporatization (Andreyeva et al., forthcoming), provider chains (Eliason et al., 2020; La Forgia and Bodner, 2024), management companies (La Forgia, 2023), and private equity (Gandhi et al., 2020; Liu, 2022; Singh et al., 2022; Kannan et al., 2023; Gandhi et al., 2023; Gupta et al., 2023; Richards and Whaley, 2023). Our study demonstrates how tunneling affects providers' capital structure and financial health, factors that a number of recent studies have shown can affect patient care (Adelino et al., 2022; Begley and Weagley, 2023; Antill et al., 2023; Olenski, 2023). Finally, while the widespread tunneling practices we document are likely legal, we contribute to the growing literature on (potentially) fraudulent practices of health care providers (Howard and McCarthy, 2021; Eliason et al., 2021; Shi, 2023; Leder-Luis, 2023; Shekhar et al., 2023; O'Malley et al., 2023; Gupta et al., 2024).

More broadly, our study speaks to a key question that underlies much of the tension in the U.S. health care sector: Who should capture the rents in health care? An important first step to such work is accurately measuring these rents. Recent studies have shown this to be quite challenging, such as work demonstrating the extent to which physicians capture rents through non-wage sources (Gottlieb et al., 2023) and quantifying previously unmeasured hassle costs (Dunn et al., 2024). Our paper highlights that assessing value capture in health care requires measuring and understanding the extent to which providers' parent organizations compensate themselves through mechanisms such as related party transactions.

Finally, this paper contributes to a small but rapidly burgeoning literature empirically analyzing the nursing home industry. Previous studies have touched on a wide variety of topics, including quality (Grabowski et al., 2008; Einav et al., 2022; Olenski and Sacher, forthcoming), access (Ching et al., 2015; Olenski, 2023; Cheng, 2023; Hackmann et al., forthcoming), staffing (Lin, 2014; Gandhi et al., 2021; Ruffini, 2022; Gandhi and Ruffini, 2023), and payments (Hackmann, 2019; Gandhi et al., 2024; Hackmann et al., 2024). Our paper nicely complements the existing literature by delving into the financial health of these providers. In particular, our findings are informative to the ongoing debate over why quality remains persistently low in this industry (Grabowski, 2001; Gandhi et al., 2024), suggesting that the conventional wisdom that poor financial

health is the binding constraint preventing facilities from improving quality (Harrington et al., 2007; Begley and Weagley, 2023) is overstated. These conclusions provide insights that are valuable to policymakers, regulators, and other stakeholders interested in improving quality.

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 examines the impacts on clinical and operational outcomes. Section 9 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), as falls, fractures, and high levels of pain are exceedingly common. 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), including death (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.[2] 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, CMS 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

[2]One recent study found that Medicaid and Medicare comprise 44% and 40% of overall revenue, respectively (Gandhi, 2023).

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 (AHCA and NCAL, 2023; AHCA v. Becerra, 2024).

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 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.

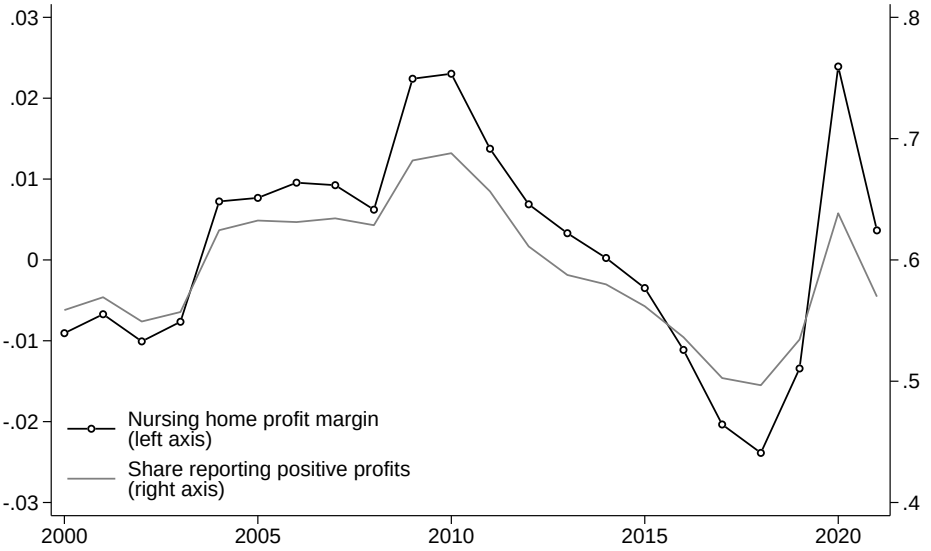



Figure 1: Nursing Home Profitability

*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 several reasons why nursing facility owners would choose to shift profits to a related party in this way. 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. One report found that 31 states considered facilities' reported costs when determining per diem Medicaid reimbursement rates (MACPAC, 2019). 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.[3]

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 many 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) may have particular tax advantages.

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 neglect 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

[3]The reimbursement system in the state that we study, Illinois, takes steps to account for related party costs when calculating rates. Indeed, awareness of this issue motivated the state's data collection efforts in the first place.

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.[4] 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 associated with public cost reporting and instead divert line items such as executive compensation through a related organization, in an effort to avoid public and 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 related party 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 federal 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. Our focus on the nursing home industry is motivated in part by particularly rich state cost report data, which we detail below.

## 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 $1^{st}$ and $99^{th}$ percentiles, a practice we carry throughout this paper. Additionally, the HCRIS data on related parties 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

[4]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.

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. Unlike HCRIS, individual facilities' records are used to help determine facility-level Medicaid rates, and so are subject to regular audit risk.[5] 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%.

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

While not *per se* evidence of tunneling, these two services—management and rents—are particularly 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.

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

[5] In practice, the risk of audit is quite low, but the threat exists nonetheless.

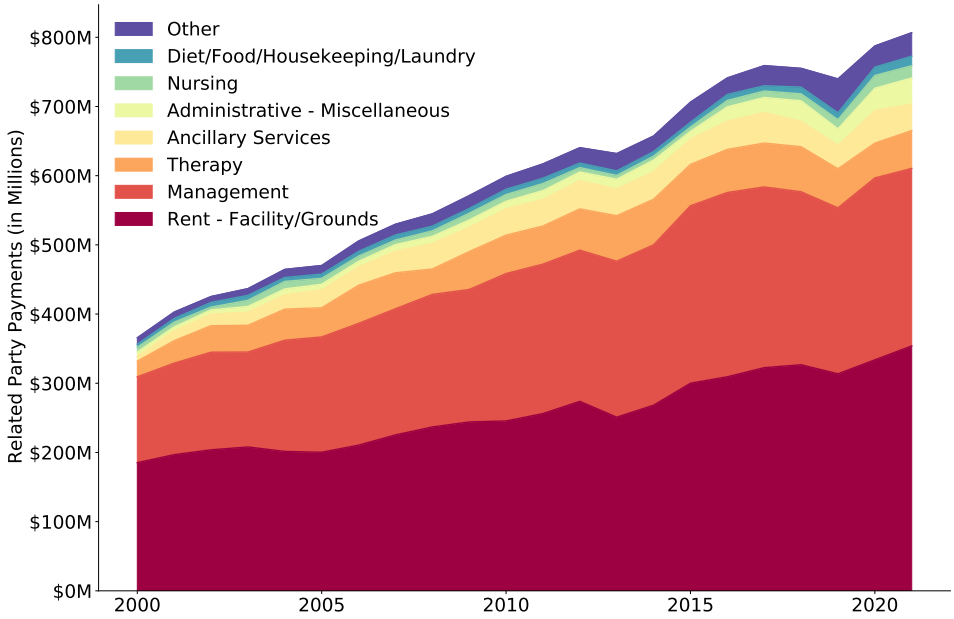



Figure 2: Amount Paid to Related Parties

*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.

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.[6] We take a similar approach for management services, setting a threshold of $5,000.[7] 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.

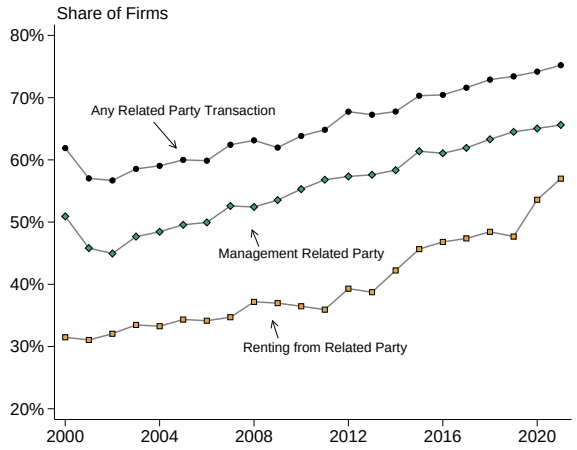
Figure 4 compares the distribution of reported costs for firms that do and do not purchase related party services. To ease comparison between firms that rent their facilities and those who own them, we aggregate real estate expenditures into a single comprehensive category. The cost report data make 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. By far the largest of these costs are facility rents (for those firms that do not own their building) and depreciation (for owners).[8]

[6]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.

[7]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.

[8]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

(a) Share of Firms Reporting a Related Party Payment




(b) Related Party Adoptions

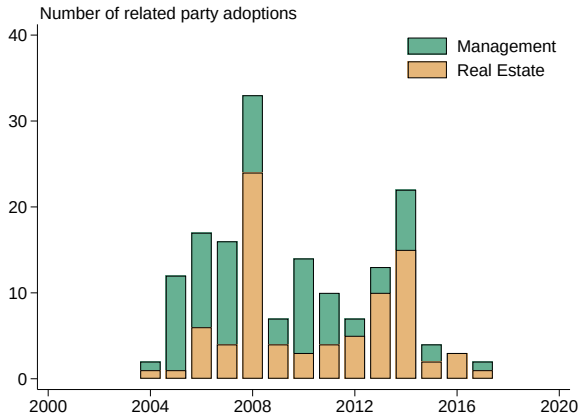



Figure 3: Growing Use of Related Parties

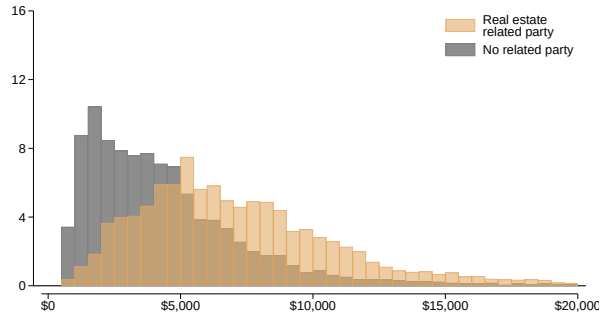
*Notes:* Panel (a) plots the share of facilities that have any related party transactions, transactions for management services, and transactions for facility rental payments, respectively. Panel (b) plots the number of adoptions for management services or real estate, restricting to only firms with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

Panel (a) depicts 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 than firms that either own their facility or rent from an arms-length landlord ($7,094 relative to $4,377 per bed). Panel (b) depicts 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 those that do have modestly higher management costs ($6,811 relative to $6,137 per bed). Note that firms that transact with related parties are not inherently more costly: in Appendix Figure B.3, we examine per-bed nursing expenditures, the largest single category of spending for any nursing home, and find little difference between those that do and do not employ either a real estate or management related party. Finally, Appendix Figure B.3 also shows that overall, firms that utilize related party real estate or management services appear less profitable on paper than others ($965 relative to $2,159).

While these results are suggestive of the intention and scope for profit tunneling, they are far from conclusive. While nursing homes using related parties tend to have higher levels of management and real estate spending, it may be that these facilities simply have higher costs. 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 unrelated parties (5.1% of firms). Geographic differences in land values and managerial labor markets could therefore explain the significant differences in spending. As such, we require a thorough research design to understand whether related party payments are inflated above their true costs. We describe such an approach in the following section.

variable, which would not generate bias in our subsequent regression estimates.

(a) Real Estate Costs per Bed




(b) Management Costs per Bed

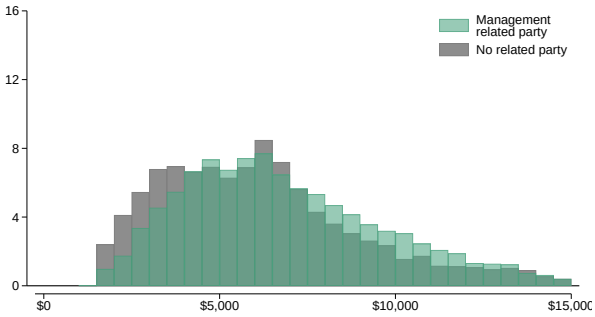



Figure 4: Costs by Related Party Status

*Notes:* Figure presents histograms of per-bed costs, 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.

# 3 Estimating the Impact of Related Party Adoption

## 3.1 Conceptual Framework

In this section, we describe our conceptual framework for considering the impact of transacting with a related party on a facility's reported costs. For each service area $s$ (e.g., real estate or management), facility $i$ in year $t$ details their spending $c_{it}^s$ in their annual cost report. For ease of notation, we suppress the superscript $s$ in this subsection and denote this reported cost by $c_{it}$. Our data allow us to decompose these costs into two components.

The first component is direct costs, which we denote by $d_{it}$. These include costs incurred directly by the facility (e.g., depreciation or administrator salaries) as well as arms-length purchases (e.g., interest or rent to an arms-length landlord). We treat these costs as truthfully reported since it's typically infeasible to inflate these costs without actually making inflated payments to an arms-length party such as an employee, landlord, or supplier.[9]

The second component is payments made for services rendered by related parties. We denote these by $p_{it}$ to emphasize that they need not reflect a true cost and instead reflect a transfer price charged to the facility by the related party. The key empirical challenge is that $p_{it}$ might be artificially inflated to exceed the true cost of the provided services. We model these mark-ups with a service-specific factor $\theta$, where the true cost of the services provided by the related party are $\theta p_{it}$. The wedge $p_{it} - \theta p_{it} = (1-\theta)p_{it}$ between the price charged by the related party and the true cost represent profits being tunneled to the related party through an inflated transfer price.

In summary, reported costs ($c_{it}$) are the sum of direct costs ($d_{it}$), which are reported truthfully, and related party payments $p_{it}$, which are marked up above true cost by $(1-\theta)p_{it}$.[10] Importantly, since $c_{it}$

[9]Note that while depreciation doesn't involve an arms-length transaction, it is also difficult to manipulate given that it is computed based on a standard formula.

[10]Often facilities will have either exclusively direct costs or exclusively related party payments for a given service. For example, a facility that owns its own land and buildings likely has only direct real estate costs, whereas a facility that rents from a related party likely has no direct real estate costs. However, direct costs and related party payments are not mutually exclusive. For example, facilities employing related party management services frequently also pay for some management services directly.

includes related party payments, it too will be inflated. The underlying value of interest to regulators and the public are the "true costs"—i.e., the cost after excluding any related party markups—which we denote by $\tilde{c}_{it}$. While we cannot observe these directly, we can express them as a function of $\theta$:[11]

$$\begin{aligned}\tilde{c}_{it} &= d_{it} + \theta p_{it} \\ &= c_{it} - p_{it} + \theta p_{it} \\ &= c_{it} - (1-\theta)p_{it}.\end{aligned}$$

Thus, unobserved true costs $\tilde{c}_{it}$ can be expressed as a straightforward function of reported costs, reported related party payments, and the unknown factor $\theta$. Inferring true costs therefore requires an estimate of $(1-\theta)$, i.e. the extent of related party markups.

To estimate $(1-\theta)$, we require a functional form assumption on the unobserved evolution of true costs. Specifically, we assume that true costs are additively separable in facility and time components and an orthogonal error term: $\tilde{c}_{it} = \alpha_i + \gamma_t + \varepsilon_{it}$. Rearranging terms, this yields the following equation:

$$c_{it} = (1-\theta)p_{it} + \alpha_i + \gamma_t + \varepsilon_{it} \tag{1}$$

Equation (1) shows how $\theta$ relates total spending on the service ($c_{it}$) to related party payments ($p_{it}$). Crucially, both $c_{it}$ and $p_{it}$ are reported by facilities on their cost reports, suggesting that $(1-\theta)$ (and therefore $\theta$) can be recovered from their empirical relationship. Our primary empirical exercise is to test the null hypothesis that $\theta = 1$, i.e. that related party payments are not inflated above true costs.

## 3.2 Research Design

To test whether $\theta = 1$ in (1), we isolate variation in $p_{it}$ induced by facilities that do not initially utilize related parties for particular services but start to do so during our sample period. We refer to these instances as the facility "adopting" a related party. These events are valuable both conceptually and econometrically because they provide a clear discrete jump in $p_{it}$ that is driven by the facility's decision to purchase a service from the related party.[12] Formally, our research design is a difference-in-differences approach that compares changes in reported costs 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.[13] The necessary "parallel trends" assumption for our 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.

Our primary specifications in Sections 4 and 5 respectively transform $p_{it}$ into an indicator for facility $i$ having adopted a related party by period $t$ for real estate and management services. That is, our primary specifications in these sections are binary (as opposed to continuous) difference-in-differences. This estimates the average effect of adopting a related party on total costs, and it admits a straightforward test of the null hypothesis that related party transactions do not increase costs. Binary differences-in-differences has the

[11] The second line follows from the accounting identity $c_{it} = d_{it} + p_{it}$.

[12] In contrast, variation in $p_{it}$ after the facility has adopted a related party can be driven by factors like variation in input costs.

[13] 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.

appealing property of weaker assumptions than continuous difference-in-differences, which require strong parallel trends and linearity in treatment effect (Callaway et al., 2024). Note that our principal findings do not require a binary approach. In Section 6, we revisit the continuous treatment specification for the purposes of constructing more precise measures of hidden profits, and find that our results are broadly insensitive to the choice of specification.

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. 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.

Given that real estate and management related party transactions constitute an outsize share of spending on related parties (Figure 2) our analysis focuses on adoptions of these services. When examining real estate related party adoptions, we restrict to cases in which the nursing home owned its land and buildings prior to renting from a related party. These cases represent the clearest examples in which adopting a related party landlord may change the amount that the facility pays to utilize the property without actually changing the ultimate owner that controls the real estate.

Our primary sample includes cohorts for 83 rental company adoptions and 79 management company adoptions. We then 'stack' the datasets and implement the following differences-in-differences event-study regressions separately for real estate and management related party adoptions:

$$c_{itm} = \beta_{t-\tau_m} RP_{im} + \alpha_{im} + \gamma_t + \varepsilon_{itm}, \tag{2}$$

where $i$ indexes facility, $t$ indexes calendar year, $m$ indexes adoption event, and $\tau_m$ gives the year of the adoption event. The variable $c_{itm}$ denotes 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-event fixed effects $\alpha_{im}$. That these fixed effects also vary by event 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.[14] Therefore, the evolution of $\beta_{t-\tau_m}$ for $t - \tau_m \geq 0$ shows the dynamic treatment effect of related party adoption. When examining reported costs, these coefficients provide a clear test of the null hypothesis in our conceptual framework. Insofar as related party payments precisely reflect true costs—i.e., if $\theta = 1$—then we would expect these $\beta_{t-\tau_m}$ to be zero. On the other hand, if related party payments exceed true cost—i.e., if $\theta < 1$—then we expect these coefficients to be positive.

The evolution of $\beta_{t-\tau_m}$ for $t - \tau_m < 0$ allows us to observe whether facilities that adopted related parties were already experiencing differential trends prior to adoption. This helps assess the plausibility of the

[14]Note that 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.

parallel trends assumption. We cluster our standard errors 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. 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, and it is difficult to rationalize why outsize changes would coincide with related party adoption. 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 it generates cost *savings*, rather than cost hikes.

Nevertheless, one way we probe the plausibility of this assumption is by looking for changes in real economic activity following related party adoption. If changes in reported costs correspond to simultaneous real cost shocks, rather than simply reflecting 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 Related Party Real Estate

In this section, we assess the impacts of adopting a rental company related party—i.e. renting from a related party—on facility costs and balance sheet items. We examine cases in which nursing homes own their real estate prior to renting from a related party, 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 same 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 from the sale.[15] This suggests that there must be other advantages or implications of the transaction, which we explore here.

[15]The cost report data include the share of ownership overlap between the nursing home and related parties. In our data, 99.0% of related party transactions are with entities that have perfect ownership overlap (Appendix Figure B.4).

| | Adopting Firms | Control Firms |
|---|---|---|
| | (1) | (2) |
| *Per-Bed Financials ($)* | | |
| Revenue | 56,475.7 | 64,075.1 |
| Expenses | 54,484.6 | 62,352.1 |
| Total Assets per Bed | 63,316.6 | 125,641.9 |
| Total Liabilities per Bed | 46,843.2 | 40,679.5 |
| Negative Equity, % | 18.1 | 14.5 |
| Profit | 687.6 | 1,698.3 |
| *Per-Bed Expenses ($)* | | |
| Nursing | 18,029.4 | 19,819.4 |
| Total Real Estate | 3,894.8 | 4,432.8 |
| *Facility Characteristics* | | |
| Beds | 115.8 | 79.6 |
| For-Profit, % | 69.9 | 28.4 |
| Occupancy, % | 76.9 | 85.4 |
| Medicaid Share, % | 62.5 | 70.7 |
| Chicago, % | 8.4 | 5.3 |
| Number of Firms | 83 | 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. Note that for assets, liabilities, and equity, we restrict to only facilities that do not cease balance sheet reporting following the related party adoption.

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 structure, 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 balanced 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.

## 4.1 Impact on Real Estate Costs

When a nursing home starts to rent from a related party, the nature of the facility's real estate spending changes. Prior to an adoption, a facility incurs direct costs of owning the real estate, predominantly depreciation, real estate taxes, and mortgage interest. Afterward, the facility incurs fewer direct costs and instead primarily pays rent to the related party. Accordingly, our focus in this section is on total real estate spending, i.e. the sum of these component parts.

Figure 5 depicts our event study estimates of the impact of related party adoption on a facility's real

estate spending. Panel (a) shows the impact on a nursing home's total spending on real estate ($c^s_{it}$), inclusive of both direct real estate costs ($d^s_{it}$) and rents ($p^s_{it}$). 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 related party adoption. The estimates imply that the amount that nursing homes spend on real estate rise by $1,595 per bed in just the first year of renting from a related party. Pooling the entirety of the post-adoption window, annual real estate costs rise by $1,744 per bed. This increase in total spending on real estate is a substantial 42.4% of the pre-adoption mean.

In panel (b), we decompose the total effect into changes to direct spending on real estate by the nursing home ($d^s_{it}$) and payments made to the related party ($p^s_{it}$). As anticipated, the estimates do suggest that in renting from a related party, the facility substitutes the direct costs of ownership for related party rental payments. Crucially, however, these two effects do not perfectly offset one another. The additional rent paid to the related party substantially exceeds the savings from having fewer direct costs of real estate ownership.

Therefore, the primary impact of renting real estate from a related party is to increase the amount the facility pays to utilize *the same* real estate as before. While it is theoretically possible that the related party real estate company materially improves the property, it strains credulity that such improvements could be so substantial or immediate as to instantly increase the average value of tenancy by 42.4%. Moreover, it is important to emphasize that a related party sale-leaseback exists purely on paper: while the name of the corporation on the real estate title changes, the ultimate owner that controls the property does not.[16]

Panel (c) further decomposes the key direct costs of facility ownership—depreciation, interest, and real estate taxes—and contrast them with the rent paid to related parties.[17] As expected, the reduction in direct costs is driven by statistically significant declines in depreciation expenses ($1,399), interest payments ($1,431), and real estate taxes ($247). Consistent with panel (b), even the sum of these reductions in direct cost line-items are small relative to the dramatic $4,534 increase in rents paid to related parties, generating the sizeable increase in total real estate spending reported in panel (a).

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 Section 2.2 that related parties' reported costs should be interpreted with caution. Related parties are not subject to the same regulatory oversight as providers themselves and therefore likely face little risk of enforcement against sub-standard reporting. Moreover, related party reporting is less-detailed, making it easier to mask transfers from the related party to owners and their relatives as non-specific costs, such as administrative salary payments. Nonetheless, these reported costs may be more credible specifically in the context of real estate, where line items such as interest and depreciation may be difficult to exaggerate.

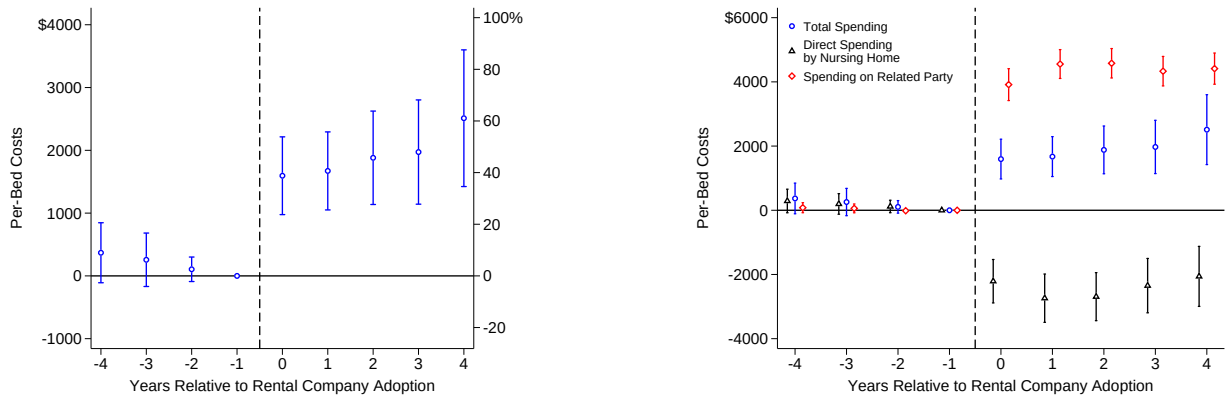
Appendix Figure B.7 compares the new costs paid by the related party to the decrease in direct costs paid by the nursing home. Panel (a) shows that, as expected, the related party reports new depreciation expenses after the sale-leaseback while the nursing home reports less. On average, the new depreciation being claimed by the related party approximately equals the reduction in depreciation being claimed by the nursing home. As a result, we see a very modest (statistically insignificant) average increase of only 4.8% of the pre-treatment mean. Panel (b) shows a similar pattern with interest expenses: new interest expenses for the related party slightly exceed the reduction for the nursing home such that the joint entity's interest rate

[16] In contrast, a sale-leaseback to an outside firm actually changes the property's ultimate owner and therefore might more plausibly affect the available resources and preferences for upkeep and other investments in the property.

[17] See Appendix Figure B.6 for other line-items, including non-rental payments to related parties and rental payments to non-related parties.

(a) Total Spending

(b) Direct and Indirect Spending




(c) Key Line-Items

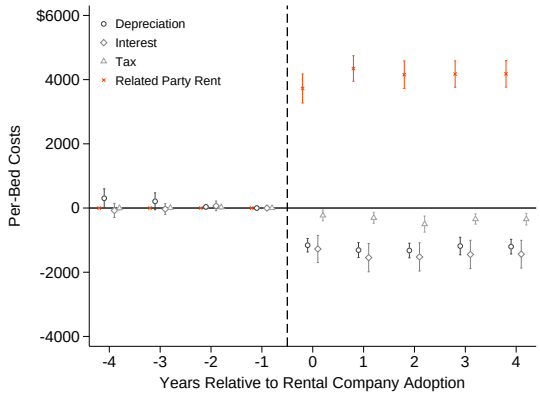



Figure 5: Real Estate Expenditure Around Related Party Adoption

*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. Panel (c) provides a further decomposition, breaking down the sources of both related party and direct spending. The remaining inputs of real estate spending are shown in Appendix Figure B.6. Each point corresponds to an estimate of the $\beta^{\tau}$ parameters from equation (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

expenses increase by an average of 9.9% of the pre-period mean. This increase in interest expenses suggests that owners may be using the sale-leaseback as an opportunity to take a larger mortgage. We explore this possibility further in Section 4.2.

**Robustness** We also examine the robustness of our analysis to several alternative specifications. Costs are commonly right-skewed, so we show robustness of our findings to use of a logged dependent variable in Appendix Figure B.9a. We also show in Appendix Figure B.10 that our estimates look similar when employing the standard two-way fixed-effects estimator without stacking. In Appendix Figures B.11a and B.12a, we restrict the sample to only for-profit and not for-profit firms, respectively. We find similar effects in both groups, though the relatively low take-up of related parties among non-profit and public firms means we are unable to reject the possibility of null effects in this subgroup. In Appendix Figures B.13a and B.14a, we restrict the sample to only chain-affiliated firms and non-chain firms, respectively, and find relatively similar patterns across subgroups. In Appendix Figure B.16 we show robustness to restricting controls only to facilities renting from a non-related party. These estimates are similar to our main specification, suggesting that our results are not driven by a difference in trends between market rents and the accounting costs of ownership.

## 4.2 Impact on Balance Sheets

The sale-leaseback transaction shifts substantial assets and liabilities between the facility and the related party, which could present an additional opportunity for tunneling. Moreover, the modest increase in consolidated interest expenses (Appendix Figure B.7, panel b) suggests that the transaction may be used to increase leverage of the consolidated entity. Therefore, in this section we study the implications of the related party sale-leaseback for the capital structure and financial health of both the provider and the related party.

We cannot examine the details of the sale-leaseback transaction directly, as the cost report data do not contain information on property sales. Fortunately, Illinois requires facilities to submit uniquely detailed balance sheets as part of their annual cost reports. Most notably, facilities must report both a balance sheet for the facility, as well as a "consolidated" balance sheet that includes the assets and liabilities of the facility's related parties as well. This level of granularity allows us to track assets and liabilities as they shift from the facility's balance sheet to that of the related party's.[18]

Using these three series (nursing home, 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 (2), 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 (joint) entity.

Figure 6 presents the event study estimates for various balance sheet measures. Panel (a) shows that as the building transfers ownership, assets reported by the nursing home fall, while assets reported by the related party rise. Surprisingly, we find that these do not perfectly offset, and the total assets held by the consolidated entity fall by $44,353 per bed (60.0% of the mean) after a rental company adoption.

The decline in total assets does not itself suggest a below-market transaction value of the building, nor

[18]Facilities submit balance sheets for the nursing home and the consolidated entity, which includes both the nursing home and its related parties. Therefore, we infer the related party balance sheet by subtracting the nursing home's assets and liabilities from the consolidated entity's assets and liabilities.

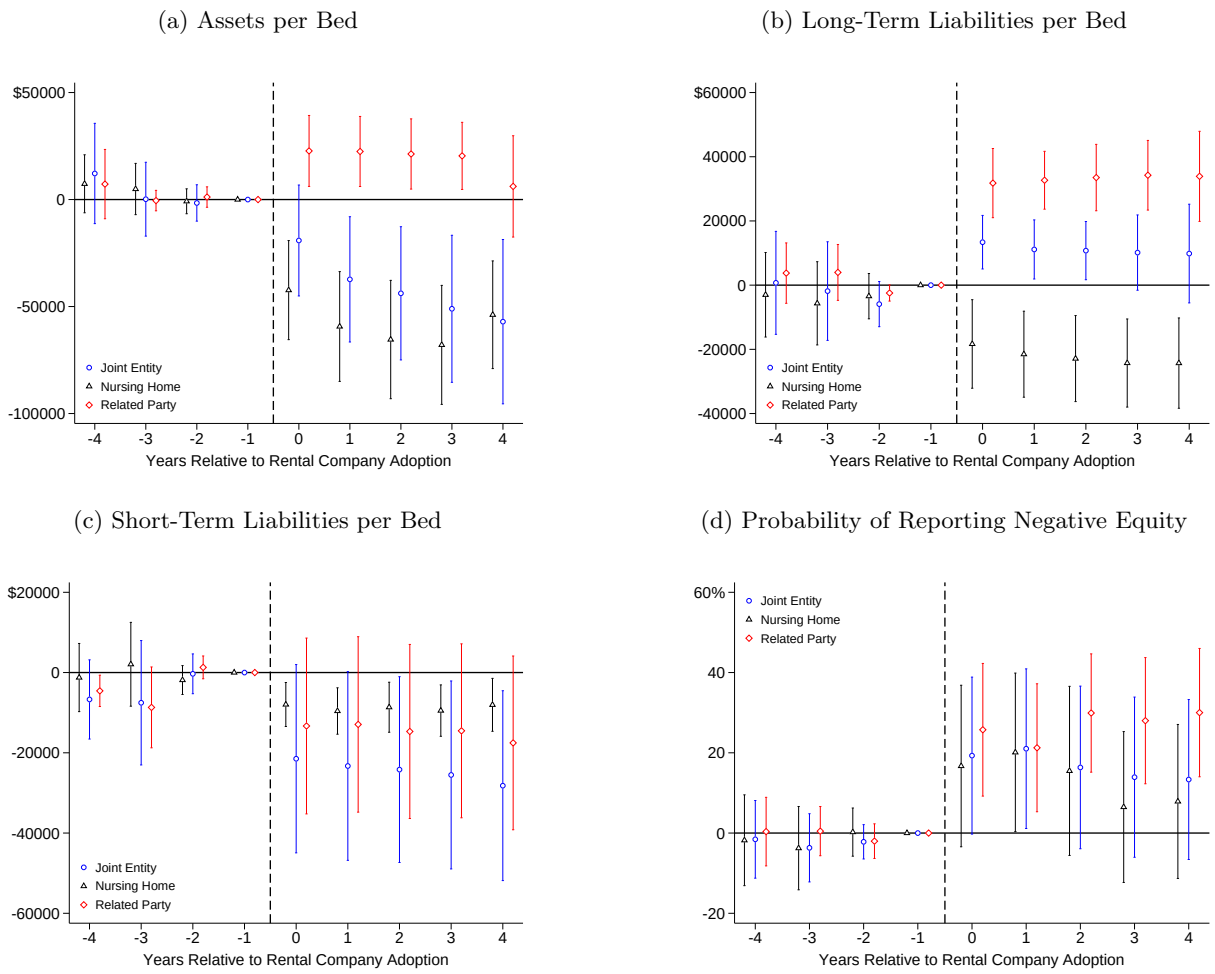



Figure 6: Change in Balance Sheet

*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 $\beta^{\tau}$ parameters from equation (2) 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 $1^{\text{st}}$ and $99^{\text{th}}$ percentiles. Standard errors are clustered by facility.

that the firm is necessarily made worse off. This is because the transaction is also likely to affect the liabilities of both parties. The nursing home likely uses the payment it receives to pay off its mortgage, and it could further be using liquidity to pay down other liabilities as well. Meanwhile, the related party may finance the purchase by taking out a new mortgage. Therefore, interpreting the changes in assets can only be done in context of the changes in liabilities.

We explore the effect of the transaction on long- and short-term liabilities in panels (b) and (c), respectively. The results are striking. The nursing home pays down long-term liabilities—which includes mortgage debt—as well as some short-term liabilities. However, the total reduction in liabilities is smaller than the nursing home's loss in assets: on average, facilities pay off just \$27,794 per bed in liabilities, which explains just 45.9% of the \$60,621 drop in the nursing home's assets, leaving the remaining \$32,827 per bed unaccounted for. This result that nursing homes' book equity (i.e., assets minus liabilities) tends to decreases after the sale leaseback implies that the transaction price of the sale-leaseback is typically lower than the

book value of the real estate.

While it could be that the nursing home sells the property to the related party at such a low price because the property's true market value is less than its book value, this seems implausible. The book value of real estate is typically adjusted downward from the original purchase price based on straight-line depreciation, whereas the market value of real estate typically increases over time.[19] Moreover, the fact that related parties typically charge nursing homes a premium to lease the space rather than own it (Figure 5) is inconsistent with book value exceeding market value. Taken together, this suggests another important avenue for tunneling: nursing homes selling their property to the related party below market value. Our estimates suggest that, on average, related party sale-leasebacks tunnel this $32,827 per bed off of the nursing home's balance sheet.

This has sizeable implications for the nursing home's financial health because it disappears a sizeable amount of book equity from the nursing home's balance sheet. Indeed, following the sale-leaseback, the nursing home is 14.7 percentage points more likely to report negative equity (panel d). In other words, the sale-leaseback is so extractive that it often leaves the nursing home appearing to be less than worthless on paper. From the vantage point of a regulator blind to related party balance sheets, this would appear to leave the nursing home entity in a precarious financial position, verging on bankruptcy or even closure.

The implications for related party balance sheets are equally striking. Panels (b) and (c) show that on the other side of the transaction, related parties substantially increase their long-term liabilities. This occurs almost entirely through new mortgage liabilities (Appendix Figure B.8), revealing that related parties commonly finance the purchases through debt.[20] Importantly, these new liabilities actually exceed the increase in related party assets in panel (a), suggesting that the new debt the related party takes out to finance the purchase is greater than the property value being reported on their books. Because mortgages are typically collateralized by the property, this suggests that the mortgage lender perceives the property to have a market value that exceeds what is being reported to regulators. Moreover, because the book value that the related party reports should reflect the price it paid to the nursing home, this is consistent with the related party underpaying the nursing home for its real estate and immediately capitalizing the discount by taking out a mortgage against a market value significantly above what it paid.

Some of this newfound liquidity is used to pay down short-term liabilities (panel c), but the rest appears to vanish from the related parties' books. In fact, related parties typically see their equity decrease such that the transaction results in a 27.3 percentage point increase in related parties reporting negative equity. Thus, even though the sale-leaseback appears to be highly favorable to the related party, the related party does not keep the benefits on their books. While we cannot ascertain where these funds go when they move off the related party's balance sheet, it is plausible that related parties are paying out the missing component of this new debt 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, because nursing homes' dividends and other payments to owners must be reported to the government and can be scrutinized by the public.

The ultimate impact of related party sale-leaseback transactions for nursing homes' owners are clearest when considering the consolidated balance sheets. These show the total assets and liabilities held by the owners, either through the nursing home or its related parties. Here, the estimates clearly demonstrate the extractive nature of the transactions. Figure 6 panel (b) and Appendix Figure B.8 show that owners use the transaction as an opportunity to increase long-term leverage by $12,807 per bed (44.3% of the mean),

[19] Real estate prices in Illinois increase by an average of 41% between 2000 and 2019.

[20] Note that the net increase in long-term liabilities for the consolidated entity exceeds the increase in interest payments. This suggests that, in general, this new debt is on comparatively favorable terms to pre-existing debt.

apparently refinancing to take out a larger mortgage. Figure 6 panel (a) shows that the consolidated entity reports a dramatic $44,353 per bed decrease in assets, representing either a mark-down in the reported value of the real estate even as it collateralizes a larger mortgage, or else that the consolidated entity spent down the assets or paid them out. Some of this can be explained by paying down $20,894 in short-term liabilities on the consolidated balance sheet (panel c), however this rationalizes only 36.6% of the $57,160 per bed in new long-term debt and reduction in assets. The remaining $36,266 per bed is likely ultimately paid out to owners, leaving the consolidated entity 18.6 percentage points more likely to report negative equity.

This approach of increasing leverage and paying the liquidity out to owners accomplishes two goals. First, in taking out a larger mortgage, the owner is able to implicitly capitalize on any appreciation in property value without actually claiming the capital gains on their taxes. This would not be possible if realizing the gains through a market-price sale to an outside party. Second, owners are implicitly capitalizing future rents they expect to receive from the facility by borrowing at the low rate available for collateralized loans and paying the future interest obligations with cash flow from rents.

That the sale-leaseback leaves even the consolidated entity appearing impoverished demonstrates a key challenge in addressing tunneling. Policymakers and courts interested in making providers' assets and profits visible to the public, regulators, or malpractice claimants may find it difficult to accomplish this through greater visibility on related parties alone. Related parties appear to be only a stopover for the value they extract, so that even their balance sheets do not tell precisely where the funds ultimately end up.

# 5 Related Party Management Services

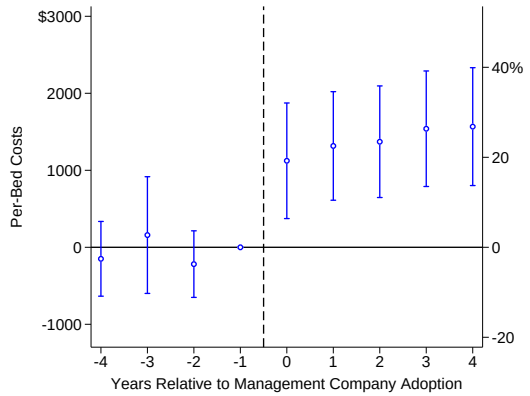
The descriptive analysis of Section 2.4 indicates that after rent, management services is the second largest category of related party spending. Together, these two cost centers comprise the lion's share of all related party spending, and are therefore the focus of our analysis. We adopt an identical approach to estimating the impact of management services related party adoption; that is, we estimate a variant of equation (2), 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.

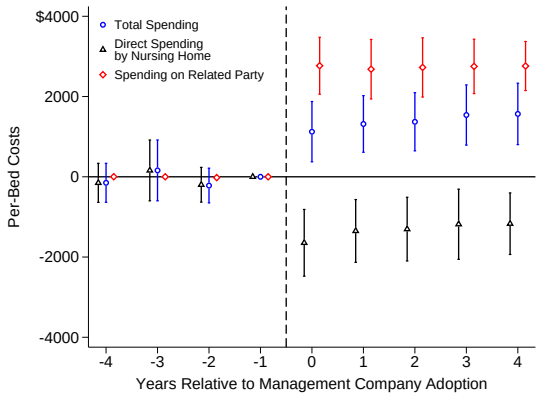
## 5.1 Impact on Management Costs

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 assumption, we can examine the leading $\beta^{\tau}$ terms from equation (2), estimated over our management related party sample, and considering management costs as the dependent variable.

(a) Management Costs per Bed




(b) Decomposition of Management Costs




(c) Key Line-Items

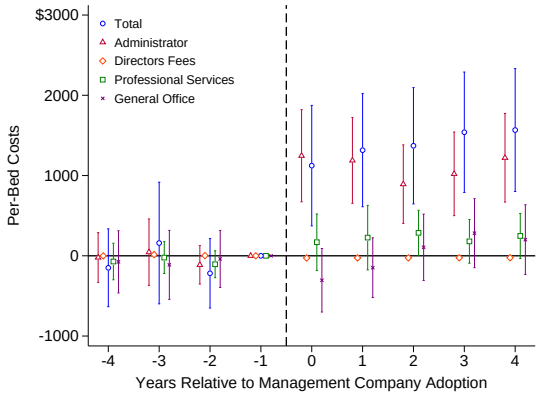



Figure 7: Management Expenses around Related Party Adoption

*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. Panel (c) provides an alternative decomposition, breaking down the components of management spending into its individual line items. Each point corresponds to an estimate of the $\beta^{\tau}$ parameters from equation (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

| | Adopting Firms | Control Firms |
|---|---|---|
| | (1) | (2) |
| *Per-Bed Financials ($)* | | |
| Revenue | 58,361.9 | 60,840.0 |
| Expenses | 59,127.8 | 58,409.1 |
| Profit | -345.1 | 2,677.7 |
| *Per-Bed Expenses ($)* | | |
| Nursing | 18,959.5 | 18,423.7 |
| Management | 5,956.9 | 6,492.3 |
| *Facility Characteristics* | | |
| 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.

Our primary results are shown in Figure 7. In panel (a) we plot the estimates of $\beta^{\tau}$ from equation (2), 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.' It is not *ex ante* obvious that changes in management spending following related party adoption should be driven by administrator salaries, rather than through increased general office expenses. Moreover, 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.

As with real estate, we may decompose the overall management effect into each of these categories separately. Panel (c) contains the results. The entirety of the total effect documented in Panel (a) is driven by administrator salaries. That we find no meaningful increase in clerical salaries (termed 'general office') is also revealing about the nature of the related party adoption. A concern that runs throughout our

analysis is that a related party 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.

**Robustness** 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 8) is not so conceptually different from the straightforward tunneling we have discussed. Nonetheless, in Figure B.15 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.9 panel (b) we plot estimates of equation (2) with a logged dependent variable, and find very similar estimates. We again find similar estimates using a standard two way fixed effects approach (Appendix Figure B.10 panel b). Exploring the role of ownership, in the bottom panels of Appendix Figures B.11 and B.12, we again find comparable effects between for-profit and non-profit/public firms, though a lack of statistical precision in the latter group inhibits our ability to conduct inference. In the bottom panels of Appendix Figures B.13 and B.14, we examine how the estimated coefficients change when we restrict the sample to only chain-affiliated firms and non-chain firms, respectively. As with the results by ownership, we find relatively similar patterns across subgroups.

## 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.19, we examine each of the other cost centers in our data, re-estimating equation (2) 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 (2) using per-bed reported ownership compensation for management services as the dependent variable. The results, in Figure 8, are noisily estimated, but

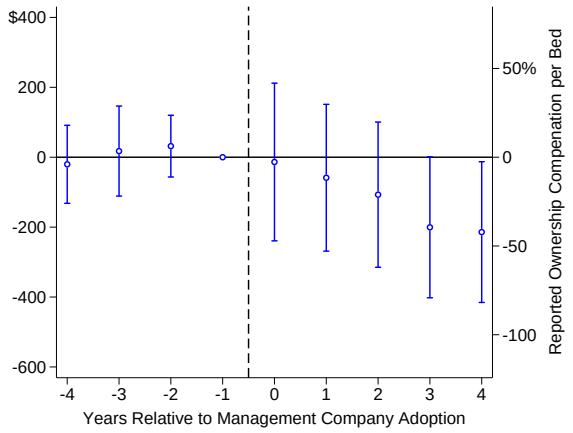



Figure 8: Reported Ownership Compensation for Management Services

*Notes:* Figure presents event study of reported per-bed 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 $\beta^{\tau}$ parameters from equation (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{\text{st}}$ and $99^{\text{th}}$ percentiles. Standard errors are clustered by facility.

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 in management costs reported in Figure 7 may be ownership compensation in disguise, supporting the hypothesis of related parties facilitating profit tunneling by firms.

# 6 Calculating Hidden Profits

The binary-treatment event studies in Sections 4 and 5 estimate the average impacts of related party adoption and reveal that related party adoption is associated with a marked increase in reported expenditures. One implication of this finding is that we can conclusively reject the null hypothesis that related party payments for real estate and management services are not marked up above true cost (i.e., we can reject the null that $\theta^s = 1$ for these services).[21]

However, these averages mask substantial variation in the extent to which facilities pay related parties (i.e., variation in $p^s_{it}$ conditional on $p^s_{it} > 0$). Insofar as we wish to delve beyond average effects on spending to infer excessive payments at the facility-level, we require an estimate of $\theta^s$. In particular, given an estimate of $\theta^s$, it is straightforward to compute the related party's margin on service $s$: $(1 - \theta^s)\, p^s_{it}$. Aggregating over services yields the total profits being hidden by facility $i$ in year $t$ through inflated related party transfer prices:

$$\pi^*_{it} = \sum_{s \in \mathcal{S}} (1 - \theta^s) p^s_{it}. \tag{3}$$

Because related party payments ($p^s_{it}$) are observed, our principal aim in this section is to estimate $\theta^s$ for each service $s$, so as to calculate 'hidden' profits $\pi^*_{it}$. As in Section 3, we henceforth omit the superscript $s$ for ease of exposition with the understanding that our estimation is done separately for each service area.

[21] Recall from Section 3.1 that the $s$ superscript denotes service lines, such as management or real estate.

Recovering $\theta$ requires us to re-estimate our specifications allowing for continuous treatment in the size of related party payments. Furthermore, we aim to do so while still leveraging only variation due to the new adoption of a related parties as in Section 3.2. To accomplish this, we modify our previous specifications by interacting $RP_{im}$ with a post-adoption indicator and a continuous dosage $\bar{p}_i$ that is the average related party payment made by facility $i$ in the years after adopting the related party:[22]

$$c_{itm} = (1-\theta)\left(RP_{im} \times \mathbf{1}\{t \geq \tau_m\} \times \bar{p}_i\right) + \alpha_{im} + \gamma_t + \varepsilon_{itm}. \tag{4}$$

In summary, equation (4) is a difference-in-differences estimator that allows for continuous treatment but enforces that all variation in non-zero treatment can be thought of as dosage size. While this approach has been employed before (e.g., Acemoglu and Finkelstein, 2008), it requires the assumption of both strong parallel trends and parametric linearity of treatment effect in dosage size (Callaway et al., 2024).[23] Given these assumptions, $(1-\theta)$ is simply the coefficient yielded by estimating regression equation (4) on our stacked dataset.

The continuous dosage approach also admits a direct analog to event study equation (2):

$$c_{itm} = \beta_{t-\tau_m}\left(RP_{im} \times \bar{p}_i\right) + \alpha_{im} + \gamma_t + \varepsilon_{itm}. \tag{5}$$

We show in Appendix Figure B.21 that the continuous dosage event studies imply effects very similar to those from the more flexible binary event studies used in Sections 4 and 5, suggesting these assumptions are not too restrictive.[24]

## 6.1 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 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 (1) to recover the corresponding $\theta^s$.

Parameter estimates are presented in Table 3. Consistent with our findings in Sections 4 and 5, we find significant estimates for real estate and management services. For ease of interpretation, we also present the implied related party markup for each service, which is simply $1-\theta^s$.[25] The implied markup for real estate services provided by a related party is 36.1%; 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

[22] Prior to related party adoption, $RP_{im} \times \mathbf{1}\{t \geq \tau_m\} \times \bar{p}_i^s$ takes a value of 0, and after adoption, it takes the takes a value of the facility's average post-adoption related party spending. It is always zero for facilities that never adopt a related party.

[23] 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).

[24] To facilitate comparison with between the binary and continuous dosage estimates, we scale the coefficients from equation (5) by the mean value of $\bar{p}_i$ across facilities.

[25] Following convention, we calculate the markup as $\frac{p_{it}^s - \theta^s p_{it}^s}{p_{it}^s} = 1-\theta^s$, or the share of reported related party payments that are hidden profits.

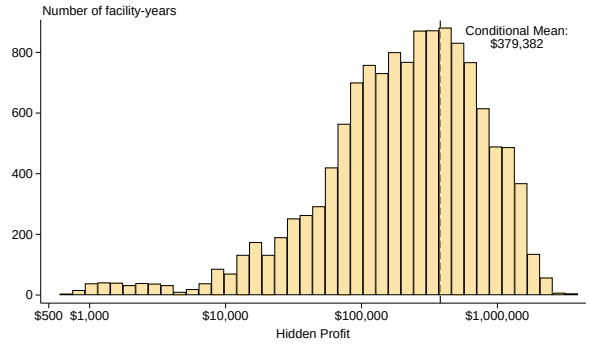
| Cost | Percent of Spending on Related Parties | Parameter Estimate $\hat{\theta}^s$ | Implied Related Party Markup (%) |
|---|---|---|---|
| Total Real Estate | 30.9 | 0.639 (0.440, 0.839) | 36.1 (16.1, 56.0) |
| Management | 25.4 | 0.583 (0.280, 0.885) | 41.7 (11.6, 71.9) |
| Therapy | 12.4 | 0.978 (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 $\theta^s$

*Notes:* Table presents estimates of the parameter $\theta^s$ for each cost category considered. Each line corresponds to a regression estimate of equation (4). 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.

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 markup is noisy, and we again cannot reject the null of no 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 $\pi^*_{it}$. We report the corresponding event studies for each cost category (analogues to those estimated in Sections 4 and 5) in Appendix Figure B.20.

(a) Distribution of Hidden Profits




(b) Evolution of Hidden and Reported Profits

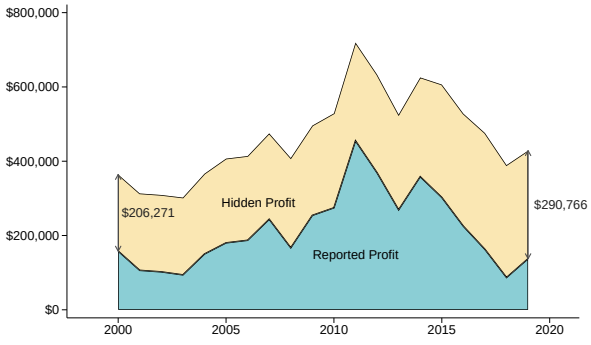



Figure 9: Hidden and Reported Profits

*Notes:* Figure presents the results of the hidden profit calculation in equation (3). 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 $1^{st}$ and $99^{th}$ percentiles. We exclude 2020 onward due to the Covid-19 pandemic.

Figure 9 presents the profit calculations based on our estimates. Panel (a) plots the distribution of hidden profits $\pi^*_{it}$ 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 $379,382. Without conditioning on any related party transaction, the mean across all facilities is $251,735 hidden profit. Note also the log-scale: The distribution has a long right tail; the median and interquartile range are $231,022, $92,166, and $521,481, respectively,

with a staggering 95$^{\text{th}}$ percentile of \$1,292,657. 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.22 panel (a) contains the analogous distribution for per-bed profits.

Panel (b) presents the mean reported profit ($\pi_{it}$) and hidden profit ($\pi^*_{it}$) 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 decline through 2019.[26] Accounting for hidden profits increases the mean total profit of a facility to \$428,398 by 2019; this corresponds to a 211% increase over the reported profit for this year. Equivalently, 67.9% 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 56.6% in 2000, suggesting that firms are increasingly using related parties as a means to tunnel profits. Put simply, these results suggest that a staggering (and growing) share of nursing home profits go unreported, instead flowing through related parties.

We examine the robustness of our calculations in several ways. Appendix Figure B.22 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.23, we replicate Figure 9, 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.

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 Section 8 suggests 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.

## 6.2 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 $\pi^*_{it}$ 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

[26] Note that the federal HCRIS cost report data cover all facilities, not just those in Illinois. This, in conjunction with potential HCRIS misreporting, explains the divergence in reported profits between Figures 1 and 9.

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 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.[27] We use the PBJ data to calculate the observed RN and CNA staffing ratios for all Illinios nursing homes in 2019.

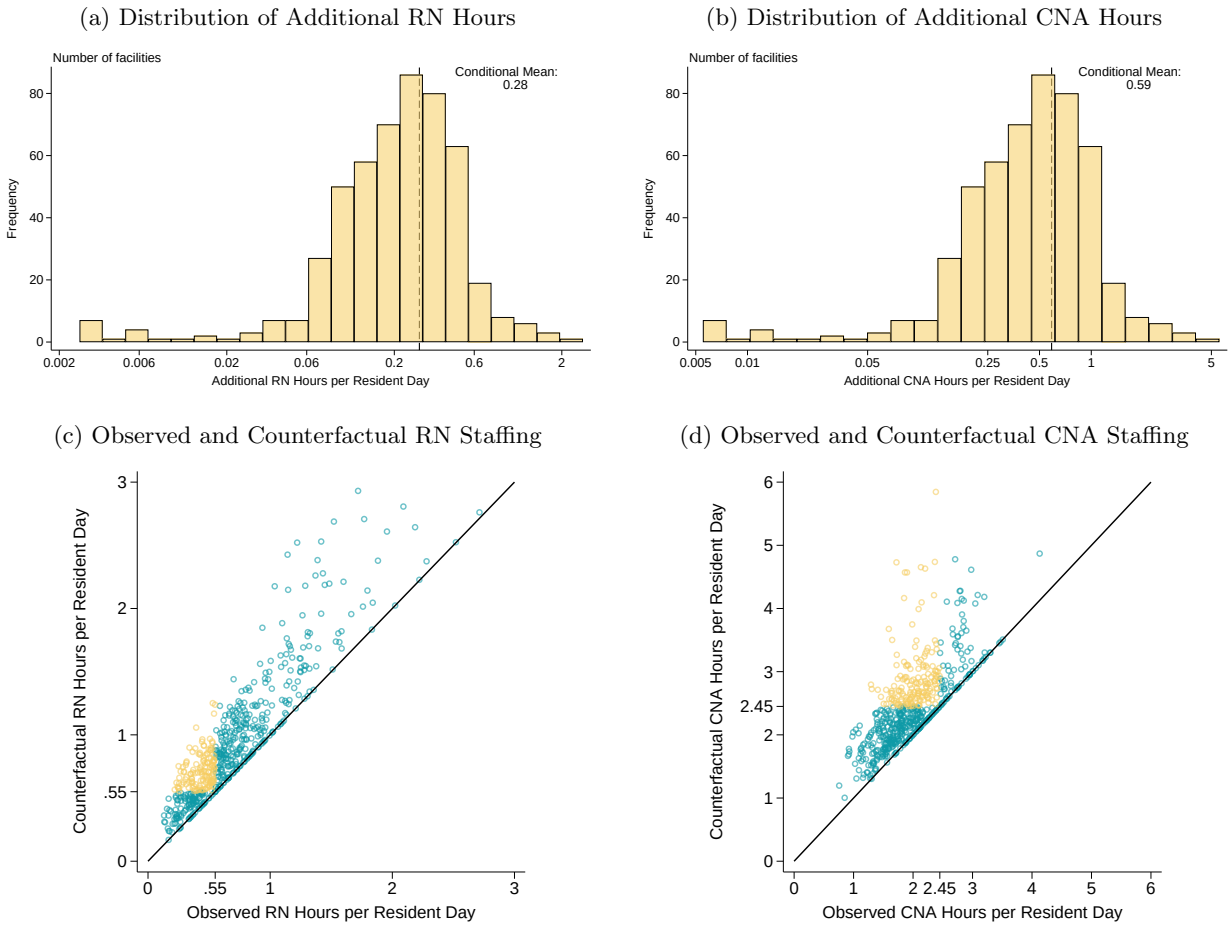



Figure 10: Counterfactual Direct Care Staffing

*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 10 panels (a) and (b), respectively. These estimates indicate that, among the firms with non-zero hidden profits, RN hours would rise by nearly 0.28 hours per resident day. Similarly, these same hidden profits would translate to an additional 0.59 additional CNA hours per resident day. These increases are sufficiently large that the

[27]These data, which are typically automatically submitted to 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.

mean staffing ratios statewide (i.e. including the non-related party firms) would increase 35.7% and 26.1%, respectively.

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 CMS minimum staffing rule 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 78.8%. Similarly, we find that compliance with the CNA standard of 2.45 hours per resident day would rise from 15.3% to 43.4%. 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 $\pi^*_{it}$ were translated into either RNs or CNAs, and so overstates the share of firms who could easily comply.

# 7 Asset-Shielding Incentive to Tunnel

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 1st and 99th percentiles. We then estimate our primary difference in differences specification, equation (2), over the HCRIS sample.

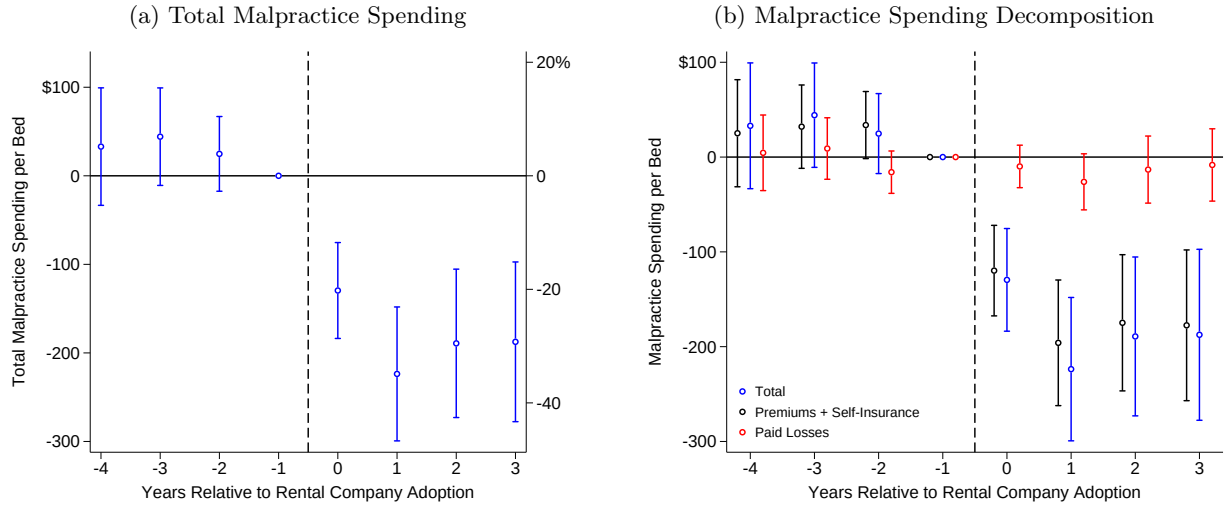



Figure 11: Malpractice Risk and Real Estate Related Party Adoption

*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 11. 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 Impacts on Clinical and Operational Outcomes

Our results suggest substantial changes in reported costs upon a related party adoption. 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. Primarily, 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 capital investments or improvements in management services. Though it is difficult to measure the 'quantity' or 'quality' of inputs such as real estate and management services, it is straightforward to measure 'outputs,' such as capacity, patient volume, and health outcomes. Alternatively, one might anticipate that increases in costs associated with a related party adoption might generate reductions in nurse staffing, thereby diminishing patient health outcomes. In either case, finding no evidence of meaningful changes in clinical or operational outcomes suggests that the changes in costs found in the prior sections do not reflect real economic activity, and instead reflect profit tunneling.

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.[28] For each outcome measure we study, we re-estimate a version of equation (2) using the new dependent variable, 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. Following the practices of Sections 4 and 5, we estimate separate models for real estate and management company adoption.

Our findings are summarized in Figure 12. 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, nor in their use of either skilled nurse or nurse aide staffing. Note that 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 often move in opposite directions: in the case of management company adoption (panel b), 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. Because we are testing many different outcomes, the confidence intervals are adjusted for multiple hypothesis testing. The unadjusted equivalents (in Appendix Figures B.17 and B.18) report similar 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

[28]LTCFocus is sponsored by the National Institute on Aging (1P01AG027296) through a cooperative agreement with the Brown University School of Public Health.

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.

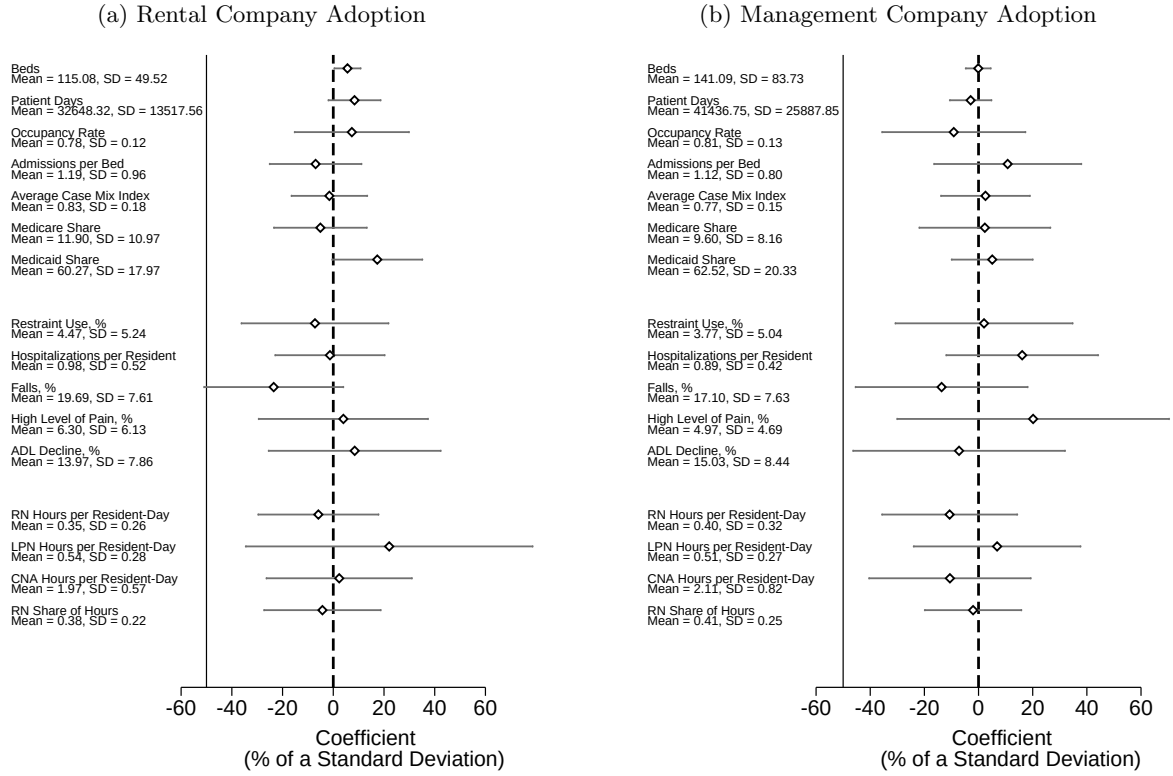



Figure 12: Impact on Clinical and Operational Outcomes

*Notes:* Figure presents forest plots of various non-financial outcomes. Panel (a) presents results from real estate company adoption. Panel (b) presents results from management company adoption. Each point presents an estimate from a variant of equation (2) with a different dependent variable and the relative time dummies collapsed to an indicator for whether the firm has adopted a related party. For ease of comparison, all coefficients are scaled by the standard deviation across non-treated observations. The error bars reflect 95% confidence intervals corrected for multiple hypothesis testing. Results without adjustment for multiple hypothesis testing shown in Appendix Figures B.17 and B.18. All models include year and facility-by-event fixed effects. Standard errors are clustered by facility.

# 9 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.

Cost report data reveal that the lion's share of related party spending is on real estate and management services. We find that starting to pay related parties for these services quickly and substantially increases a nursing home's reported costs. Under the assumption that related party adoption does not coincide with simultaneous cost shocks, we are 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: \$1,744 per bed for real estate (42.4% of the mean) and \$1,435 per bed for management (24.6% of the mean).

We also find that the average sale-leaseback transaction transfers $32,827 per bed of book-value to the the related party. In addition to acquiring the property at a discount, the related party further increases its liquidity by taking out a new mortgage that exceeds the property's book value. This liquidity does not stay on the related party's books and is likely ultimately paid out to the owners. In the end, both the facility and related party appear to be left financially worse off, respectively 14.7 and 27.3 percentage points more likely to report negative equity.

The related party markups we estimate imply that a staggering amount of the industry's profits are hidden. Our estimates suggest that reported nursing home profits reflect only 32.1% 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 $92,166 to $521,481. 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 to providers 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. Additionally, our findings suggest that related party transactions can make litigation against health care providers less attractive by hiding or shielding assets from potential claimants. Finally, our results suggest that other state and federal agencies interested in accurately assessing providers' financials consider following Illinois in collecting detailed data on related party transactions and making those data subject to potential audit. Such data are vital for policymakers, regulators, and stakeholders to understand the financial dynamics within the health care industry and to formulate policies that promote financial integrity and transparency.

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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.

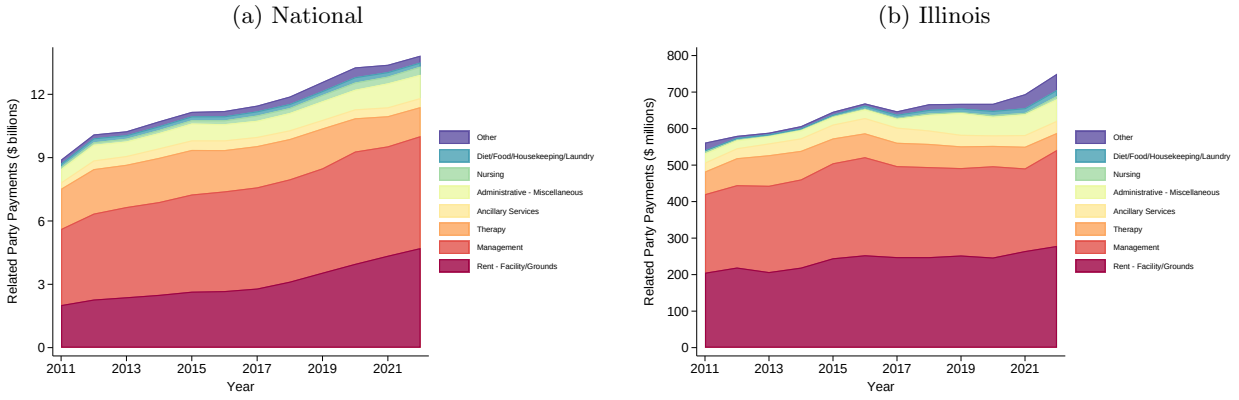



Figure A.1: Amount Paid to Related Parties (HCRIS)

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.[29] 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 (2) using per-bed malpractice spending as the dependent variable. The results of this regression are described in Section 7.

[29] 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

This appendix contains additional analyses that supplement the tables and figures in the main text.

1. Figure B.1 shows the share of firms reporting related party transactions across health care industries.
2. Figure B.2 depicts the distribution of nursing home expenses using the Illinois Medicaid cost report data.
3. Figure B.3 plots the distribution of nursing costs and profits by related party status.
4. Figure B.4 is a histogram of related party overlapping ownership shares. 99.0% of related party transactions are with entities that have 100% ownership overlap.
5. Figure B.5 shows the spillover impact of rental company adoption on various other cost categories.
6. Figure B.6 shows other components of real estate spending not included in Figure 5 panel (c).
7. Figure B.7 shows the impact of rental company adoption on total costs, including those reported by related parties.
8. Figure B.8 shows the total mortgage liability as reported on firm and related party balance sheets in a window around a rental company related party adoption.
9. Figure B.9 replicates the main effects following a log transformation of the dependent variables.
10. Figure B.10 replicates the main effects using a standard two-way fixed effects model.
11. Figure B.11 replicates the main effects, restricting the analytic sample to only for-profit facilities.
12. Figure B.12 replicates the main effects, restricting the analytic sample to only not-for-profit facilities.
13. Figure B.13 replicates the main effects, restricting the analytic sample to only chain-affiliated facilities.
14. Figure B.14 replicates the main effects, restricting the analytic sample to only non-chain-affiliated facilities.
15. Figure B.15 replicates the main effects, restricting the analytic sample to only facilities that do not experience a change in ownership in either event time -1 or 0.
16. Figure B.16 replicates the main real estate effect, restricting the control group sample to only facilities renting from non-related parties.
17. Figure B.17 replicates Figure 12a using standard confidence intervals that are unadjusted for multiple hypothesis testing.
18. Figure B.18 replicates Figure 12b using standard confidence intervals that are unadjusted for multiple hypothesis testing.
19. Figure B.19 shows the spillover impact of management company adoption on various other cost categories.
20. Figure B.20 shows estimates for related party markups for other cost categories included in the hidden profit calculations of Section 6.

21. Figure B.21 replicates the main effects using a continuous treatment definition.

22. Figure B.22 replicates Figure 9, scaling the measures of profit by the number of beds.

23. Figure B.23 replicates Figure 9, considering only real estate and management in the hidden profit calculation.

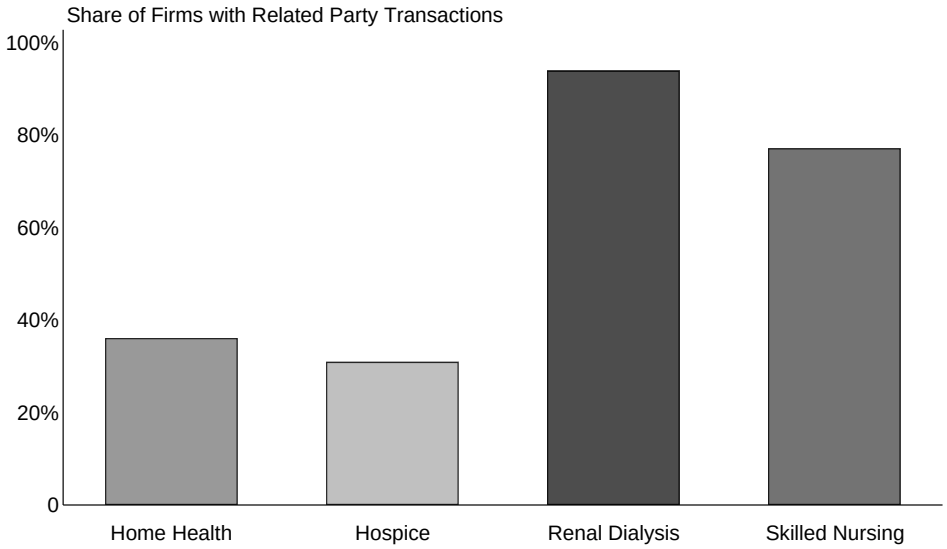



Figure B.1: Related Party Transactions Across Industries

*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.

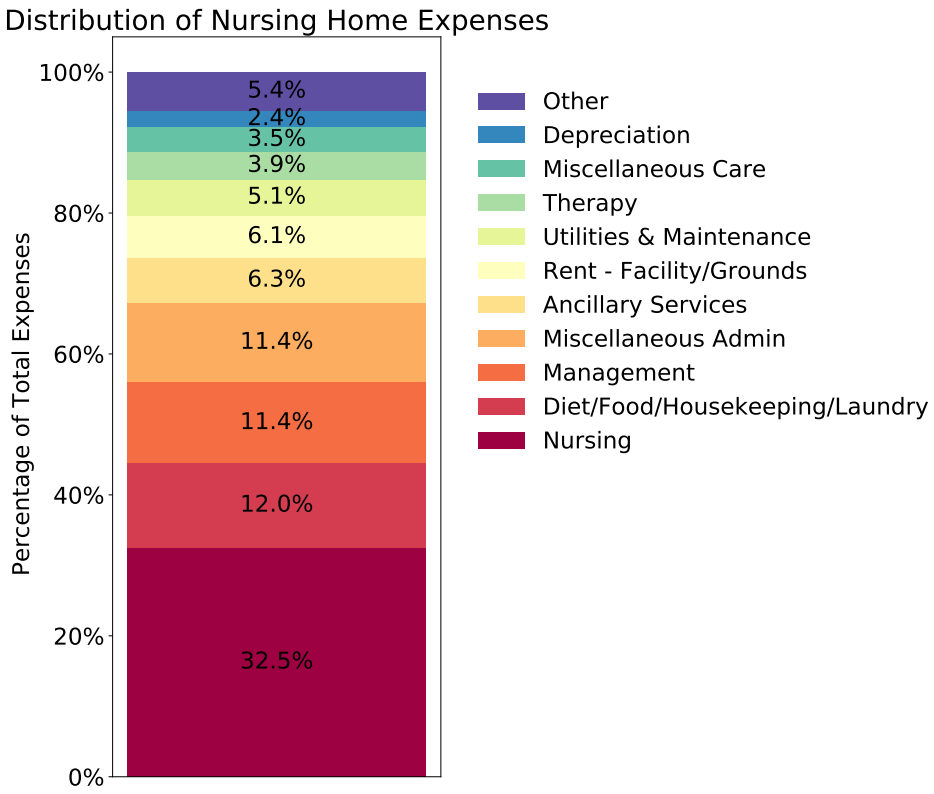



Figure B.2: Total Nursing Home Expenses

*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) Nursing Costs per Bed

(b) Profit per Bed

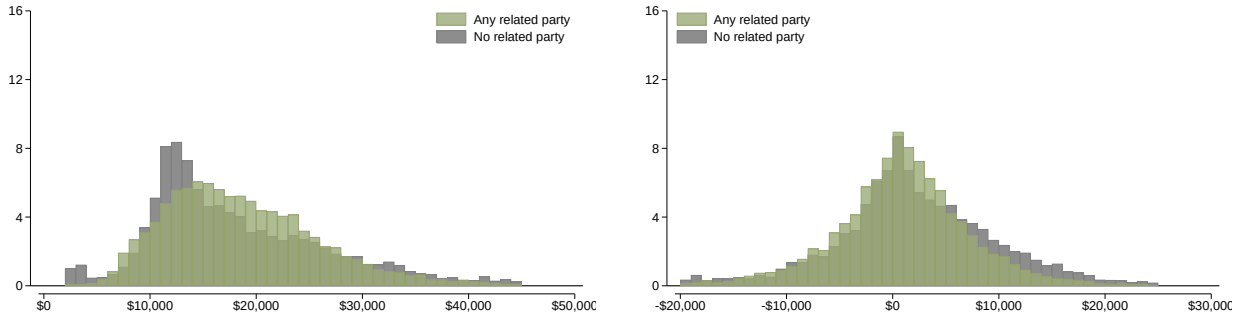



Figure B.3: Costs and Profits by Related Party Status

*Notes:* Figure presents histograms of per-bed costs and profits, by related party status. Panel (a) presents nursing expenditures, pooling firms that have adopted either a management or a real estate related party and those that have neither. Panel (b) presents profits, also pooling related party firms.

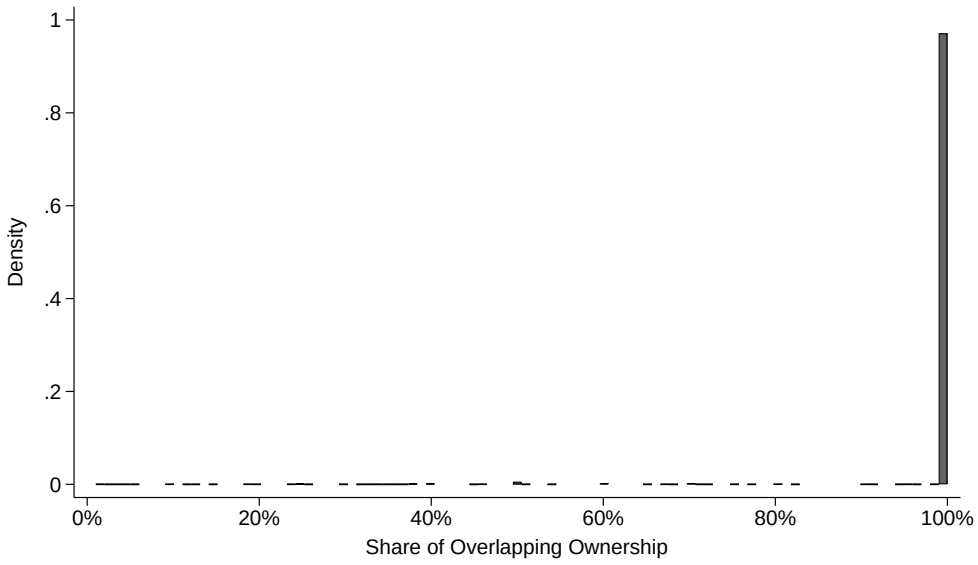



Figure B.4: Histogram of Overlapping Ownership Share

*Notes:* Figure plots the distribution of overlapping ownership shares across related party transactions, weighted by the size of the transaction. 99.0% of transactions are with related parties with which there is 100% ownership overlap.

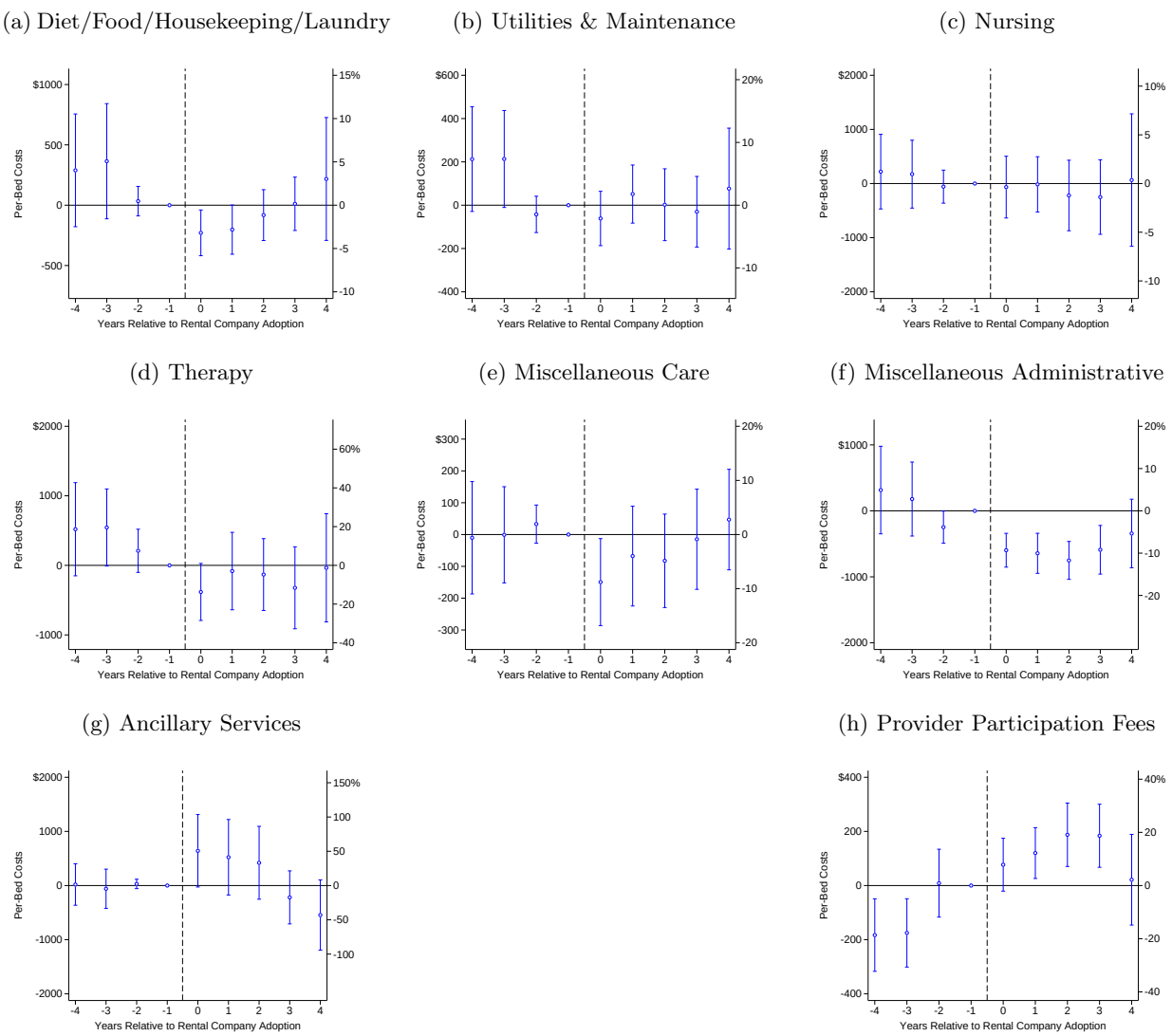



Figure B.5: Rental Company Adoption: Spillovers to Other Cost Categories

*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 $\beta^{\tau}$ parameters from equation (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{\text{st}}$ and $99^{\text{th}}$ percentiles. Standard errors are clustered by facility.

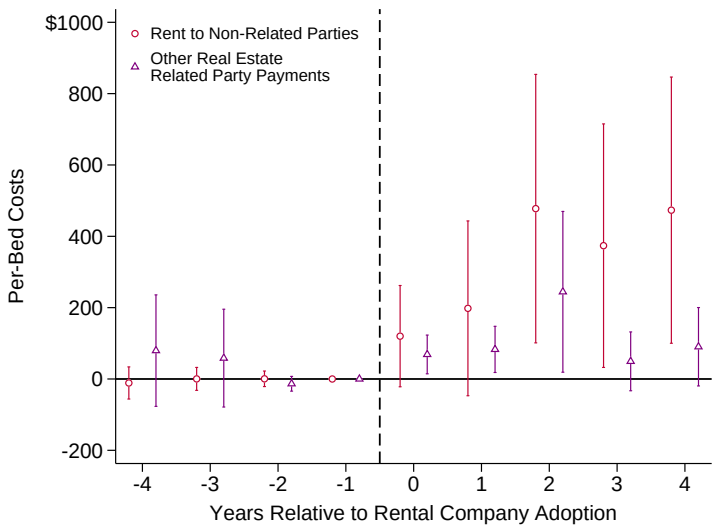
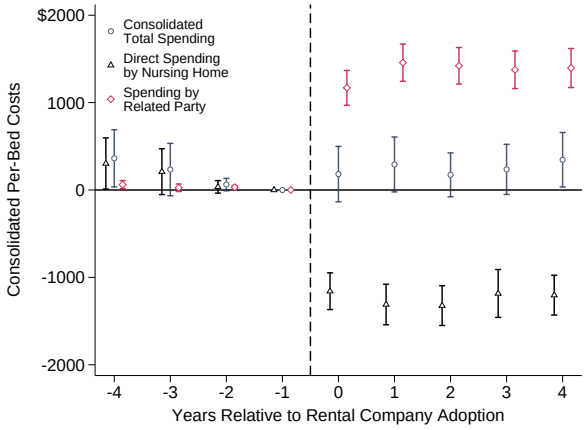



Figure B.6: Other Components of Real Estate Decomposition

*Notes:* Figure presents event studies of real estate costs around the time a nursing home adopts a rental company related party. Figure includes remaining components of real estate spending not shown in Figure 5 panel (c). All effects are measured in costs per bed. Each point corresponds to an estimate of the $\beta^{\tau}$ parameters from equation (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

(a) Depreciation Expenses




(b) Interest Expenses

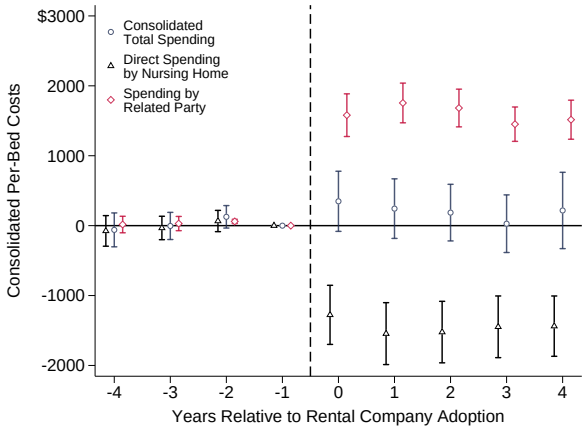



Figure B.7: Incorporating Costs Reported by Related Parties

*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 (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

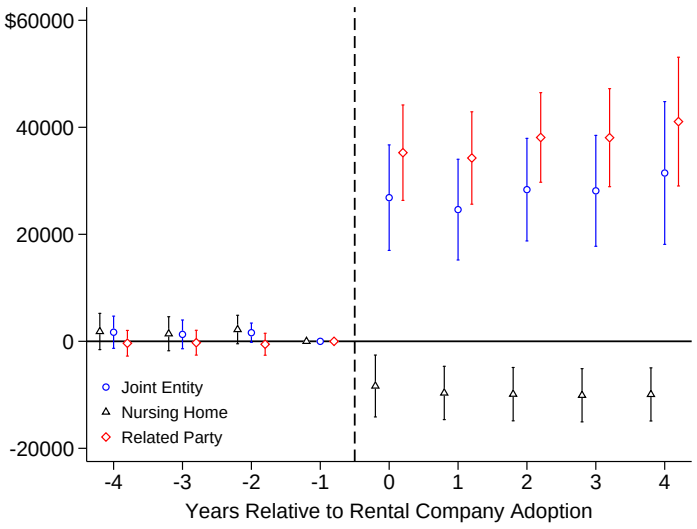
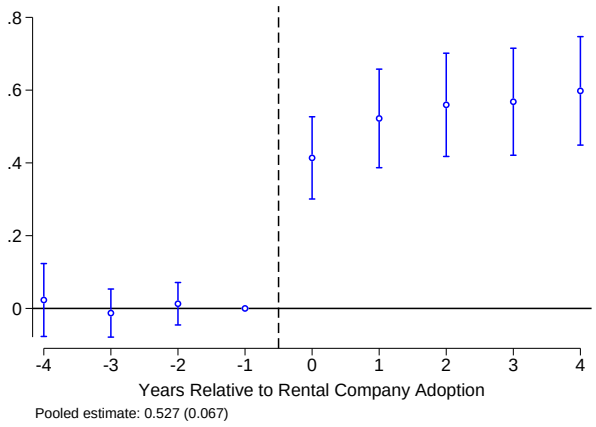



Figure B.8: Total Mortgage Liability

*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 $\beta^{\tau}$ parameters from equation (2) 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 $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

(a) Log Real Estate Costs




(b) Log Management Costs

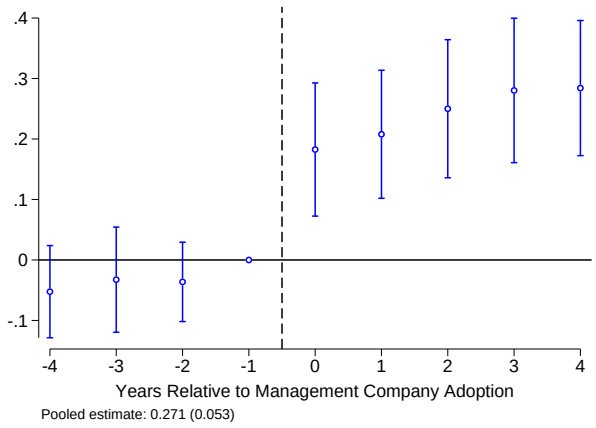
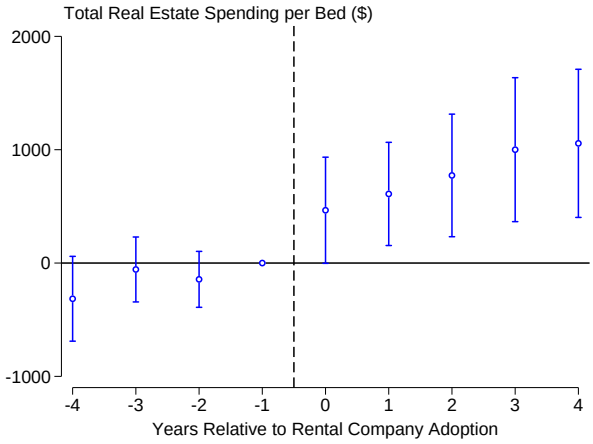



Figure B.9: Log Expenses and Related Party Adoption

*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 $\beta^{\tau}$ parameters from equation (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

(a) Real Estate Spending




(b) Management Spending

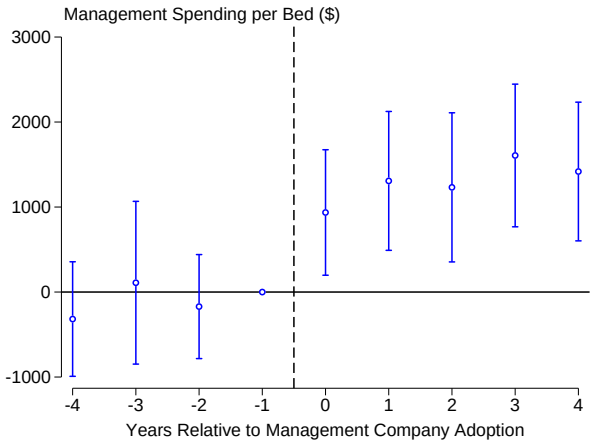
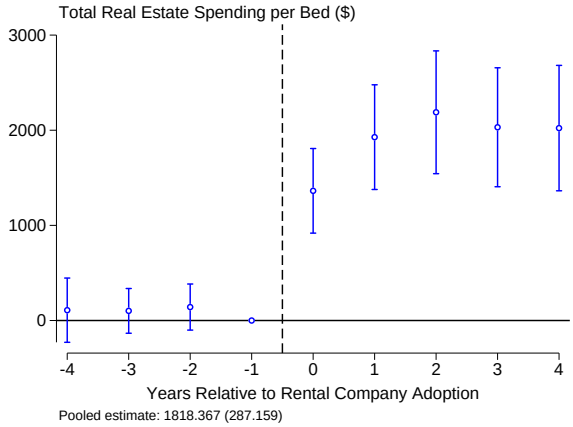



Figure B.10: Total Expenses and Related Party Adoption: Two-Way Fixed Effects

*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 (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

(a) Real Estate Spending




(b) Management Spending

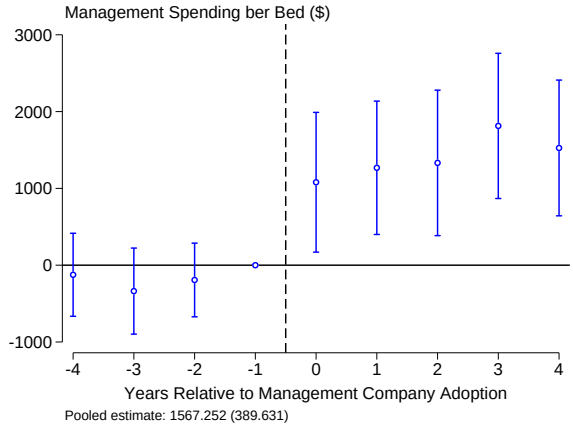
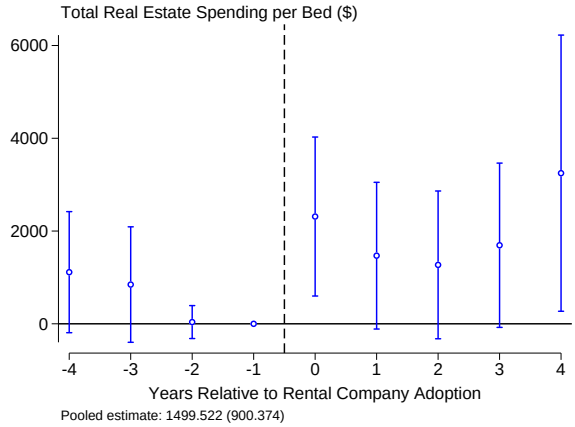



Figure B.11: Reported Expenses and Related Party Adoption: For-Profits

*Notes:* Figure presents event studies of real estate and management costs around the time a nursing home adopts a rental/management company related party, restricting both the treatment and control groups to only for-profit firms. 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 (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{\text{st}}$ and $99^{\text{th}}$ percentiles. Standard errors are clustered by facility.

(a) Real Estate Spending




(b) Management Spending

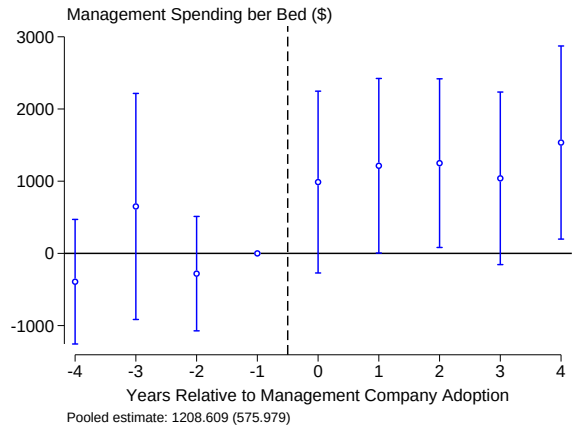
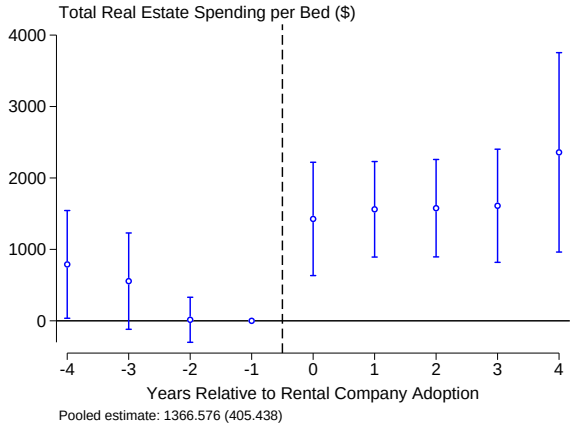



Figure B.12: Reported Expenses and Related Party Adoption: Not For-Profits

*Notes:* Figure presents event studies of real estate and management costs around the time a nursing home adopts a rental/management company related party, restricting both the treatment and control groups to only not for-profit firms. 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 (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

(a) Real Estate Spending




(b) Management Spending

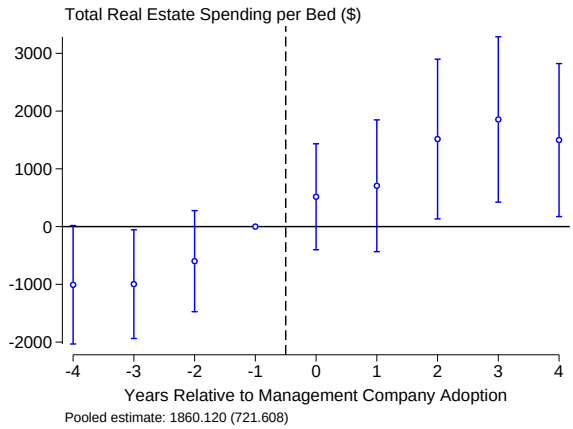
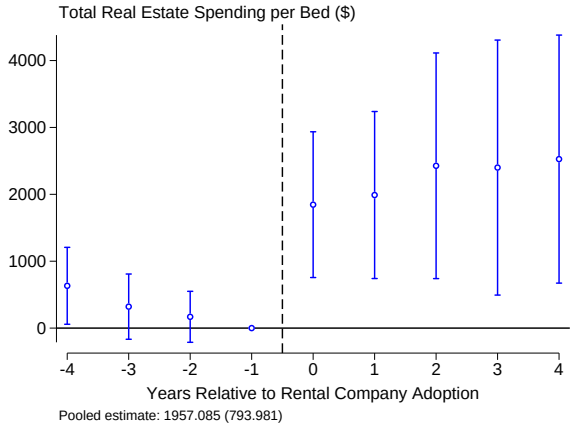



Figure B.13: Reported Expenses and Related Party Adoption: Chain-Affiliated

*Notes:* Figure presents event studies of real estate and management costs around the time a nursing home adopts a rental/management company related party, restricting both the treatment and control groups to only chain-affiliated firms. 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 (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

(a) Real Estate Spending




(b) Management Spending

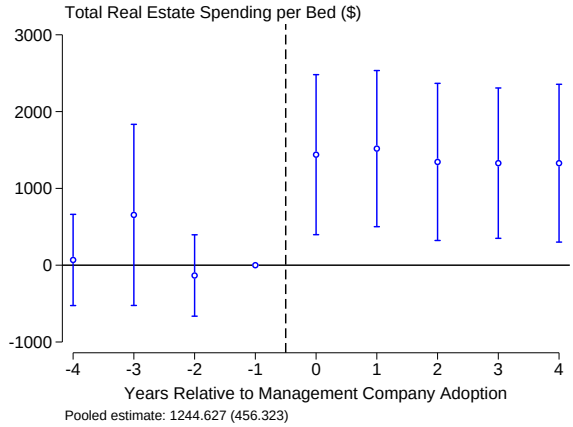
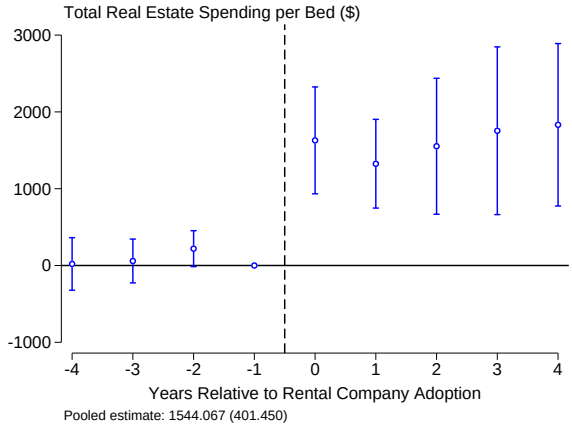



Figure B.14: Reported Expenses and Related Party Adoption: Non-Chain-Affiliated

*Notes:* Figure presents event studies of real estate and management costs around the time a nursing home adopts a rental/management company related party, restricting both the treatment and control groups to only nonchain-affiliated firms. 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 (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

(a) Real Estate Spending




(b) Management Spending

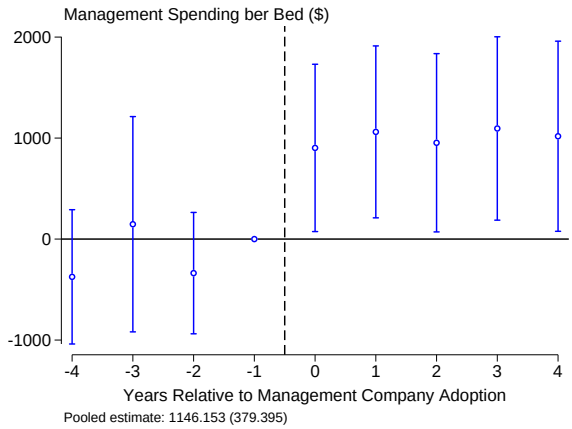



Figure B.15: Reported Expenses and Related Party Adoption: Excluding Ownership Transitions

*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 $\beta^{\tau}$ parameters from equation (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

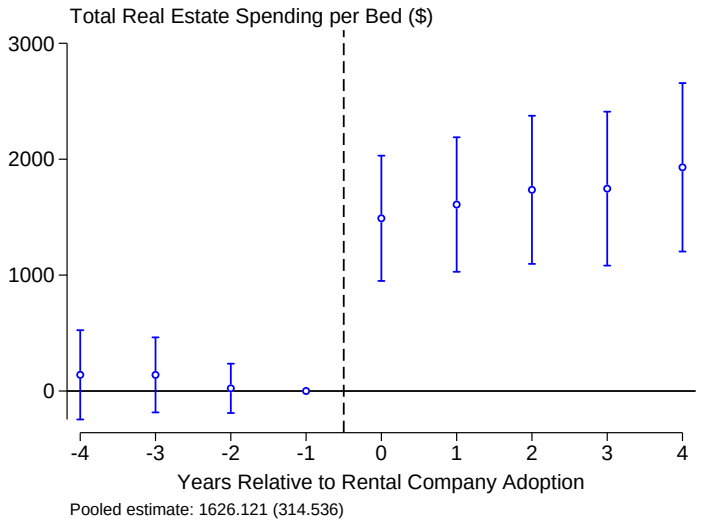



Figure B.16: Rental Company Adoption with Renters-Only Control Group

*Notes:* Figure presents event study of real estate costs around the time a nursing home adopts a rental company related party. Control group consists of only facilities that rented in relative year -1. Each point corresponds to an estimate of the $\beta^{\tau}$ parameters from equation (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

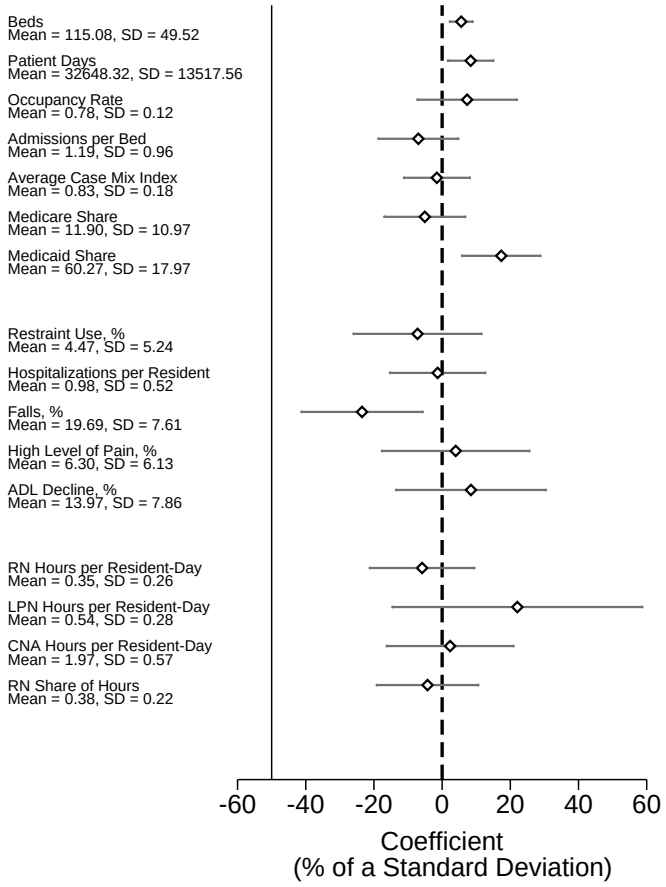



Figure B.17: Effect of Rental Company Adoption on Outcomes Without Multiple Hypothesis Correction

*Notes:* Figure presents a forest plot of different non-financial outcomes. Each point presents an estimate from a variant of equation (2) 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 standard 95% confidence intervals without correction for multiple hypothesis testing. All models include year and facility-by-event fixed effects. Standard errors are clustered by facility.

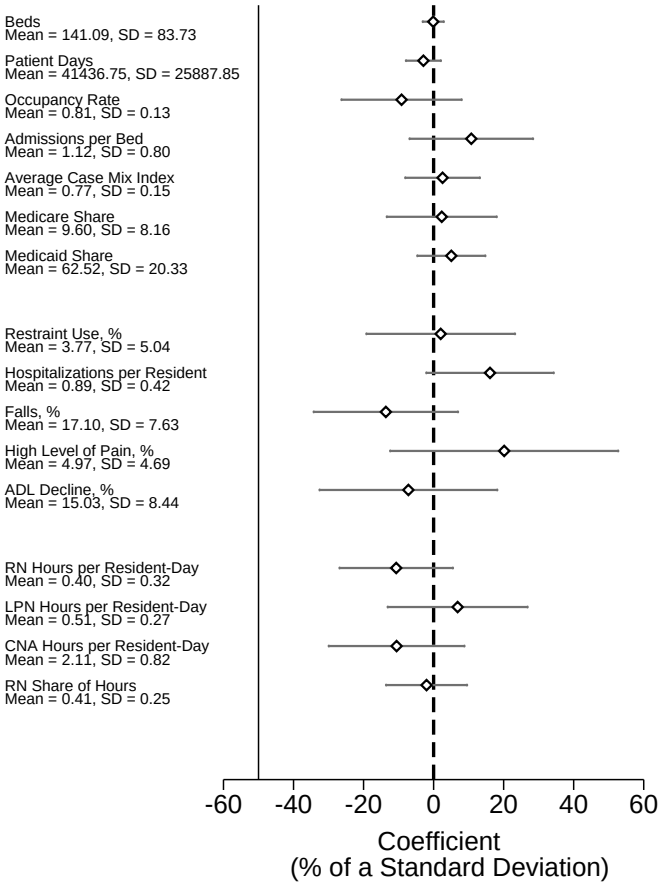



Figure B.18: Effect of Management Company Adoption on Outcomes Without Multiple Hypothesis Correction

*Notes:* Figure presents a forest plot of different non-financial outcomes. Each point presents an estimate from a variant of equation (2) 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 standard 95% confidence intervals without correction for multiple hypothesis testing. All models include year and facility-by-event fixed effects. Standard errors are clustered by facility.

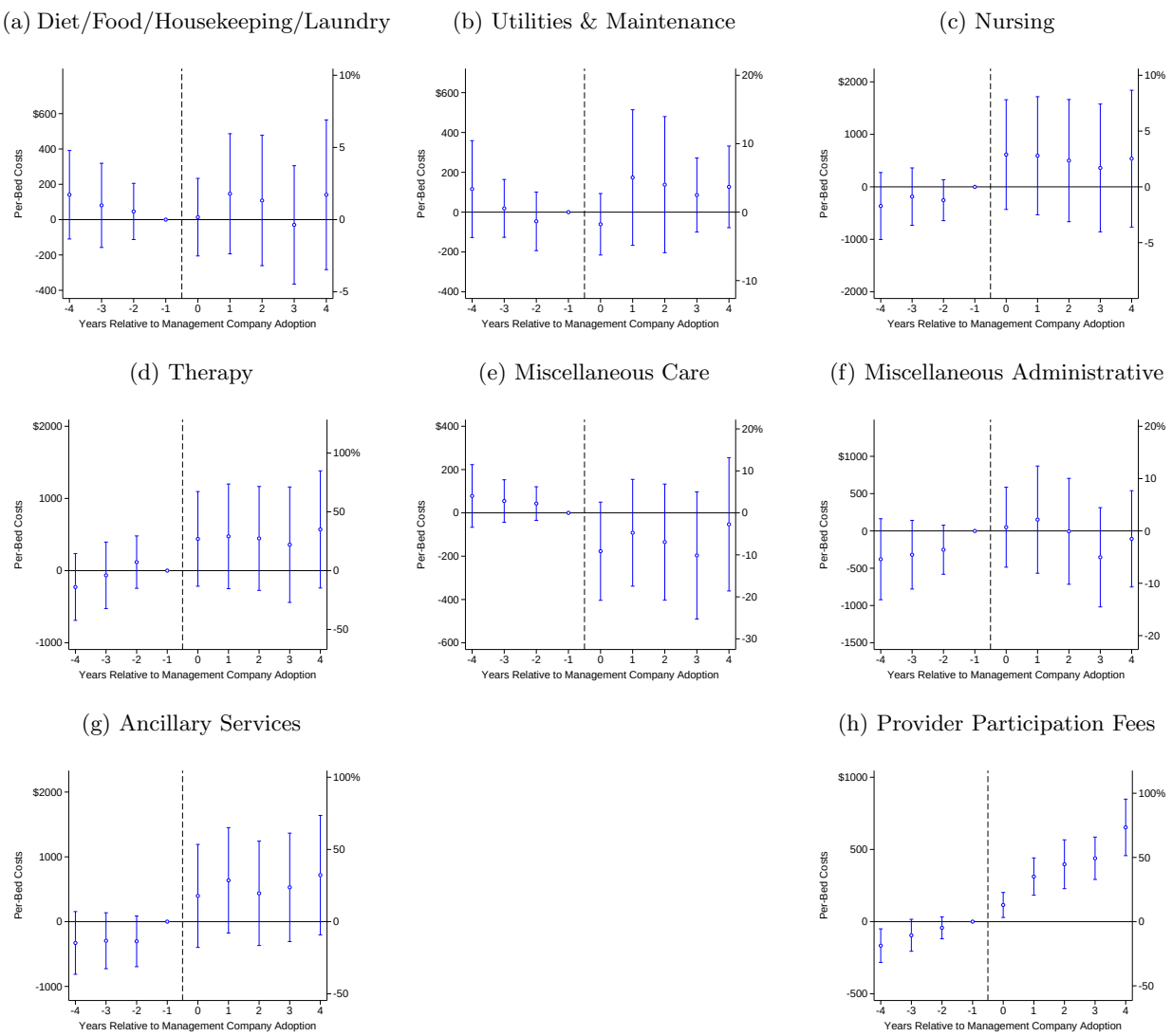
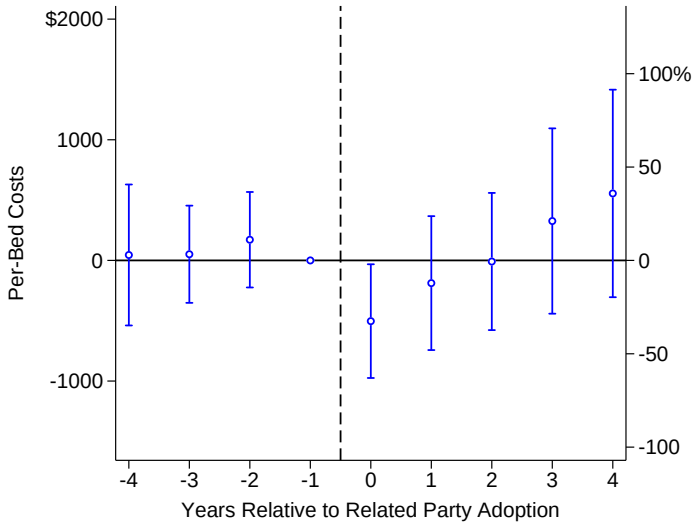



Figure B.19: Management Company Adoption: Spillovers to Other Cost Categories

*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 $\beta^{\tau}$ parameters from equation (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{\text{st}}$ and $99^{\text{th}}$ percentiles. Standard errors are clustered by facility.

(a) Therapy Per-Bed Costs




(b) Ancillary Services Per-Bed Costs

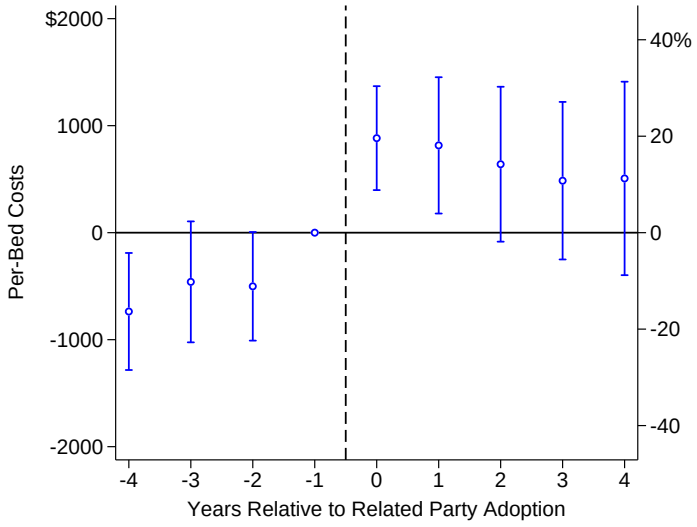
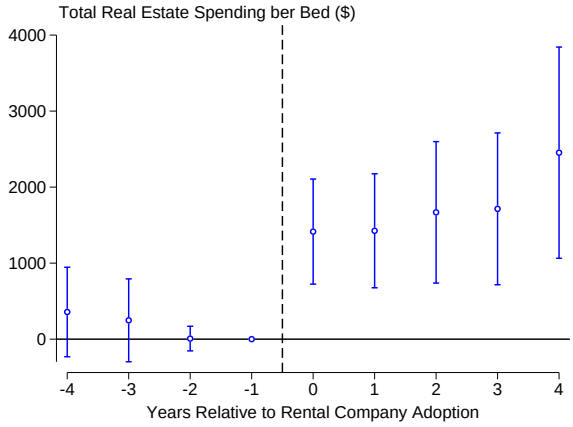



Figure B.20: Other Cost Category Related Party Adoption

*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 (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

(a) Real Estate Spending




(b) Management Spending

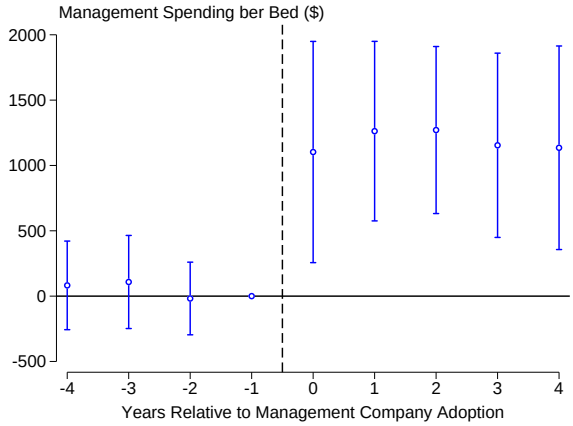
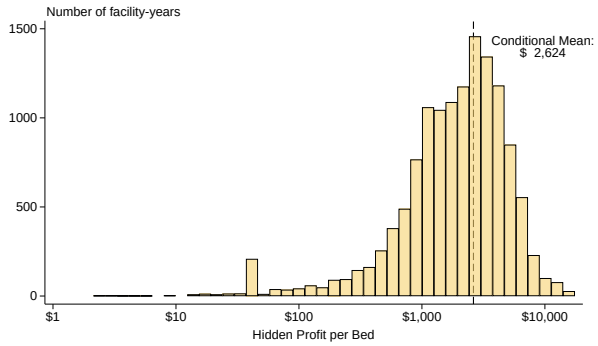



Figure B.21: Reported Expenses and Related Party Adoption: Continuous Treatment

*Notes:* Figure presents event studies of real estate and management costs around the time a nursing home adopts a rental/management company related party, where treatment is scaled by post-adoption related party spending. All coefficients are scaled by the mean post-adoption related party spending across firms, to facilitate comparisons with the main specification. 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 (2). The error bars reflect 95% confidence intervals. All models include year and facility-by-event fixed effects. Dependent variables are winsorized at the $1^{st}$ and $99^{th}$ percentiles. Standard errors are clustered by facility.

(a) Distribution of Hidden Per-Bed Profits




(b) Evolution of Hidden and Reported Per-Bed Profits

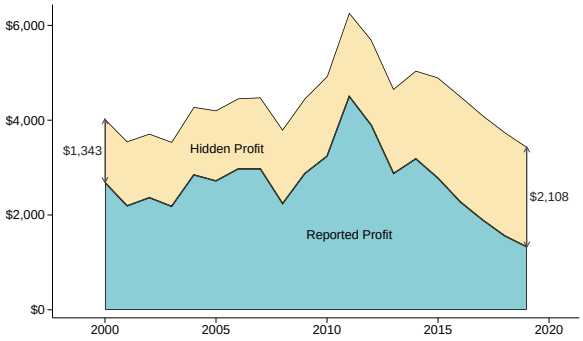
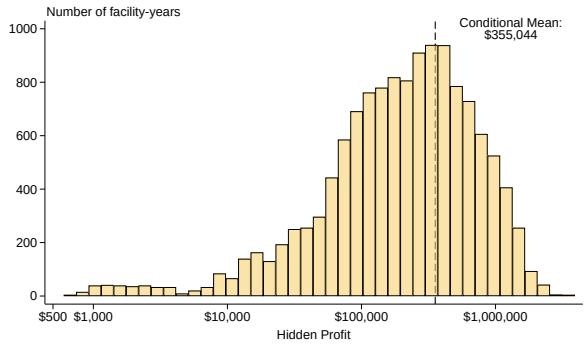



Figure B.22: Hidden and Reported Per-Bed Profits

*Notes:* Figure presents the results of the hidden profit calculation in equation (3), 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 $1^{st}$ and $99^{th}$ percentiles. We exclude 2020 onward due to the Covid-19 pandemic.

(a) Distribution of Hidden Profits




(b) Evolution of Hidden and Reported Profits

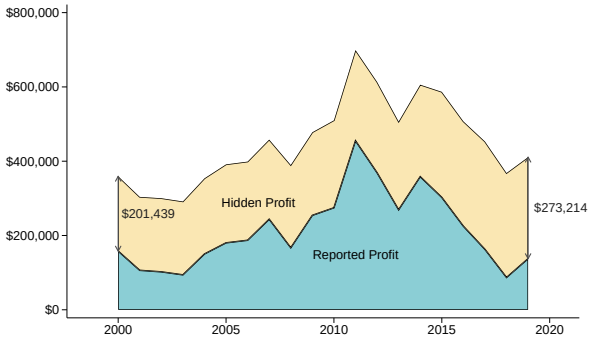



Figure B.23: Hidden and Reported Profits: Only Real Estate and Management

*Notes:* Figure presents the results of the hidden profit calculation in equation (3), 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 $1^{st}$ and $99^{th}$ percentiles. We exclude 2020 onward due to the Covid-19 pandemic.