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TUNNELING AND HIDDEN PROFITS IN HEALTH CARE

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ABSTRACT

This study examines whether healthcare providers tunnel profits and assets to commonly-owned related parties by making inflated payments for their goods and services. Such practices allow providers to understate their profitability—which may encourage regulators to increase reimbursements and relax quality standards—and shield assets from malpractice liability. Using uniquely detailed nursing home financial data, we find evidence of widespread tunneling to related-party real estate and management companies. Our estimates suggest that 68% of nursing home profits are tunneled to related parties and that accounting for tunneled profits and assets raises the implied typical investment IRR from 4.83% to 13.11%.

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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, with both federal and state governments mandating detailed financial reporting from a large share of providers. Regulators then use these data to assess providers' financial health, set reimbursement rates, and determine the feasibility of costly quality regulation.

To be useful, these data must be accurately reported. We raise the concern that many providers are overstating their costs by purchasing from "related parties"—i.e., sister entities that share common ownership with the provider—at greatly inflated transfer prices. These related-party transactions allow firm owners to move profits off the books of closely monitored health care providers into other, less regulated companies they also own. Doing so conceals providers' true profitability and distorts 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 providers to inflate reported costs. Moreover, industry groups often advocate for rate increases or against new quality regulations by pleading poverty, pointing to low or even negative reported profits. Finally, hiding profits and assets in related entities can shield them against potential malpractice litigants (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). Providers have likewise been accused of tunneling to circumvent regulation limiting their profit margins (Sherman et al., 2025). Even insurers have been accused of tunneling by overpaying vertically integrated providers, pharmacies, and pharmacy benefit managers in order to overstate their medical loss ratios (Frank and Milhaupt, 2023). Tunneling is not limited to for-profit firms: 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; NASEM, 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 (AHCA, 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 industry groups' argument that they simply cannot afford to improve care, with facilities reporting an average profit margin of just 0.13%. However, increasing awareness and scrutiny of related-party transactions has called the veracity of these figures into question (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. Estimating these markups is non-trivial as firms that transact with related parties may have systematically different costs than those that do not. We identify these related party markups using a stacked difference-in-differences approach (Deshpande and Li, 2019). Specifically, we infer related party markups based on the size of the 'jump' in a facility's reported costs when it begins to outsource a good or service to a related party.

We primarily examine nursing homes' real estate and management expenditures—representing approximately 77% of all related party spending—and find evidence of substantial and widespread tunneling. 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. On net, renting from a related party increases facilities' yearly real estate costs by an average of $1,744 per bed (42.4% of the mean).

The sale of the property itself also presents an important opportunity for tunneling. Using detailed balance sheet data on nursing homes and their related parties, we find evidence that related parties typically purchase facilities' real estate at a huge discount. Our estimates indicate that this under-pricing allows an average of $54,396 per bed in asset value to be tunneled off of the nursing home's balance sheet in the property sale. This estimate suggests that by 2019, approximately 19.6% of the industry's real estate value had been tunneled off nursing homes' balance sheets through under-priced real estate sales.

We find a similar story when nursing homes start paying a related-party management company: facilities replace direct spending on management with larger payments to related parties for management services. Our estimates suggest that, on net, paying a related-party management company increases management costs by an average of $1,124 per bed (24.6% of the mean).

The key assumption underlying our approach is that beginning to transact with a related party

is not systematically correlated with real cost shocks. This precludes, for example, related parties instantly and dramatically improving the facility's real estate and management. Such is highly implausible, as related parties share the same owner, own the same property, and manage the same facility. In other words, the transactions exist essentially entirely on paper. Consistent with this, we find little evidence that utilizing related parties affects facilities' 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. Notably, 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., 2025) 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. Likewise, our results may explain the avalanche of acquisitions occurring at prices around $100,000 per bed (Reiland, 2022) even though average reported earnings are just $1,311.21 per bed. We find the reported figures imply an internal rate of return (IRR) of just 4.83%, which is far below common hurdle rates for a healthcare investment. Adjusting for hidden profits and assets, however, increases the typical IRR to 13.11%, which is in line with industry investment reports.

To illustrate the magnitude of these hidden profits, we quantify the amount of direct care staffing—a primary measure of quality (Friedrich and Hackmann, 2021)—that could be purchased using tunneled profits. If hidden profits were instead 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 policymakers and regulators, who often rely on reported profitability figures when assessing the implications of proposed policies, payments, and regulations for providers' financial health. 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). Likewise, providers' poor reported financial health has been central to the ongoing debate about new federal minimum staffing standards (Grabowski and Bowblis, 2023). Advocacy groups for for-profit (AHCA, 2024) and non-profit (LeadingAge, 2024) nursing homes both released statements that few facilities could afford to comply and warned that many facilities might "ultimately close altogether." In its public comment and lawsuit to repeal the new rule, the American Health Care Association (an industry advocacy group) cited a study of Medicare cost report data finding that "nearly 60% of facilities have negative operating margins" (AHCA v Becerra, 2024). Regulators also give such concerns careful consideration: CMS contracted a study that explicitly assessed the financial burden of staffing minimums for facilities (White et al., 2023) and also cited our study

when discussing the financial feasibility of compliance in the final rule. 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, compliance in Illinois with the registered nurse component of the new policy would rise from 55.2% to 78.8%.[1]

Many of the benefits to tunneling—such as aiding in lobbying efforts against regulation or to increase reimbursements—are difficult to measure. One benefit we can measure is the financial benefit from shielding tunneled assets from malpractice liability (Casson and McMillen, 2003; Brickley et al., 2017). Using federal data detailing facilities' spending on malpractice insurance premiums and paid losses, we find that shielding nursing homes' valuable real estate assets from liability reduces malpractice-related costs by 32.4% (about $25,885 per year).

Finally, researchers should note the difficulties with interpreting providers' cost report data that we highlight. Google Scholar returns more than 3,800 articles analyzing or referencing Medicare or Medicaid cost reports to characterize providers' finances, such as their costs, capital structure, investment decisions, and resource allocation. 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. Importantly, 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.

Related Literature Our research connects to several strands of literature. The first is an economic analysis of profit tunneling by firms, for which there exists a considerable finance literature, beginning with the canonical work of Johnson et al. (2000), La Porta et al. (2000), and La Porta et al. (2002), who establish the key theoretical foundations and legal basis for profit tunneling in the context of corporate governance. Empirical investigations have found firm behaviors consistent with profit tunneling in many contexts. Bertrand et al. (2002) show how firms in Indian business groups tunnel profits to entities in which the controlling shareholder has higher cash flow rights. Bae et al. (2002) find that firms in Korean business groups make strategic acquisitions to benefit other firms in the group. Cheung et al. (2006) find that Hong Kong-listed firms earn significant negative returns following related-party transactions. Jiang et al. (2010) document examples of Chinese firms exploiting submarket intercorporate loans to siphon billions from their publicly listed counterparts. Finally, a growing literature on the role of institutional investors in firm conduct argues that common ownership patterns 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,

[1] We caution that these calculations are intended to illustrate the magnitude of hidden profits, not to imply that all hidden profits could or should be wholly reallocated to additional staffing.

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, 2024). 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., 2025; 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; Griffin and Priest, 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.

2 Institutions and Data

2.1 Industry Background

Quality Concerns. Low quality of care is the defining challenge in the nursing home industry. Residents routinely suffer harm in the course of their care (Office of Inspector General, 2014), with falls, fractures, and persistent pain occurring at high rates. The academic and policymaker consensus is that inadequate levels of direct care staffing are the central driver of low-quality care. Most facilities are chronically understaffed (Geng et al., 2019), which is linked to adverse events (Konetzka et al., 2008), including death (Friedrich and Hackmann, 2021).

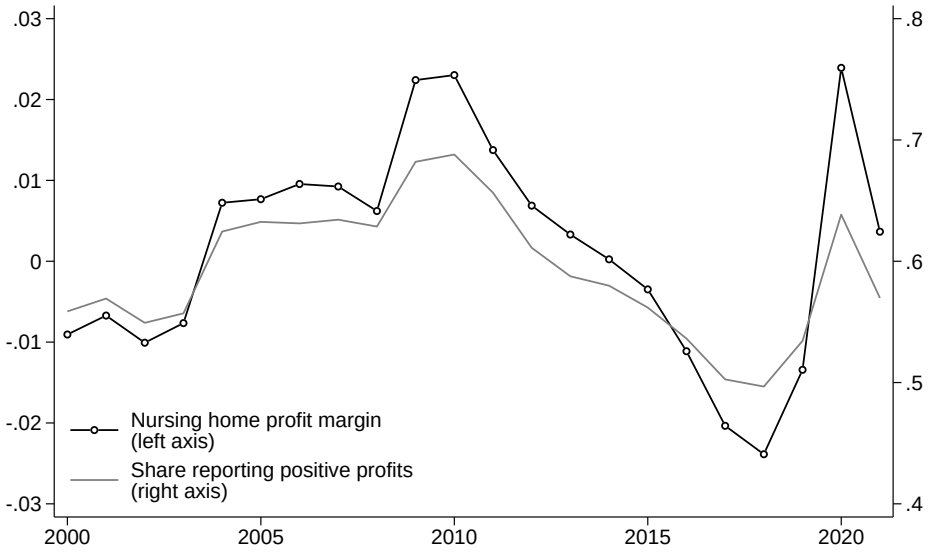
Several market failures help explain the persistence of low-quality care. Consumers' limited ability to assess quality prior to admission blunts firms' incentives to compete on quality. Similarly, the high risk associated with transfers diminishes incumbent residents' capacity to 'vote with their feet.' On the supply side, price competition is limited because the vast majority of care is financed by Medicare and Medicaid, which largely determine reimbursement rates based on facilities' reported costs, rather than quality of care. Together, these forces weaken firms' incentives to undertake costly quality improvements and offer a clear theoretical underpinning for direct quality regulation.

Indeed, such quality regulation is common. Federal and state policy initiatives have frequently targeted staffing levels, given their strong link to clinical outcomes. Many states impose minimum staffing requirements, with financial penalties for firms whose staffing levels fall below predetermined thresholds (Lin, 2014; Matsudaira, 2014). In 2023, CMS proposed a rule imposing a federal minimum staffing requirement, which 57% of facilities would need to increase staffing to meet (Grabowski and Bowblis, 2023). Industry lobbying groups have consistently opposed such reforms, arguing that facilities cannot absorb the added costs. Trade organizations argue that the burden imposed by staffing minimums will lead to closures (Olenski, 2023) and bankruptcy (Antill et al., 2025), thereby further limiting access to care. The common refrain 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).

Cost Reporting. Every nursing home certified by the Centers for Medicare and Medicaid Services (CMS) must submit an annual 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 regulators to assess providers' financial well-being. HCRIS filings appear to support the industry's claims of poverty: Figure 1 shows that in 2019—immediately prior to the pandemic—46.6% of nursing homes reported accounting losses. Over the full period, mean and median profit margins were just 0.13% and 1.76%, respectively.

These data portray an industry on the brink, which presents a handful of contradictions with other facts about the industry. 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

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.

turnover is approximately 4% annually (Bond et al., 2023), and there was an 8.5% exit rate across all industries in 2019 (U.S. Census Bureau, 2024). Moreover, the past two decades have witnessed an avalanche of merger and acquisition activity and private equity investment in the industry (Gandhi et al., 2023; Gupta et al., 2023), at considerable transaction prices (Reiland, 2022). Such investment activity poses a puzzle for an industry that routinely reports accounting losses.

Related Parties. The 2021 HCRIS data indicate that 77% of nursing homes transact with related parties, which are organizations that have substantial (almost always 100%) overlapping ownership with the provider. The prevalence of related-party transactions calls the veracity of providers' financial reporting into question: any markups over true costs paid to related parties appear as high costs in facilities' cost reports but are essentially profits from the perspective of the facilities' owners. Understanding the magnitude of markups paid to related parties is therefore essential if regulators are to correctly infer the profitability of the nursing home industry.

Note that while our focus is on the nursing home industry, transactions with related parties have become commonplace across the health care sector. Substantial shares of providers across multiple industries reported related party payments above $10,000, ranging from 31% and 36% of hospice providers and home health agencies to nearly 94% of renal dialysis facilities (Figure A.1).

2.2 Incentives to Tunnel

In this section, we detail several incentives nursing homes have to tunnel profits to a related party. Note that similar incentives exist in many other parts of the healthcare sector.

Public Reimbursement. Many states use an explicit or implicit cost-plus approach to determine public reimbursement rates. This creates a mechanical positive relationship between facilities' reported costs and their public revenues, providing a clear incentive to inflate related-party payments. One report found that 31 states explicitly considered facilities' reported costs when determining Medicaid reimbursement rates (MACPAC, 2019). Some states do try to combat related-party markups by collecting data on related parties' *costs*. However, these efforts typically fall short, as reporting requirements for related parties are rarely enforced and easily gamed—e.g., by passing of payments to owners or their relatives as costs to the related party.[2]

Lobbying and Regulatory Politics. Public reimbursement and quality regulation are inescapably political in nature. These processes are shaped by repeated interactions between governments and firms over years. Pleading poverty has traditionally provided an effective negotiating lever for the industry. For example, the industry has built a widespread consensus based on facilities' cost reports that Medicaid rates tend to fall below average costs (NASEM, 2022). This observation has been used repeatedly to advocate for both higher rates as well to combat costly quality regulation such as the new federal minimum staffing standard.

Limiting Malpractice Liability. Nursing homes are subject to a wide array of litigation, commonly stemming from low-quality care and patient neglect. Shifting profits and assets to related parties can shield them from malpractice claims and can deter litigation by making facilities appear judgment-proof. Moreover, thin reported margins may also strengthen defenses against allegations that under-staffing reflects negligence, which is often the central issue in such claims.[3] 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 8, consistent with the existing empirical legal literature (Brickley et al., 2017).

Avoiding Transparency. Even absent these other incentives, owner-operators may simply prefer to avoid the transparency associated with public cost reporting. Tunneling to related parties allows them to obscure sensitive line items, such as profits and executive compensation, that are often cited unfavorably by policymakers, regulators, and especially news media.

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 extent of tunneling and generating aggregate corrected measures of industry profitability.

[2]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.

[3]The financial feasibility of providing high quality care may be an effective defense. Even where it is not, this may factor into the calculation of punitive damages.

2.3 Data and Empirical Challenges

Accurately measuring nursing home costs and profitability is essential to the design of public policies, such as assessing the viability of costly quality regulation or determining reimbursement rates. Two challenges complicate this task.

Estimating the Related Party Markup. The key missing ingredient is the related party markup, which is unobserved. Estimating this markup is non-trivial, and standard approaches from industrial organization for markup estimation assume profit maximization (or cost minimization) and are therefore inapplicable for self-dealing transactions. Instead, we rely on a fully reduced-form approach to recover this markup by isolating within-facility variation in reported costs, in a window around related party adoption. We discuss our empirical approach in Section 4.

Data Quality. A second challenge pertains to data quality. The federal nursing home HCRIS data depicted in Figure 1 are notoriously unreliable and not subject to audits. While sufficiently aggregated statistics from these data can be informative, the entries for individual nursing homes are often wildly 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 1st and 99th percentiles, a practice we carry throughout this paper. Additionally, the HCRIS data on related parties displayed in Appendix Figure A.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 overcome these limitations, we rely on unusually rich cost report data from Illinois. In addition to federal reporting, all Medicaid-certified facilities (which include virtually all nursing homes) must submit detailed financial reports to the state. States' cost reports are often much higher quality than HCRIS because they are often used to determine individual facilities' Medicaid reimbursement rates. This usage, as well as the associated increased audit risk, contribute to higher data fidelity.[4] The majority of Illinois cost reports are generated by paid preparers, most commonly CPAs.

Illinois, in particular, also requires nursing homes to submit uniquely detailed data on all related parties.[5] Facility costs, payments to related parties, and the related parties' reported costs all follow a uniform line-item classification, facilitating direct comparisons between facility and related party expenditures. These requirements extend back to 2000, nearly doubling the panel length available in the federal data. For these reasons, our subsequent analyses focus on the richer Illinois data.

[4] In practice, the risk of audit is quite low, but the threat appears relatively effective nonetheless.

[5] Illinois defines related parties as transacting entities that share at least 5% common ownership with the nursing home. In 99.0% of cases, however, the overlap in ownership is a full 100% (Figure A.3).

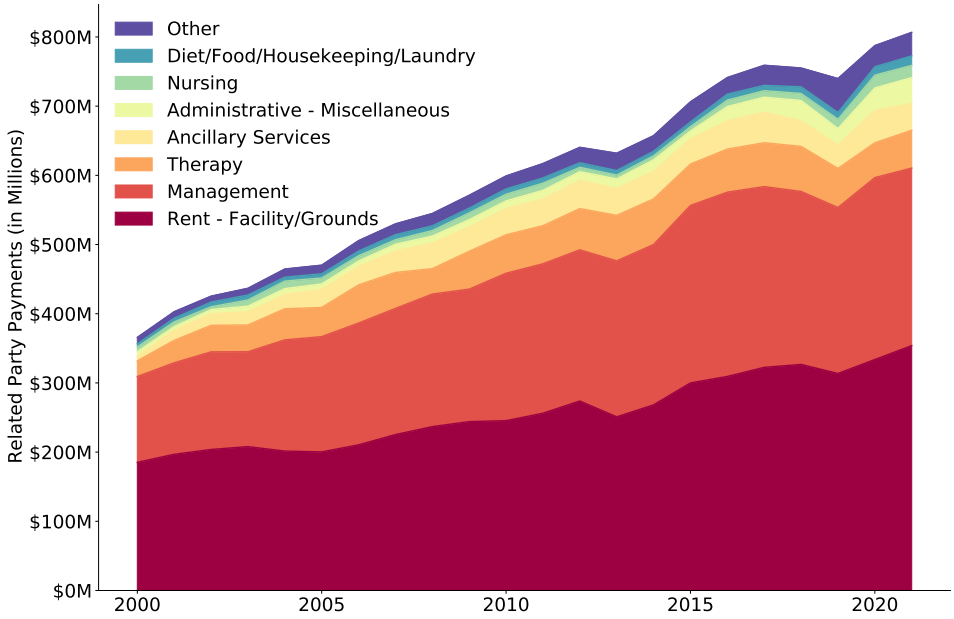
3 Descriptive Analysis of Related-Party Transactions

In this section, we use Illinois cost reports to provide some descriptive analysis of nursing home and related party spending. These findings motivate our empirical exercises described in Section 4.

3.1 Growth and Composition of Related Party Payments

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

Figure 2: Amount Paid to Related Parties



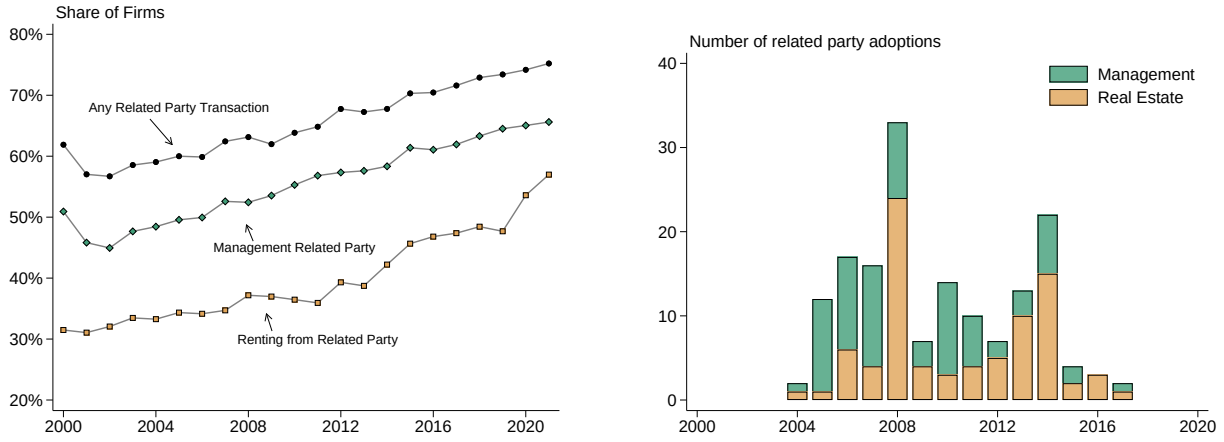
Notes: Figure documents total payments to related parties by line item classification, using the Illinois Medicaid cost report data. The data indicate that management and rental services comprise the dominant sources of related party spending.

More striking than the overall growth in self-payments is the nature of the payments. Figure 2 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 A.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 on the use and adoption of these two types of related-party transactions.

Figure 3: Growing Use of Related Parties



(a) Facilities Reporting a Related Party Payment

(b) Related Party Adoptions

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

3.2 Adoption of Related Parties

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

party payment for 'Rent - Facility & Grounds' in excess of $10,000.[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 that we observe for four years prior to and following the related party adoption. In total, we study 83 and 79 real estate and management related party adoption events, respectively.

Comparison of Adopting and Non-Adopting Firms. In Appendix B we provide a detailed comparison of adopting and non-adopting firms, the main points of which we summarize here. Facilities that transact with related parties report higher spending on management and real estate. Accordingly, related party-adopting firms also report lower levels of profitability. Yet related party firms do not appear to be inherently more costly: they report nearly identical levels of nursing expenditure as their non-adopting counterparts. Nevertheless, there are systematic differences in which firms adopt. Related party adopting firms are larger, more likely to be based in Chicago, and more likely to have a for-profit ownership structure. 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.

4 Estimating the Impact of Related Party Adoption

4.1 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 arm's-length purchases (e.g., interest or rent to an arm's-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 arm's-length party such as an employee, landlord, or supplier.[8]

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

[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 6.

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

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 θ, where the true cost of the services provided by the related party are θp_{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 $(1-\theta)p_{it}$.[9] Importantly, since c_{it} 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 θ:

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

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 θ. 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 θ 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 θ) 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.

4.2 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

[9] 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.

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.[10] 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 3.[11] 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 5 and 6 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 difference-in-differences has the 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 7, we revisit the continuous-treatment specification to construct 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 (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 all 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 difference-in-differences

[10] In contrast, variation in p_{it} after adoption can be driven by real factors like variation in input costs.

[11] 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.

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 τ_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 α_{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 γ_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.[12] 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 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

[12] 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.

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.

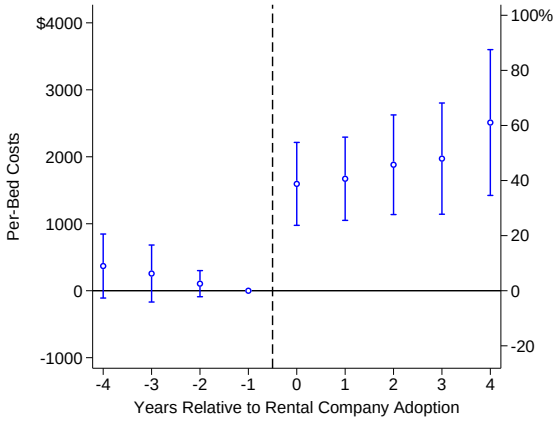
5 Related-Party Real Estate

In this section, we assess the consequences of renting real estate from a related party by examining nursing homes that transition from owning their real estate to renting from an affiliated entity. This transition from ownership to renting occurs through a transaction known as a "sale-leaseback," whereby a firm sells its real estate but continues operating in the same property through a lease. Arm's-length sale-leasebacks are a common way for firms to convert real estate holdings into liquid capital without disrupting operations. By contrast, in a related-party sale-leaseback, both parties share a common owner that does not gain any net liquidity from the transfer. There must therefore be other implications and advantages to related-party sale-leasebacks.

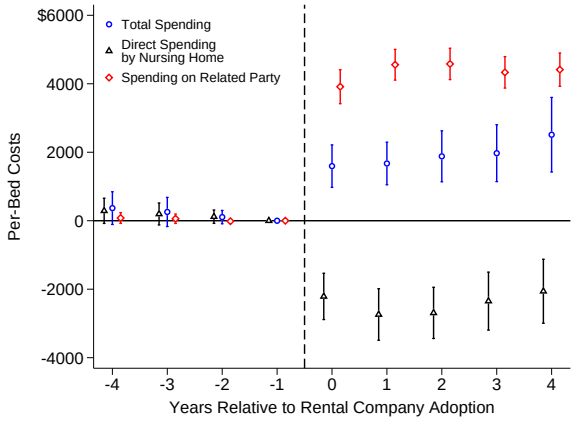
Related-party sale-leasebacks have two principal implications for the nursing home entity. First, transitioning from ownership to renting changes the nature of the nursing home's real estate spending. As an owner, the facility incurs direct costs, including mortgage interest, depreciation, and property taxes. After a related-party sale-leaseback, these direct costs are replaced by rental payments to a sister real estate holding company. Of course, because the nursing home and the real estate holding company share a parent, the rent functions as a transfer price that may be unfavorable to the nursing home entity. In particular, setting rents that exceed the direct costs of real estate enables owners to convert nursing home cash flows into earnings for the real estate company.

The second key implication of related-party sale-leasebacks is that the property sale itself presents an important opportunity for substantial tunneling. Because the sale occurs between two parties under common ownership, the sale price acts as a transfer price that can be set unfavorably for the nursing home entity. If the related party acquires the property at a discount, value is effectively shifted off the nursing home's balance sheet and onto the related party's balance sheet.

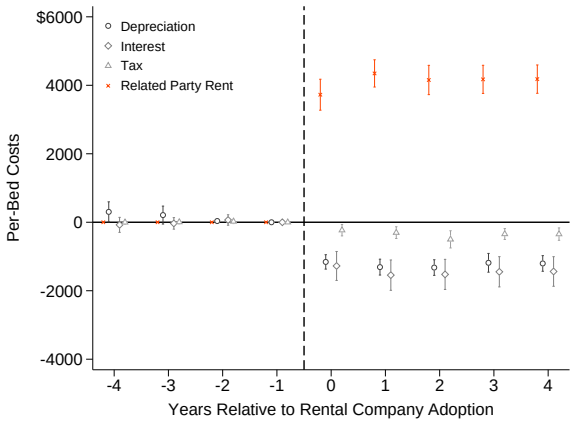
Figure 4: Effects of Renting Real Estate from a Related Party



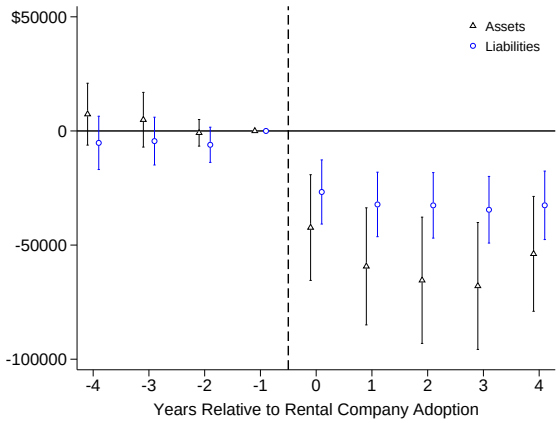
(a) Total Spending



(b) Direct and Related Party Spending



(c) Key Line-Items



(d) Nursing Home Balance Sheet

Notes: Figure presents event studies of nursing homes' real estate costs around the time they begin renting from a 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 costs and related party payments. Panel (c) breaks out key line-items. The remaining line items are shown in Appendix Figure A.5. Panel (d) presents the impact on the nursing home's assets and liabilities. Each point corresponds to an estimate of the β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

In this section, we utilize detailed cost and balance sheet data to infer the extent to which each of these channels is used to tunnel cash flows and assets out of the nursing home. Figure 4 presents event study estimates of how transitioning to renting from a related party affects both nursing homes' costs and their balance sheets.

Real Estate Costs. Panel (a) shows the impact on a nursing home's total spending on real estate (c_{it}^s), inclusive of both direct real estate costs (d_{it}^s) and any payments made to related parties for real estate (p_{it}^s). Our estimates indicate that after nursing homes begin to rent from a related party, their real estate spending increases by \$1,744 per bed (42.4% of the pre-adoption mean). Reassuringly, there is no indication of diverging trends prior to treatment, and the effect coincides precisely with when the nursing home begins renting from a related party.

Panel (b) decomposes the total effect into changes in direct spending on real estate by the nursing home and payments made to the related party. As anticipated, when a nursing home begins renting from a related party, it substitutes \$2,561 per bed in direct costs of ownership for \$4,328 per bed in new payments for real estate made to related parties.[13] Panel (c) further breaks out key line-items, confirming that nursing homes are trading reduced spending on interest payments (\$1,431), depreciation (\$1,399), and real estate taxes (\$247) for considerable new rents paid to the related party (\$4,534).[14] Consistent with panel (a), panels (b) and (c) both show that new related party payments substantially exceed the savings on direct costs of ownership.

In summary, nursing homes renting from a related party pay a substantial premium to occupy *the same* real estate they previously owned. The additional \$1,744 per bed in real estate spending represents cash flows that the nursing home entity would otherwise have booked as profits but are instead tunneled to a sister company and out of sight of regulators and the public.

The principal assumption in our approach is that the transition does not coincide with major real cost shocks. Here, both the sharpness and magnitude of our estimated effects give confidence. 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.

Assets and Liabilities. Panel (d) examines how nursing homes' assets and liabilities change when they transition from owning real estate to renting from a related party. Although the precise details of the real estate transactions are not directly observable, we can infer much from these balance sheet measures. Following a sale-leaseback, both assets and liabilities decrease substantially, by \$60,621 and \$27,794 per bed, respectively. This pattern is consistent with the nursing home using the proceeds from the sale to pay down existing debt. The relative magnitudes, however, are

[13] The difference between these two is not precisely \$1,744 due to each outcome variable being separately winsorized.

[14] See Appendix Figure A.5 for other less-common line-items, including real estate payments made to related parties that are reported as something other than rents.

striking: the decrease in liabilities accounts for just 45.9% of the decrease in assets. The remaining $32,827 simply vanishes from the nursing home's balance sheet. The most plausible explanation is that the nursing home tunnels this asset value to the related party by selling its property at a substantial discount.[15]

Even this $32,827 per bed in book value likely understates the true extent of tunneling because the market value of nursing home real estate frequently exceeds its book value. While book values are depreciated downward from an asset's original purchase price, market values for real estate in Illinois have generally increased in recent decades. On average, sale-leasebacks in our sample occur 31 years after the original purchase of the property, leaving considerable time for appreciation in market value. Using an Illinois real estate index to inflate original purchase prices, improvements, and depreciation to the year of the sale-leaseback implies an additional $21,569 per bed in tunneled market value.[16] Adding this to the tunneled book value suggests that the typical related party sale-leaseback enables tunneling $54,396 per bed off the nursing home's balance sheet in a single transaction. An important implication of this is that it leaves the nursing home in much worse financial condition. In fact, nursing homes are 14.7 percentage points more likely to report negative book equity after a related-party sale-leaseback (Figure A.6). In other words, the transactions are often so extractive that they leave the nursing home appearing less than worthless on paper.

Summary. In summary, renting from a related party offers nursing homes the opportunity to hide an average of $1,744 per bed each year. In addition, it affords owners a one-time opportunity to tunnel an average of $54,396 per bed in assets by selling the property at a steep discount. As a result, facilities renting from a related party will appear to have anemic cash flows and little or even negative value on their balance sheet. This apparent financial precarity would understandably concern regulators and policymakers, who may be inclined to respond by increasing payments or relaxing quality regulation in order to prevent bankruptcies or closures that could harm patients.

Robustness and Extensions. We examine the robustness of our analysis to several alternative specifications, samples, and estimators in Appendix C. Costs are commonly right-skewed, so we show our findings are robust to using logged dependent variables in Figure C.1a. We also show in Figure C.2a that our estimates are similar when employing the standard two-way fixed-effects estimator without stacking. In Figures C.3a and C.4a, 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

[15] If the nursing home had sold property for its full book value, the sale itself would not change the nursing home's total assets, as it simply exchanges a real asset for its equivalent book value in cash. In such a case, changes in assets can only be explained by major outlays such as paying off a mortgage. As detailed above, we can only rationalize 45.9% of the change in assets as reducing liabilities.

[16] An alternative approach to approximating market value is to assume a fair capitalization rate was applied in setting the rent. Taking this approach and assuming the $4,534 in related party rent was determined by a 6% capitalization rate implies a capitalized value of $75,567. Even conservatively attributing all of the $60,621 decrease in book assets from panel (d) to the sold real estate implies $14,946 in additional tunneled market value above book value, or a total of $47,773 in tunneled value.

possibility of null effects in this subgroup. In Figures C.5a and C.6a, we restrict the sample to only chain-affiliated firms and non-chain firms, respectively, and find relatively similar patterns across subgroups. In Figure C.7a we exclude facilities that had a simultaneous change in ownership (such as an independent facility becoming acquired by a chain), and find similar patterns. In Figure C.8 we show robustness to restricting controls only to facilities with arm's-length rental agreements, demonstrating that our results are not driven by a difference in trends between market rents and the accounting costs of ownership.

We also extend our analysis to consider related parties' reported costs and balance sheets in Appendix D. We find little evidence that related parties make dramatic investments rationalizing the observed transfer prices. We do find, however, that related parties appear to use the opportunity to take out new, larger mortgages on the property. This suggests that an additional benefit to tunneling the facility's real estate is that it offers the owner an opportunity for substantial borrowing at collateralized rates. An important caveat to this analysis is that data on related parties' financials should be interpreted cautiously, as they are less detailed and likely to be lower quality.

6 Related-Party Management Services

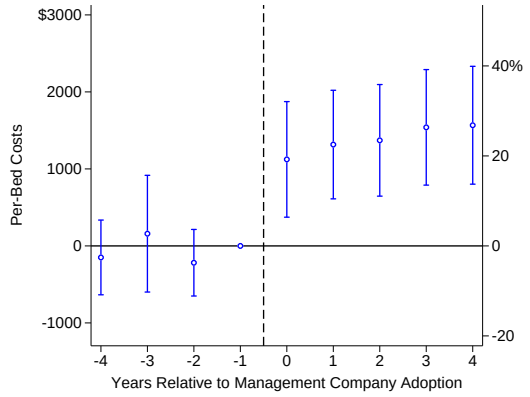
After real estate, management services comprise the second largest category of related party spending. Analogously to Section 5, we study the effect of related-party management services by estimating event studies around the adoption of a related-party management company.

Tunneling Through Management Fees. Our primary results are shown in Figure 5. In panel (a) we plot the estimates of β^{τ} 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 β^{τ} estimates are scaled by the pre-adoption average spending 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 rises sharply by \$1,124 per bed. Management spending then continues to increase modestly, such that the post-adoption mean is approximately 25% above the pre-adoption mean. In panel (b), we decompose total management spending into direct spending by the nursing home and spending on a related-party management company. When a facility starts paying a related-party management company, it reduces direct spending on management services by \$1,283 per bed. However, this decrease is more than offset by the \$2,742 increase in spending on management services provided by a related party, generating the net increase in spending on management services.[17]

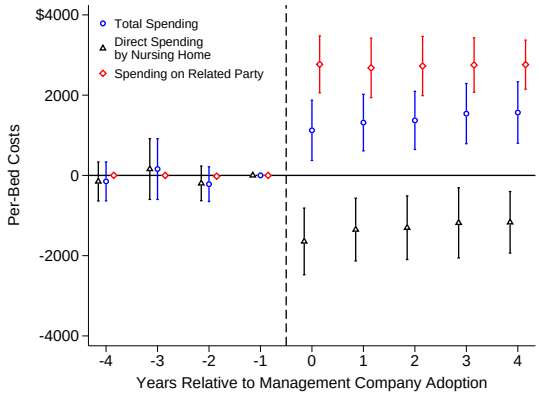
Several cost report line items comprise the category of "management services." These include *Administrative*, *Directors Fees*, *Professional Services*, and *General Office Expenses*. We separately examine each in panel (c). The entire increase in management spending is concentrated in *Administrative*. This line-item predominantly reflects administrator salaries, and nursing home owners

[17] These average effects do not precisely sum to the impact on total spending, as each series is winsorized separately.

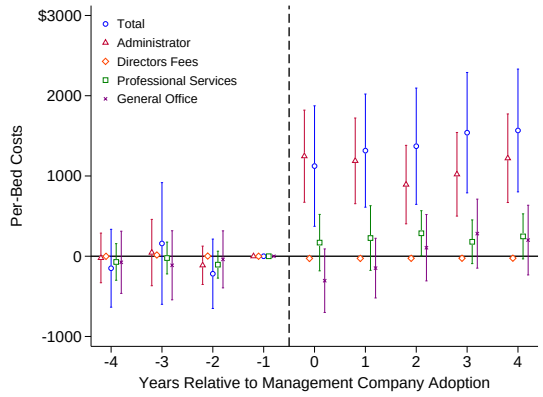
Figure 5: Management Expenses Around Related Party Adoption



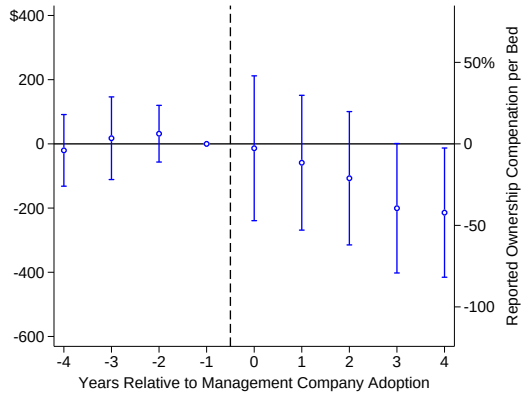
(a) Management Costs per Bed



(b) Decomposition of Management Costs



(c) Key Line-Items



(d) Reported Ownership Compensation

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

are typically considered administrators. Importantly, we find no rise in clerical salaries (captured in *General Office Expenses*). If related party adoption reflected genuine improvement in the quality or quantity of management services, one might expect higher spending on support staff as well. Instead, we find that only spending on administrator salary rises.

We cannot directly rule out that related-party adoption reflects greater provision of inherently intangible management services, rather than simply a markup over existing practices. Indirectly, we can assess this possibility by examining how spending in other cost categories changes around adoption. For instance, if related-party management companies enhanced oversight or improved efficiencies, one might expect changes in other inputs such as nursing expenses. We re-estimate equation (2) for eight primary cost centers (Appendix Figure A.7). In general, we find null effects.[18] This provides further assurance that we are not simply capturing a re-coding of expenses, such as paying a related party for management services, which then provides management and housekeeping services bundled together.

Reported Compensation to Ownership for Management Services. The evidence points toward related-party management spending at least partially reflecting direct payments to owners. This is difficult to assess using only the data available in the cost reports, but one area to probe is reported ownership compensation. Facilities must disclose all compensation to owners and their relatives, as well as board members for non-profit firms. Turning to these data, we re-estimate equation (2) using per-bed reported ownership compensation for management services as the dependent variable. The resulting estimates, reported in Figure 5 panel (d), are noisy but suggest that reported direct management compensation to owners falls by 24.8%, though we cannot reject that this difference is statistically indistinguishable from zero. This result is consistent with the hypothesis that the rise in reported management costs partly disguises ownership compensation, as firms instead shift their compensation through related parties.

Robustness. We examine the robustness of our analysis to several alternative specifications, samples, and estimators in Appendix C. 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 9) is not so conceptually different from the straightforward tunneling we have discussed. Nonetheless, in Figure C.7 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 5, we also examine the robustness of our

[18] Of the eight examined, the only statistically significant increase occurs in "provider participation fees" paid to Illinois' Medicaid department. Note that while statistically significant, the dollar amounts are relatively small and the event study exhibits pre-trends, suggesting any change is unrelated to the use of related-party management services.

analyses to several alternative specifications. In Appendix Figure C.1 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 C.2 panel b). Exploring the role of ownership, in the bottom panels of Appendix Figures C.3 and C.4, 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 C.5 and C.6, 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.

7 Calculating Hidden Profits

The binary-treatment event studies in Sections 5 and 6 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).

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 θ^s. In particular, given an estimate of θ^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 θ^s for each service line s, so as to calculate 'hidden' profits π^*_{it}. As in Section 4, we henceforth omit the superscript s for ease of exposition with the understanding that our estimation is performed separately for each service area.

Recovering θ 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 party as in Section 4.2. 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 post-adoption related party payment made by facility i:

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

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. Although

this approach has been employed before (e.g., Acemoglu and Finkelstein, 2008), it requires the assumptions of both strong parallel trends and parametric linearity of treatment effect in dosage size (Callaway et al., 2024). 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 C.9 that the continuous dosage event studies imply effects very similar to those from the more flexible binary event studies used in Sections 5 and 6, suggesting these assumptions are not too restrictive.

7.1 Results

Table 1: Estimates of θ^s

Cost	Percent of Spending on Related Parties	Parameter Estimate $\hat{\theta}^s$	Implied Related Party Margin (%)
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)

Notes: Table presents estimates of the parameter θ^s for each cost category considered. Each line corresponds to a regression estimate of equation (4). The implied margin 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.

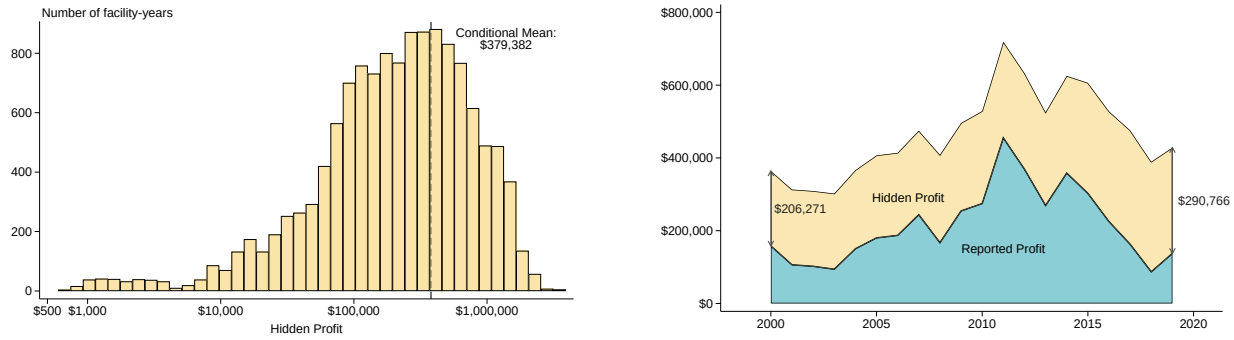
We estimate θ^s for real estate and management services—which constitute the majority of related party spending (Figure 2)—as well as for therapy and ancillary services—which are the only other service lines with at least 5% of spending going to related parties.[19] Table 1 presents our estimates of θ^s and the margins implied by the related party markups: $1-\theta^s = \frac{p^s_{it}-\theta^s p^s_{it}}{p^s_{it}}$. These margins describe the share of related party spending that is hidden profit.

Consistent with our findings in Sections 5 and 6, we find substantial, statistically significant margins of 36.1% and 41.7% for real estate and management services, respectively. For therapy services, we are unable to reject the null of no related-party markup (i.e., $\theta^s = 1$). This may indicate that therapy costs are risky or impractical to inflate since therapy utilization is auditable from claims data and resident assessment data submitted to CMS. Finally, we estimate a large but statistically imprecise margin for ancillary services, which includes physician, dental, pharmacy,

[19] See Figure A.8 for event studies of therapy and ancillary services analogous to those in Sections 5 and 6.

and other services ancillary to skilled nursing and rehab. The imprecision of our estimate is likely due to the fact that only a small share of spending on ancillary services flows to related parties.

Figure 6: Hidden and Reported Profits



(a) Distribution of Hidden Profits

(b) Evolution of 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 for the 66.5% of facility-years that have 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 6 depicts the extent of hidden profits implied by our estimates. Panel (a) plots the distribution of hidden profits at the facility-year level for the 66.5% of facility-years with related-party transactions. The estimates suggest that, on average, facilities utilizing related parties manage to hide $379,382 in profits each year. The distribution has a long right tail; the median and interquartile range are $231,022 and [$92,166, $521,481], respectively, with a staggering 95^{th} percentile of $1,292,657. While many facilities have little or no hidden profits, there is a considerable tail of facilities masking substantial profits as related party costs.

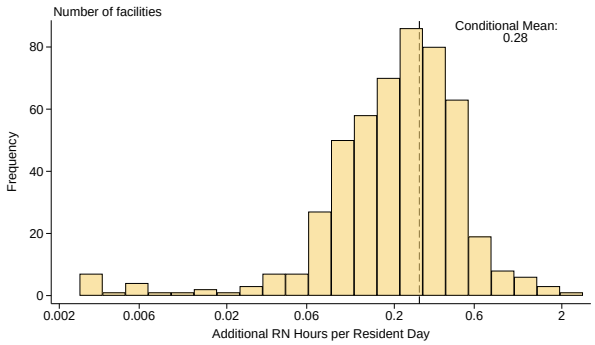
Panel (b) presents a time series of the average reported and hidden profits across all facilities in Illinois, including those not transacting with related parties. We find that a large and growing share of industry profits are hidden. In 2000, 56.6% of all nursing home profits in Illinois were already being hidden through related-party transactions. By 2019, this had grown to 68% of profits. Accounting for this fact dramatically changes the apparent financial health of the industry. While Illinois nursing homes reported an average profit of just $137,632 in 2019, this figure becomes $428,398 once hidden profits are accounted for. We present two exercises below that to help convey the magnitude of these hidden profits.

Redirecting Tunneled Profits to Care. One way to illustrate the magnitude of hidden profits we uncover is to measure them in terms of the quantity of direct care staffing hours that they could purchase.[20] To do so, we rely on wages calculated from the cost report data for both registered nurses (RN) and certified nursing assistants (CNA) in 2019. To benchmark these results, we

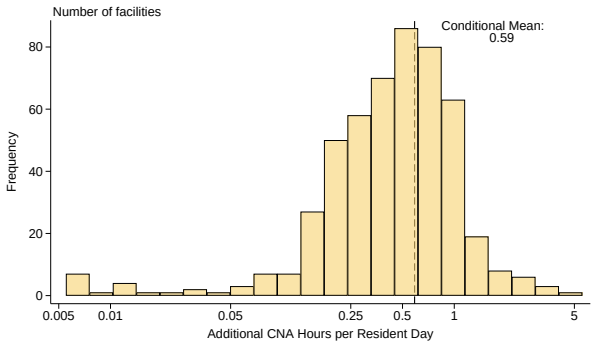
[20]This exercise should be viewed as a thought experiment intended to illustrate the magnitude of tunneled profits. Note that we abstract away from concerns such as labor supply effects or capital flight, but these should be considered when assessing any substantive policy change.

Figure 7: Counterfactual Direct Care Staffing

(a) Distribution of Additional RN Hours



(b) Distribution of Additional CNA Hours



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.

compute the realized staffing levels for all Illinois nursing homes from the Payroll Based Journal data, which contain daily staffing levels for the universe of certified nursing homes. Appendix E provides more details on these calculations.

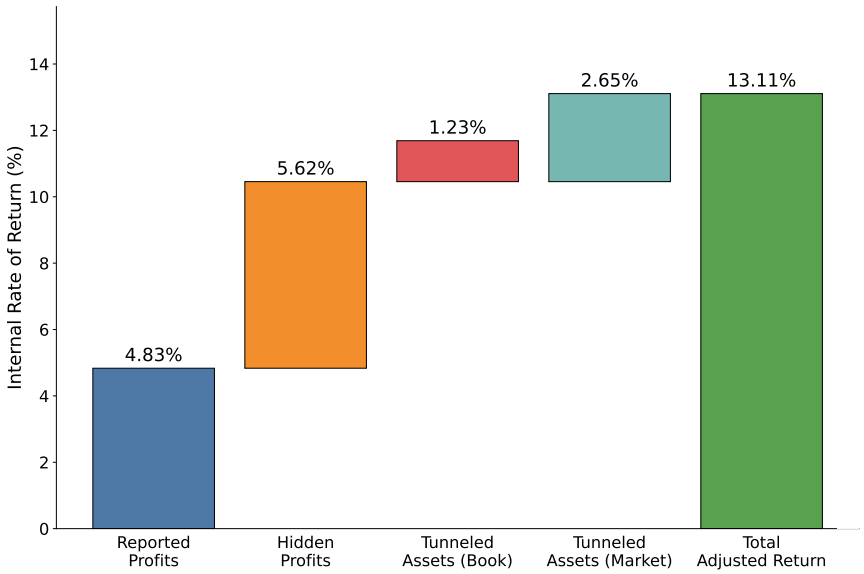
Figure 7 presents the distributions of marginal hours per resident day. We find that, for facilities with non-zero hidden profits, RN staffing would rise by nearly 0.28 hours per resident day, whereas CNA staffing hours would rise by 0.59 hours per resident day. These increases are sufficiently large that the mean staffing ratios statewide (i.e. including the non-related party firms) would increase 35.7% and 26.1%, respectively.

These would be substantial changes in staffing levels, with considerable policy relevance. A previously proposed federal minimum staffing ratio would set thresholds of 0.55 RN hours and 2.45 CNA hours per resident day. Under observed 2019 levels, only 55.2% of Illinois facilities met the RN standard and 15.3% met the CNA standard. If hidden profits were reinvested in direct care staff, compliance would rise to 78.8% and 43.4%, respectively (Appendix Figure E.1).

Implications of Tunneling for Returns. A long-standing, apparent contradiction in the industry has been that investors are willing to pay high prices to acquire nursing homes that report anemic cash flows and little book equity to regulators. We examine the extent to which this puzzle may be explained tunneling by computing the internal rate of return (IRR) required to rationalize a typical $100,000 per bed acquisition price (Reiland, 2022) before and after accounting for tunneled cash flows and assets.[21] In calculating these IRRs, we assume a 1% closure rate (Olenski, 2023) and that nominal profits and liquidation values grow at the average rate of inflation (2.16%) and real estate prices (2.04%) respectively. See Appendix F for additional details.

[21]Note that, on average, facilities hold $43,883 in current assets. After netting these out, the effective acquisition price for facilities' ongoing cash flows averages $56,117 per bed.

Figure 8: Tunneling and Implied Returns



Notes: Figure demonstrates how incorporating hidden profits and asset tunneling increase the internal rates of return implied by a typical $100,000 per bed acquisition price.

Figure 8 presents our results. If acquirers expect only to receive facilities' reported accounting profits, it would imply that the IRR on a typical acquisition is a paltry 4.83%. Accounting for the additional average $2,770 per bed of annual hidden profits increases the IRR to 10.46%. Incorporating the $32,827 in book value or $54,396 in market value tunneled via sale-leasebacks further increases the implied IRR to 11.69% or 13.11%, respectively. Thus, accounting for tunneling implies the typical acquisition has a very plausible IRR. Additionally, returns may be even higher if an investor expects to make operational changes that improve performance. For comparison, Irving Levin Associates, a market intelligence firm specializing in healthcare and senior care M&A, reports that typical capitalization rates on nursing home investments in nursing homes ranged from 12.0% to 12.5% between 2014 and 2019.

Robustness and Caveats We examine the robustness of our calculations in several ways. Appendix Figure C.10 panel (b) contains the analogous distribution for per-bed profits. Additionally, to confirm that our estimates of hidden profits are insensitive to the inclusion of therapy and ancillary services, in Appendix Figure C.11, we replicate Figure 6, 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 9 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.

8 Asset-Shielding and Malpractice Liability

Section 2.2 outlines several 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.

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, nursing homes face strong incentives to move sizable assets off-book, so as to limit 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.

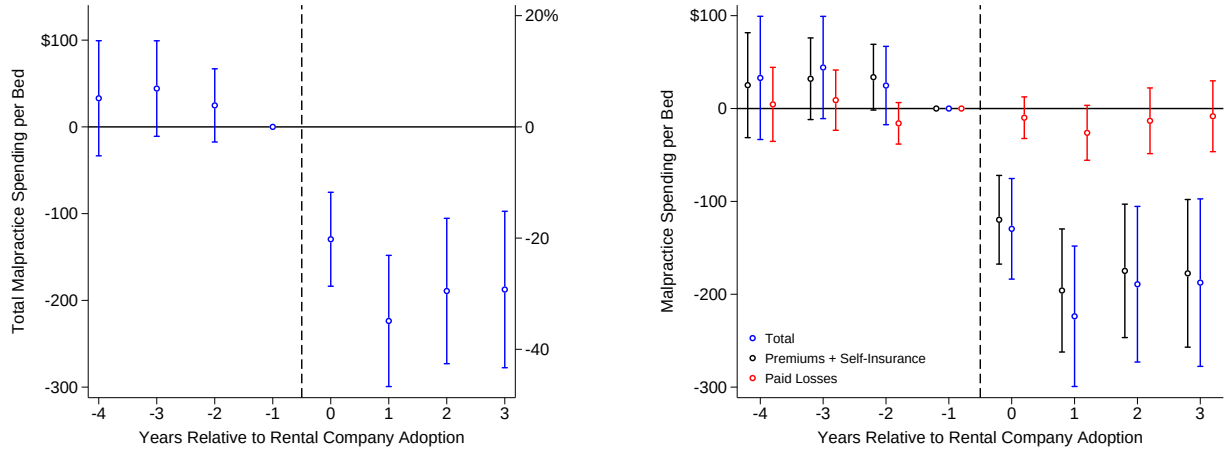
Indeed, an existing empirical study examines this behavior in the nursing home industry. Brickley et al. (2017) investigate the prevalence and causes of asset-shielding in the nursing home industry, chiefly through the sale of buildings to smaller more 'judgment-proof' owners, as Casson and McMillen (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 and 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 G.

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 9: Malpractice Risk and Real Estate Related Party Adoption



(a) Total Malpractice Spending

(b) Malpractice Spending Decomposition

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 9. 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.

9 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 meaningful changes in clinical or operational outcomes suggests that the cost increases found in the prior sections reflect profit tunneling rather than real economic activity.

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.[22] 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 5 and 6, we estimate separate models for real estate and management company adoption.

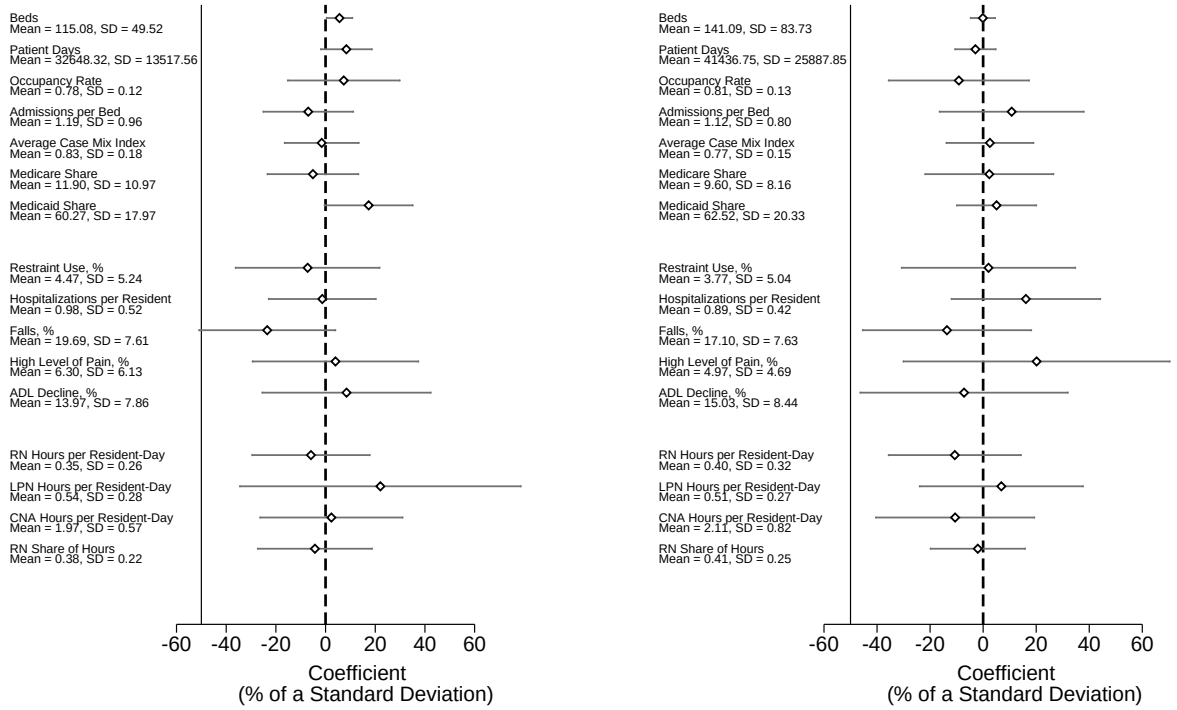
Our findings are summarized in Figure 10. We find no evidence of meaningful changes (considering both economic and statistical significance) in any of the outcomes studied. Firms report no meaningful changes in beds, total patient days, patient case mix, payer composition, use of restraints, hospitalizations, 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,

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

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 (Figure C.12) report similar results.

These null results lend support to the identification assumption that true costs evolve smoothly over the event window – as they suggest that the transactions reported here only reflect profit tunneling rather than 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 10: Impact on Clinical and Operational Outcomes



(a) Rental Company Adoption

(b) Management Company Adoption

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 C.12a and C.12b. All models include year and facility-by-event fixed effects. Standard errors are clustered by facility.

10 Conclusion

This paper documents health care providers hiding substantial profits and assets through related-party transactions. Cost report data for Illinois nursing homes 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 extent of cash flows tunneled through inflated transfer prices. Our estimates indicate that substantial cash flows are tunneled through inflated related party payments: on average, $1,744 per bed for real estate (42.4% of the mean) and $1,435 per bed for management services (24.6% of the mean). We likewise find that nursing homes are able to tunnel considerable asset value—an average of $54,396 per bed—by selling a related party their real estate at a substantial discount from its market value. Accounting for tunneled assets and profits raises the implied IRR of a typical nursing home investment from 4.83% to 13.11%.

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.

Finally, we also demonstrate a considerable benefit of tunneling for providers in reducing their malpractice premiums by making assets more difficult for claimants to access. While far from the only benefit of tunneling, it is one that we are able to assess empirically with the available data.

Our findings that health care firms may be substantially understating their profitability and assets have far-reaching policy implications. This suggests a need for caution when using firms' self-reported costs and financial data in determining reimbursement or the feasibility of quality regulations. Our findings also 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 balance sheets that are subject to potential audit. Such data are vital for policy-makers, 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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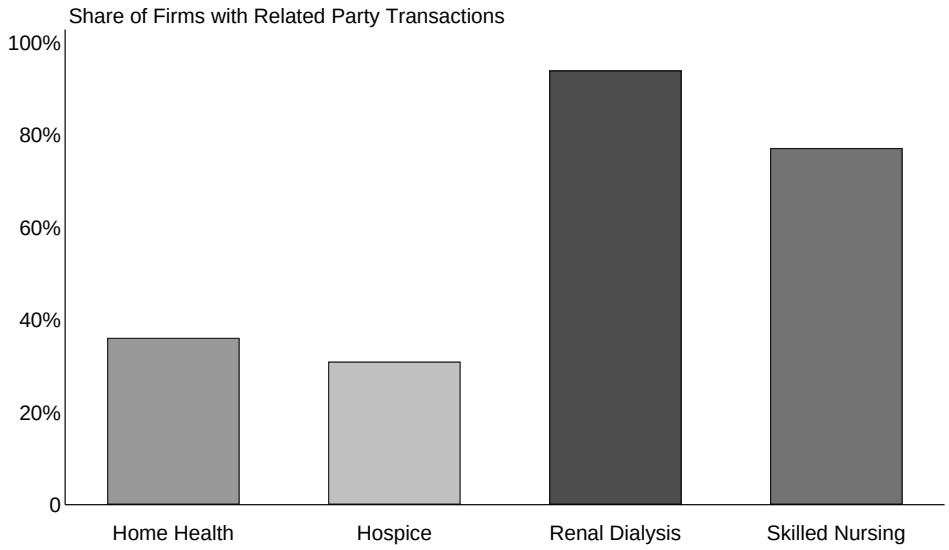
Online Appendix

A Additional Tables and Figures

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

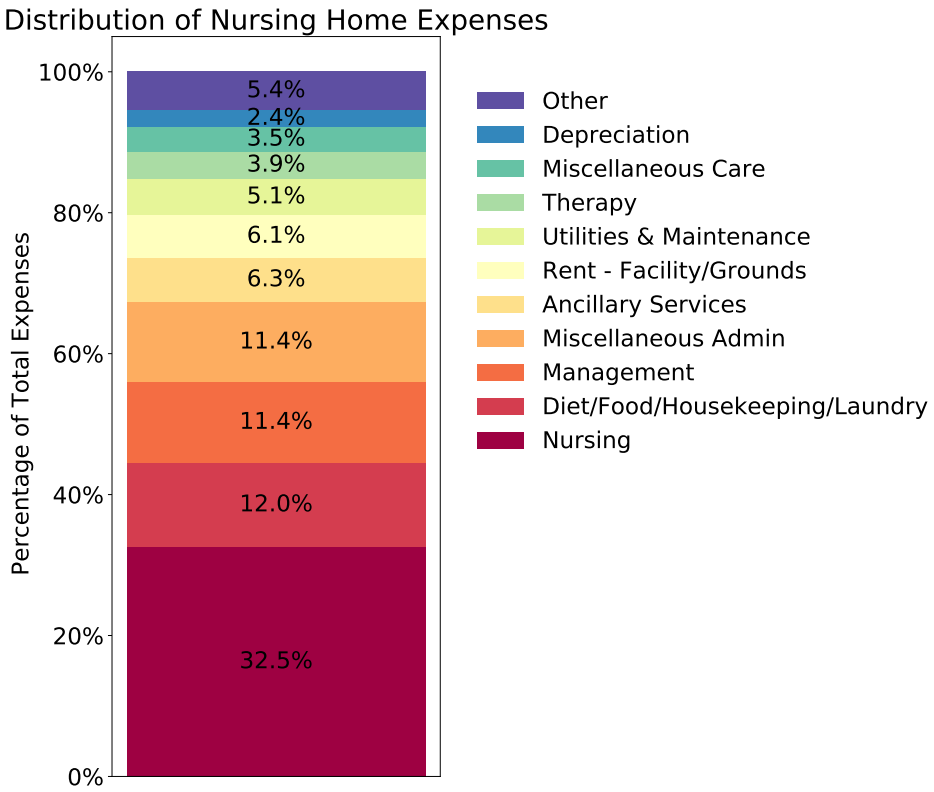
1. Figure A.1 shows the share of firms reporting related-party transactions across health care industries.
2. Figure A.2 depicts the distribution of nursing home expenses using the Illinois Medicaid cost report data.
3. Figure A.3 is a histogram of related party overlapping ownership shares. 99.0% of related-party transactions are with entities that have 100% ownership overlap.
4. Figure A.4 shows the spillover impact of rental company adoption on various other cost categories.
5. Figure A.5 shows other components of real estate spending not included in Figure 4 panel (c).
6. Figure A.6 shows how the probability of reporting negative equity changes after a nursing home starts renting from a related party.
7. Figure A.7 shows the spillover impact of management company adoption on various other cost categories.
8. Figure A.8 shows estimates for related party markups for other cost categories included in the hidden profit calculations of Section 7.

Figure A.1: Related-Party Transactions Across Industries



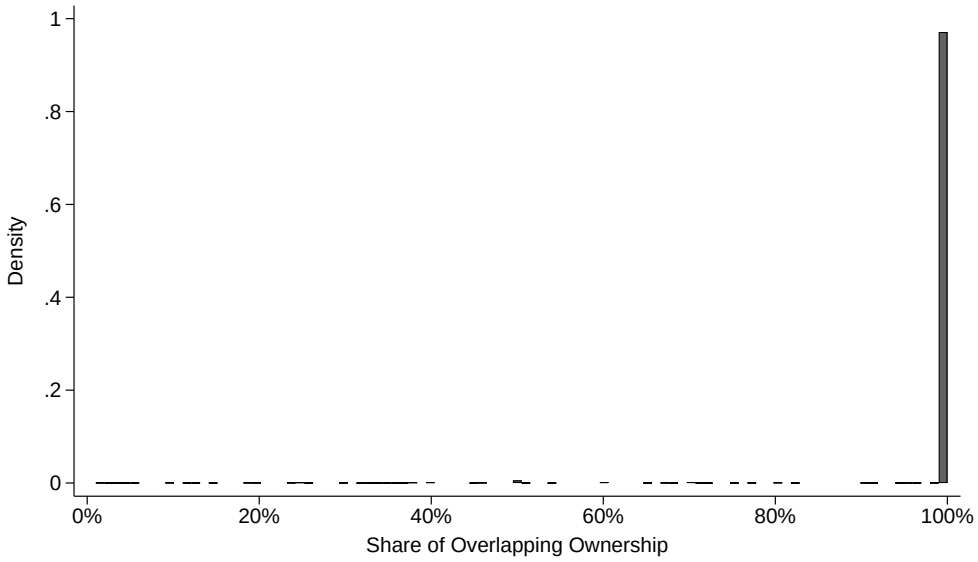
Notes: Figure reports share of establishments reporting significant related-party transactions, defined as total spending exceeding $10,000. Calculations are derived from the 2021 HCRIS cost reports for each industry. Data include reports on 7,631 renal dialysis facilities, 7,331 home health agencies,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

Figure A.2: Total Nursing Home Expenses



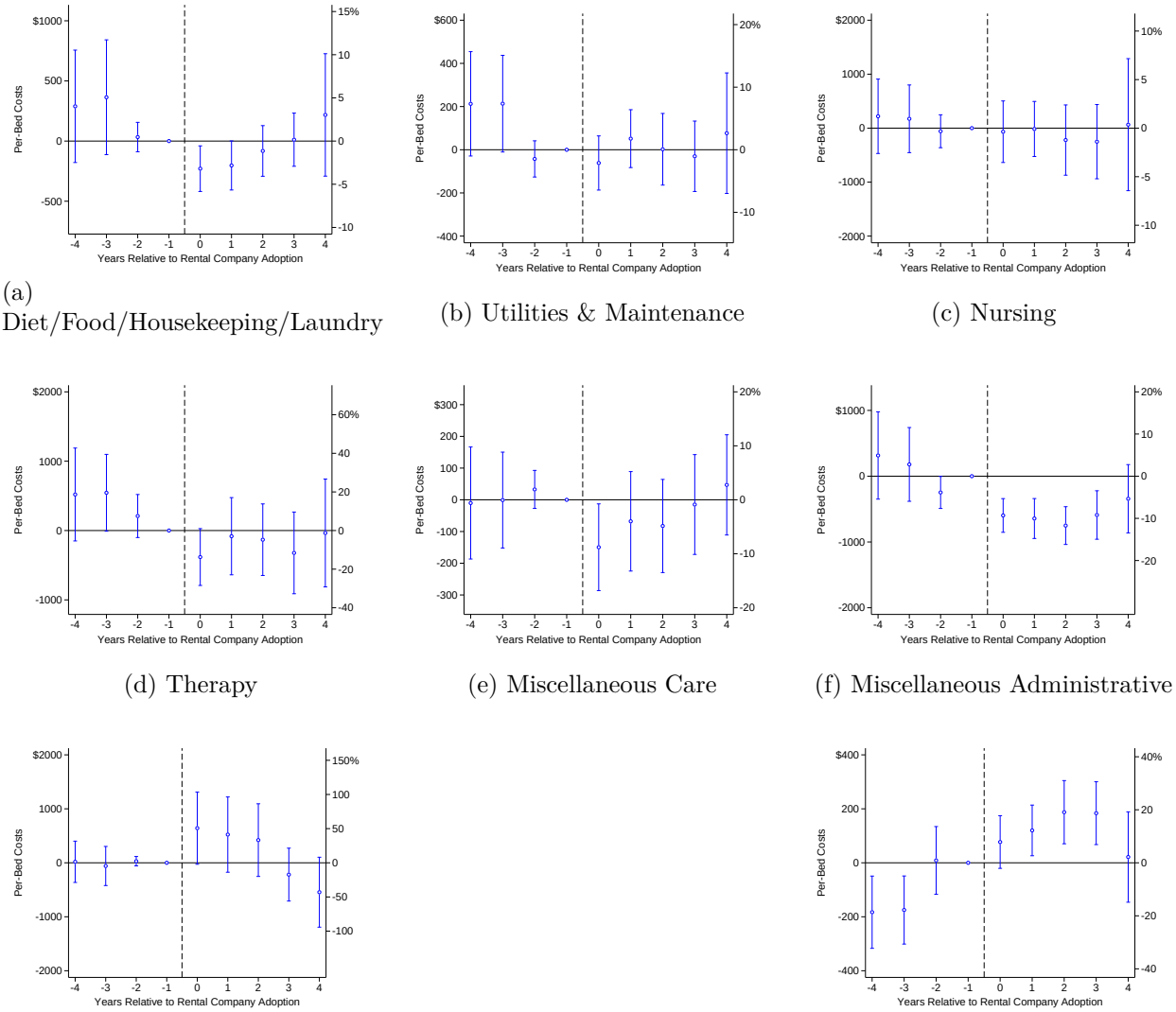
Notes: Figure plots total nursing home expenses by line item classification. For each line item we present the percentage of total expenses spent on that cost category. Data are aggregated across the entire sample period.

Figure A.3: 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 A.4: Rental Company Adoption: Spillovers to Other Cost Categories



(a) Diet/Food/Housekeeping/Laundry

(b) Utilities & Maintenance

(c) Nursing

(d) Therapy

(e) Miscellaneous Care

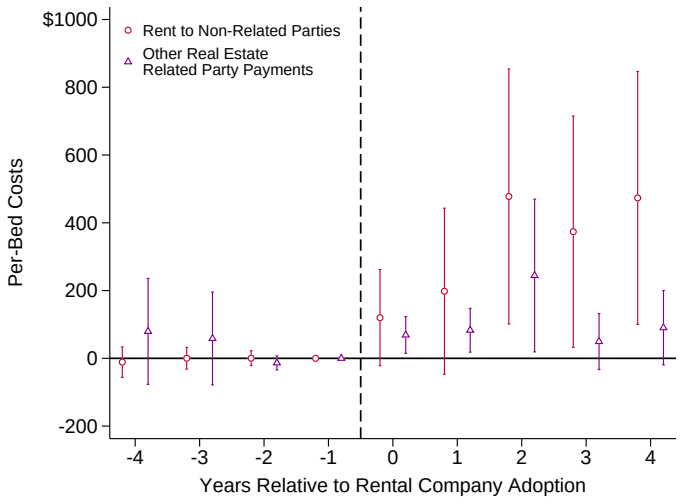
(f) Miscellaneous Administrative

(g) Ancillary Services

(h) Provider Participation Fees

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 β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

Figure A.5: 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 4 panel (c). All effects are measured in costs per bed. Each point corresponds to an estimate of the β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

Figure A.6: Probability of Reporting Negative Equity

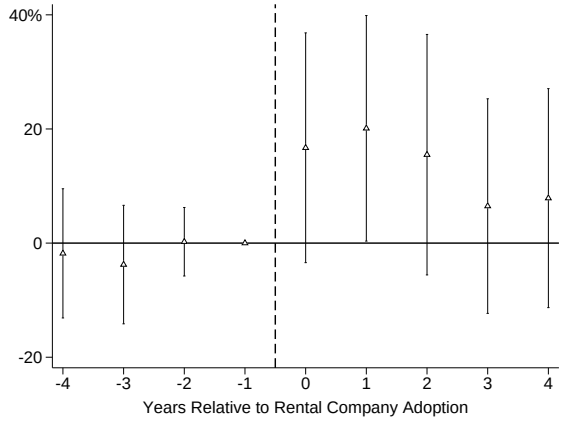
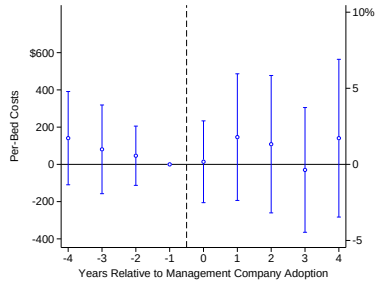
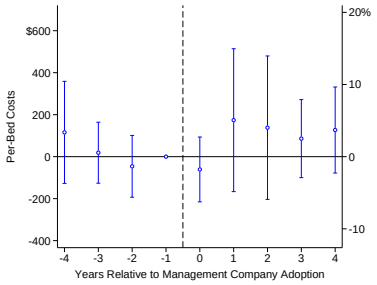


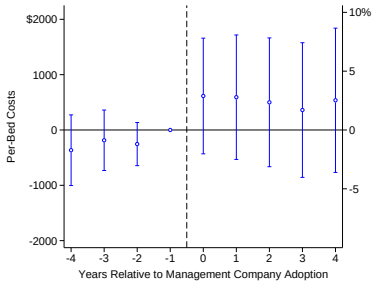
Figure A.7: Management Company Adoption: Spillovers to Other Cost Categories



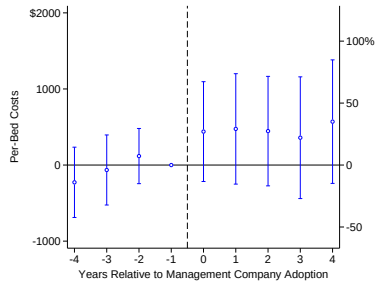
(a) Diet/Food/Housekeeping/Laundry



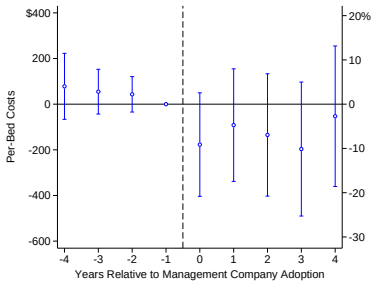
(b) Utilities & Maintenance



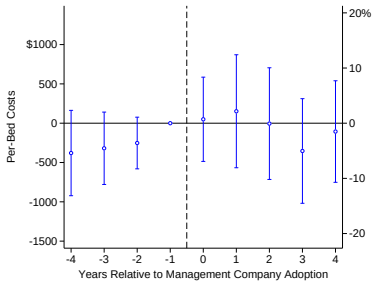
(c) Nursing



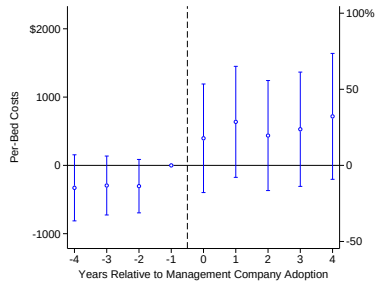
(d) Therapy



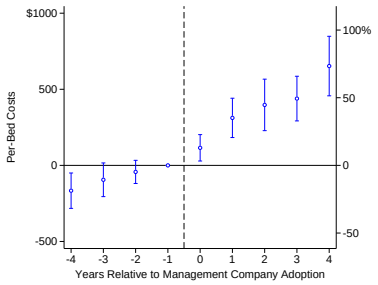
(e) Miscellaneous Care



(f) Miscellaneous Administrative



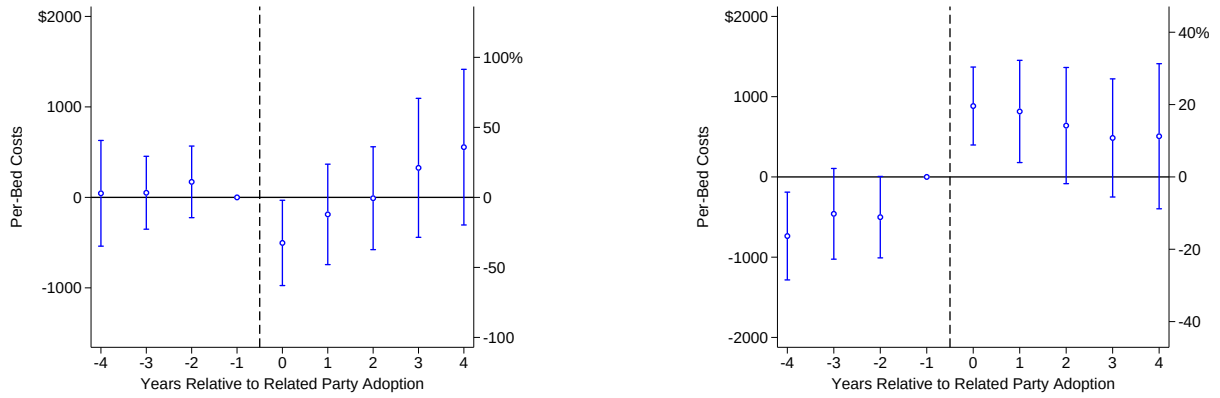
(g) Ancillary Services



(h) Provider Participation Fees

Notes: Figure presents event studies of different costs around the time a nursing home adopts a management company related party. The right axes denote the percent effect relative to the pre-adoption mean for the treatment group. Each point corresponds to an estimate of the β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

Figure A.8: Other Cost Category Related Party Adoption



(a) Therapy Per-Bed Costs

(b) Ancillary Services Per-Bed Costs

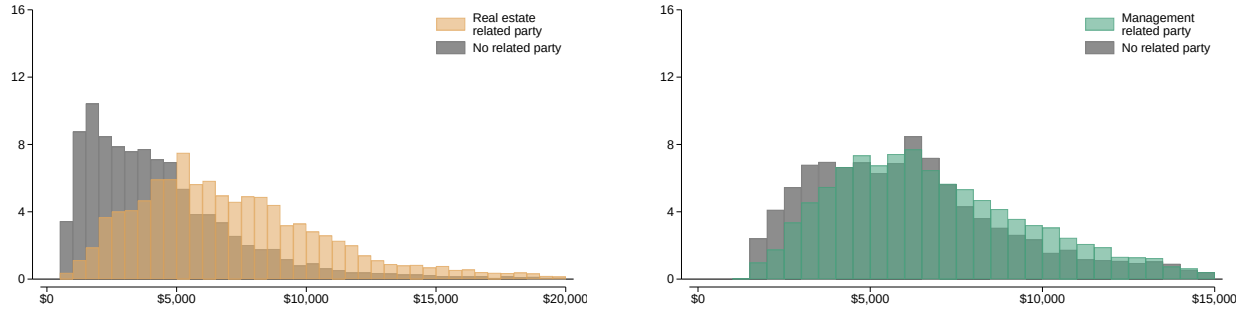
Notes: Figure presents event studies of per-bed therapy and ancillary services costs around the time a nursing home adopts a therapy or ancillary services related party, respectively. Panel (a) presents the results for therapy costs following therapy related party adoption. Panel (b) presents the results for ancillary services costs following ancillary services related party adoption. Each point corresponds to an estimate of the β^{τ} 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.

B Comparison of Adopting and Non-Adopting Firms

This appendix provides descriptive comparisons between facilities that adopt related party arrangements and those that do not. We examine differences in costs, profitability, and facility characteristics in the year prior to adoption. These results are not intended as causal evidence, but they highlight important heterogeneity and help motivate our empirical strategy.

Figure B.1 compares reported real estate and management costs per bed between adopters and non-adopters. To make comparisons consistent across ownership structures, we aggregate real estate expenditures into a single "ownership capital expenses" category, which includes facility rental payments, depreciation, interest, real estate taxes, amortization, and other capital costs. The dominant items are facility rents (for non-owners) and depreciation (for owners).[23] Panel (a) shows that firms renting from a related party report substantially higher per-bed real estate costs than either owners or firms renting from an unrelated landlord ($7,094 vs. $4,377). Panel (b) shows that facilities transacting with management RPs also have somewhat higher per-bed management costs ($6,811 vs. $6,137).

Figure B.1: Costs by Related Party Status



(a) Real Estate Costs per Bed

(b) Management Costs per Bed

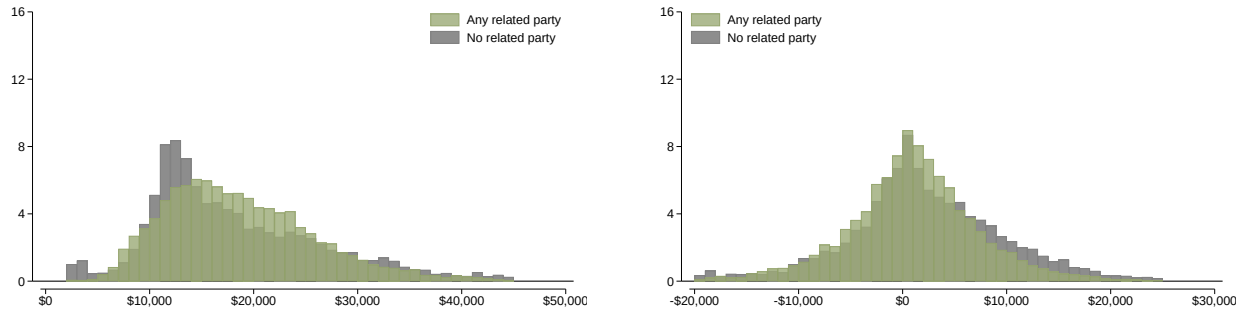
Notes: Figure presents histograms of per-bed costs, by related party status. Panel (a) presents total real estate expenses for firms that have adopted a rental company related party against those that have not. Panel (b) presents the corresponding figure for management service expenditures.

Note that firms that transact with related parties are not inherently more costly: in Figure B.2 panel (a) 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. Related-party firms have remarkably similar nursing expenditures ($18,629 per bed) compared to non-RP firms ($18,179). Panel (b) 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).

Tables B.1 and B.2 summarize pre-adoption characteristics of adopters and matched controls.

[23] In practice, some non-real estate capital costs (e.g., equipment depreciation) may be included in this category. We assume such items do not covary with RP adoption and thus act as classical measurement error.

Figure B.2: Costs and Profits by Related Party Status



(a) Nursing Costs per Bed

(b) Profit per Bed

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.

Real estate related party adopters tend to be larger, more likely to operate as for-profits, and somewhat more likely to be located in Chicago. For management related party adopters, we observe broadly similar patterns: larger size, higher likelihood of for-profit ownership, and greater concentration in Chicago. Notably, adopting facilities appear less profitable in the year before adoption. 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.

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

	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

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 B.2: Comparison of Management Related Party Firms and Control Firms

	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

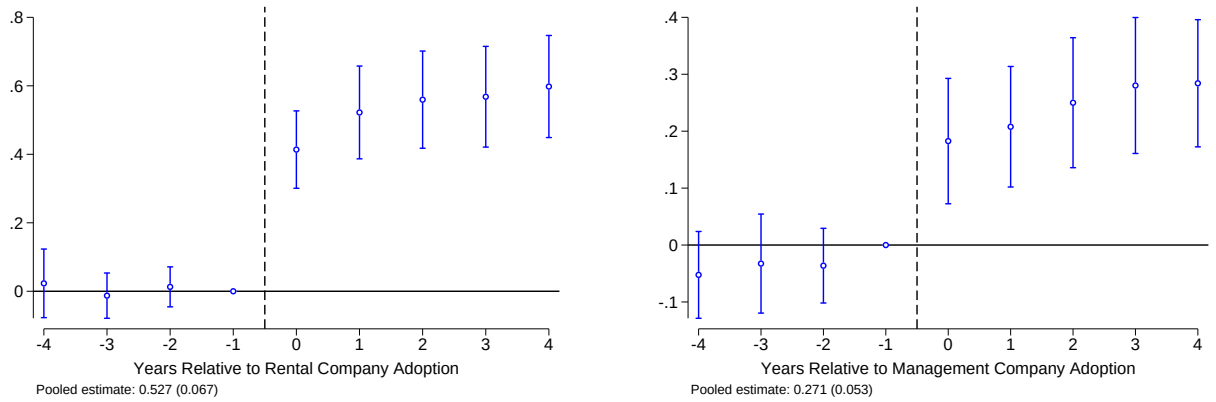
Notes: Table provides a comparison of facilities in the year prior to a management company related party adoption and the firm-years that are selected as clean controls.

C Robustness and Heterogeneity

This appendix contains additional analyses that assess the robustness of the tables and figures in the main text.

1. Figure C.1 replicates the main effects following a log transformation of the dependent variables.
2. Figure C.2 replicates the main effects using a standard two-way fixed effects model.
3. Figure C.3 replicates the main effects, restricting the analytic sample to only for-profit facilities.
4. Figure C.4 replicates the main effects, restricting the analytic sample to only not-for-profit facilities.
5. Figure C.5 replicates the main effects, restricting the analytic sample to only chain-affiliated facilities.
6. Figure C.6 replicates the main effects, restricting the analytic sample to only non-chain-affiliated facilities.
7. Figure C.7 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.
8. Figure C.8 replicates the main real estate effect, restricting the control group sample to only facilities renting from non-related parties.
9. Figure C.9 replicates the main effects using a continuous treatment definition.
10. Figure C.10 replicates Figure 6, scaling the measures of profit by the number of beds.
11. Figure C.11 replicates Figure 6, considering only real estate and management in the hidden profit calculation.
12. Figure C.12a replicates Figure 10a using standard confidence intervals that are unadjusted for multiple hypothesis testing.
13. Figure C.12b replicates Figure 10b using standard confidence intervals that are unadjusted for multiple hypothesis testing.

Figure C.1: Log Expenses and Related Party Adoption

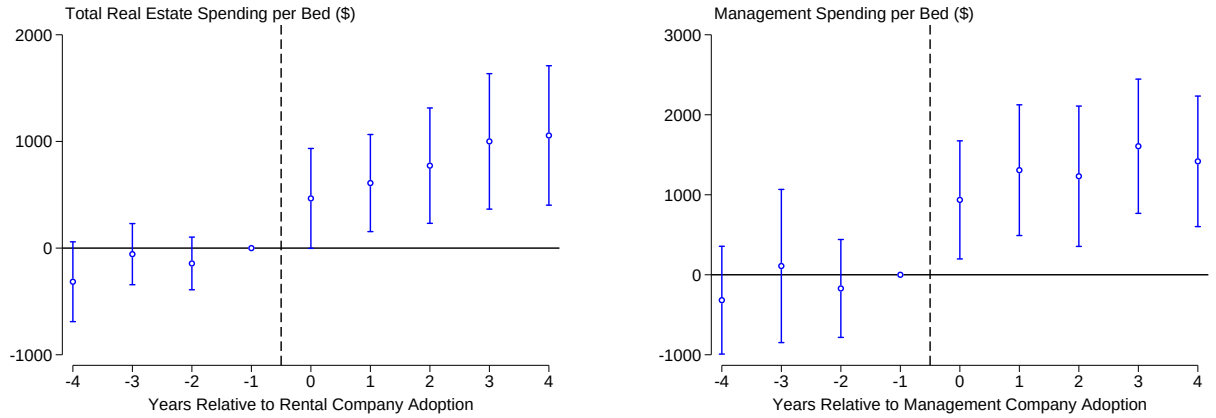


(a) Log Real Estate Costs

(b) Log Management Costs

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 β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

Figure C.2: Total Expenses and Related Party Adoption: Two-Way Fixed Effects

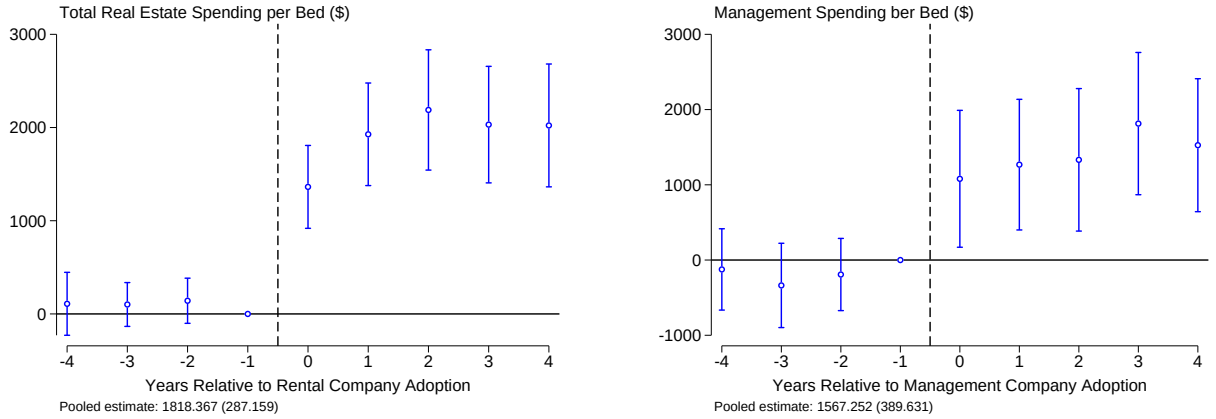


(a) Real Estate Spending

(b) Management Spending

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 β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

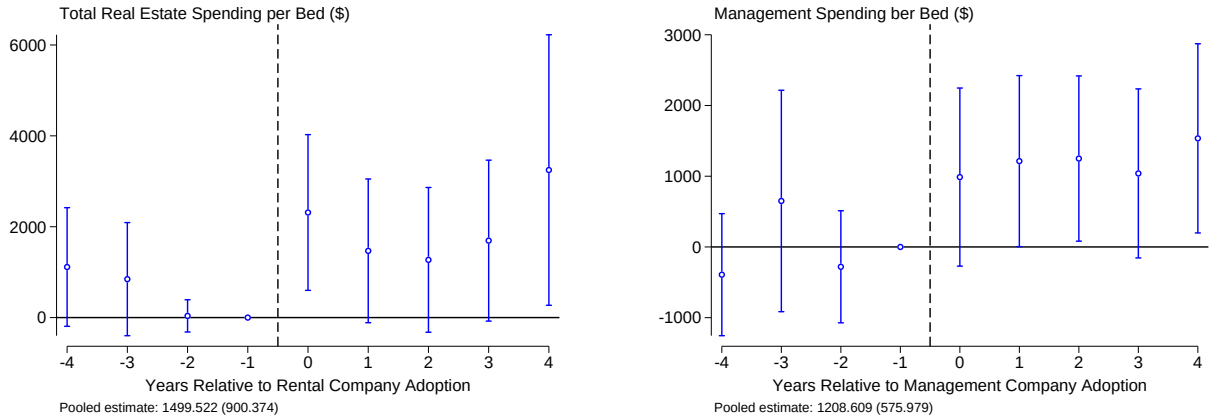
Figure C.3: Reported Expenses and Related Party Adoption: For-Profits



(a) Real Estate Spending (b) Management Spending

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 β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

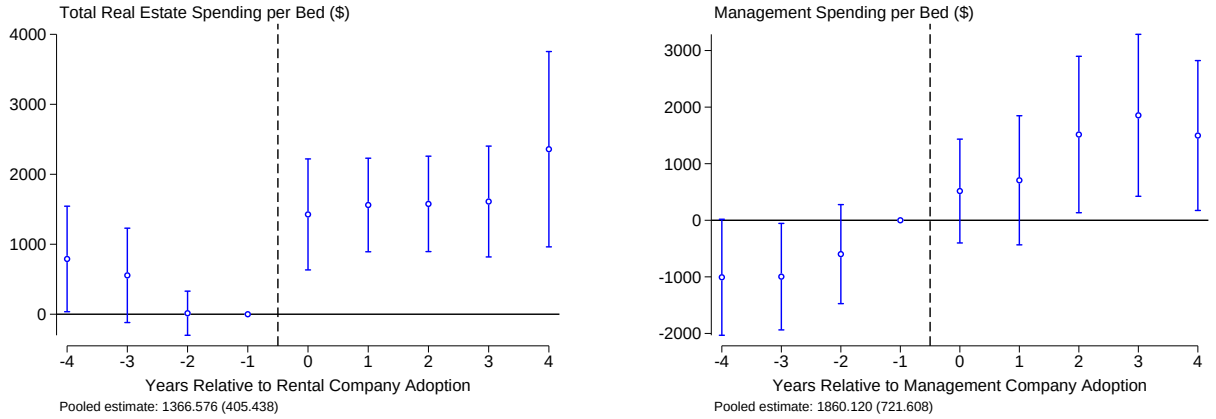
Figure C.4: Reported Expenses and Related Party Adoption: Not For-Profits



(a) Real Estate Spending (b) Management Spending

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 β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

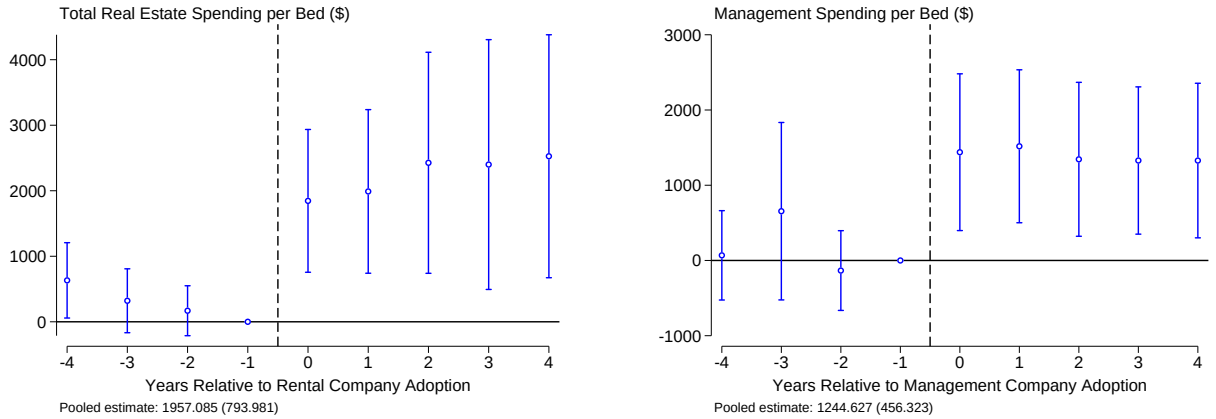
Figure C.5: Reported Expenses and Related Party Adoption: Chain-Affiliated



(a) Real Estate Spending (b) Management Spending

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 β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

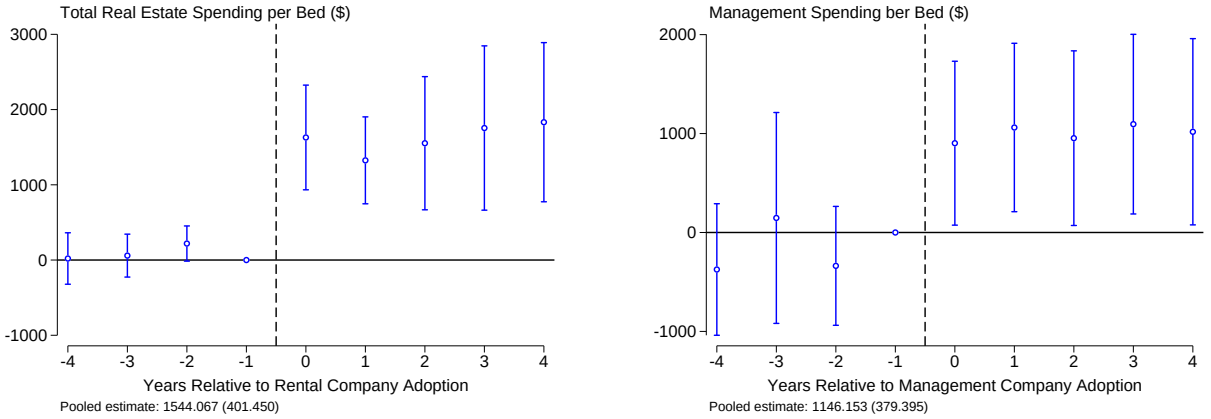
Figure C.6: Reported Expenses and Related Party Adoption: Non-Chain-Affiliated



(a) Real Estate Spending (b) Management Spending

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 β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

Figure C.7: Reported Expenses and Related Party Adoption: Excluding Ownership Transitions

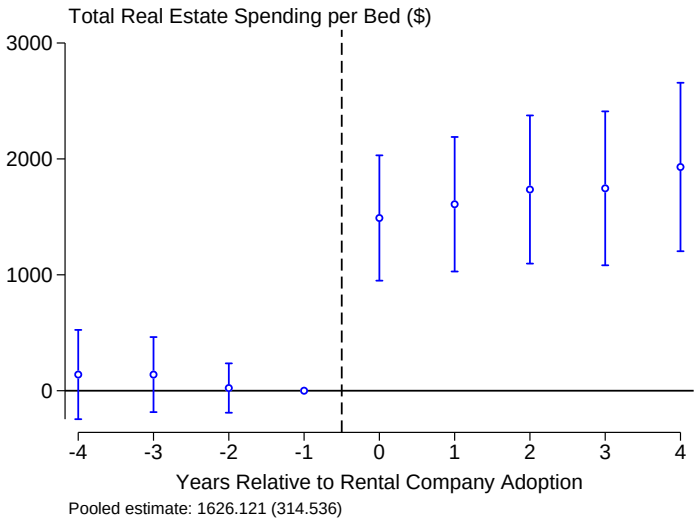


(a) Real Estate Spending

(b) Management Spending

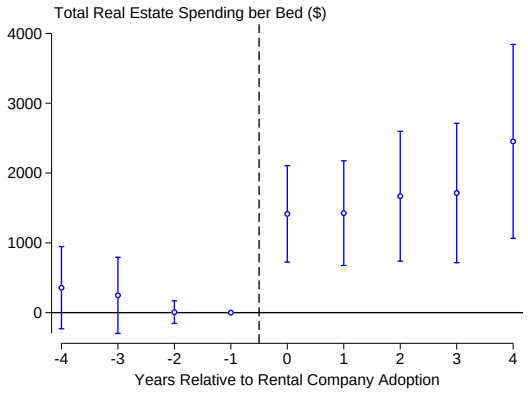
Notes: Figure presents event studies of real estate and management costs around the time a nursing home adopts a rental/management company related party, excluding the facilities that have an ownership transition in the year of or prior to a related party adoption. Panel (a) presents the results for real estate costs. Panel (b) presents the results for management costs. Each point corresponds to an estimate of the β^{τ} 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 C.8: Rental Company Adoption with Renters-Only Control Group

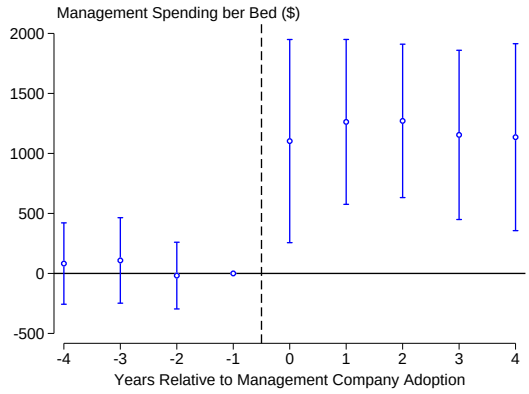


Notes: Figure presents event study of real estate costs around the time a nursing home adopts a rental company related party. Control group consists of only facilities that rented in relative year -1. Each point corresponds to an estimate of the β^{τ} parameters from equation (2). The error bars reflect 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 C.9: Reported Expenses and Related Party Adoption: Continuous Treatment



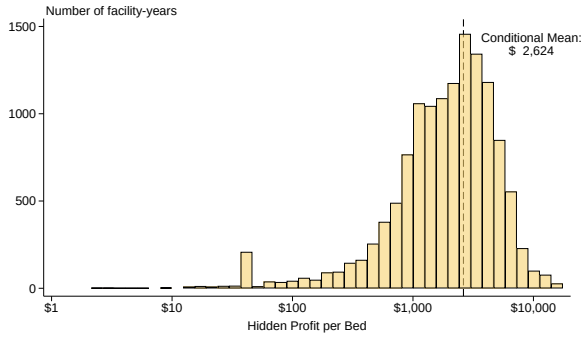
(a) Real Estate Spending



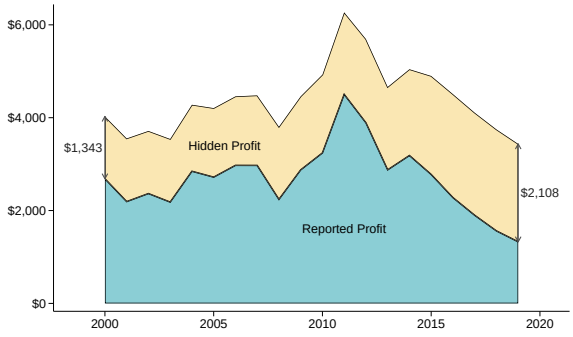
(b) Management Spending

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 β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

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



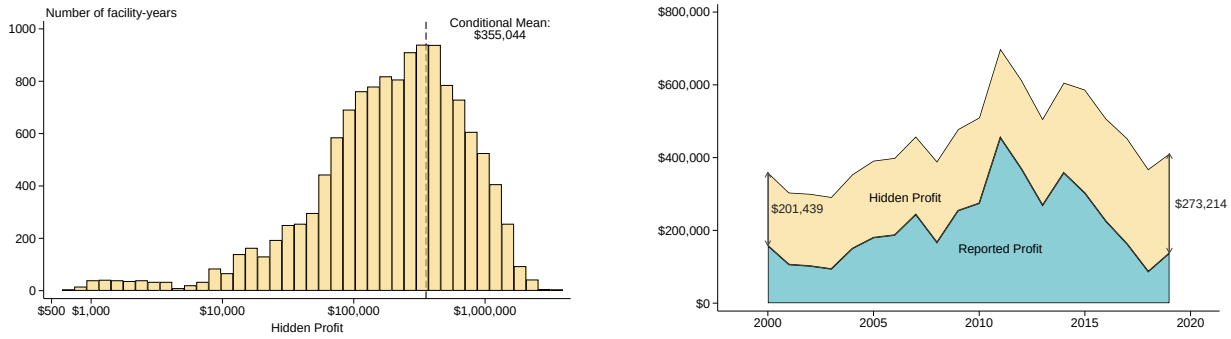
(a) Distribution of Hidden Per-Bed Profits



(b) Evolution of 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 1st and 99th percentiles. We exclude 2020 onward due to the Covid-19 pandemic.

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

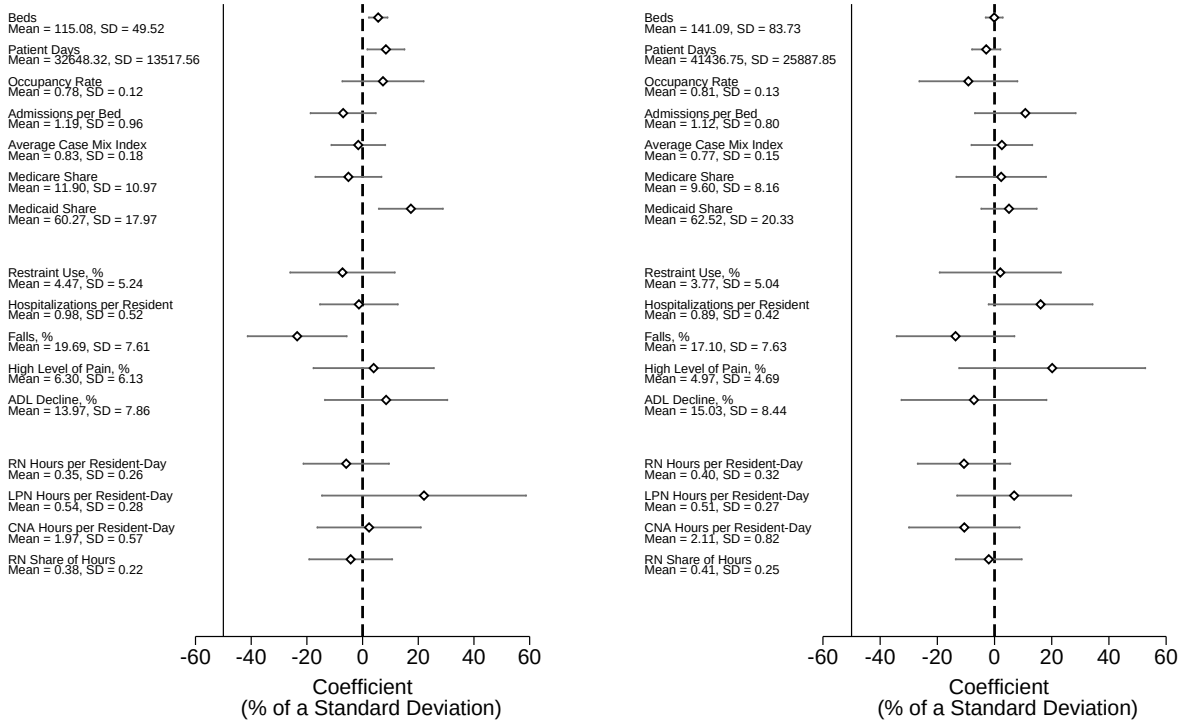


(a) Distribution of Hidden Profits

(b) Evolution of Hidden and Reported Profits

Notes: Figure presents the results of the hidden profit calculation in equation (3), considering only real estate and management services. Panel (a) presents the histogram of hidden profits. Note that facility-years with zero related-party transactions are excluded. 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 C.12: Impact on Clinical and Operational Outcomes without Multiple Hypothesis Correction



(a) Rental Company Adoption

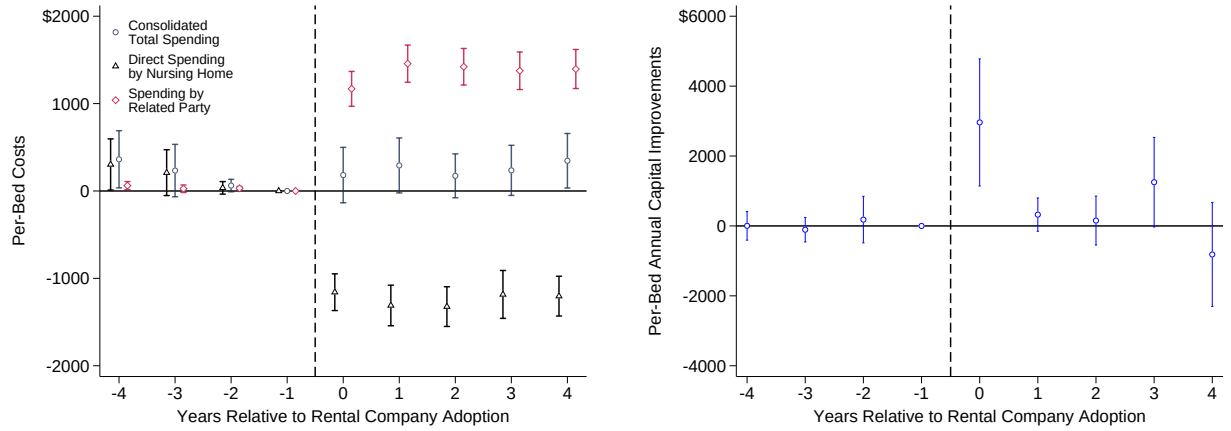
(b) Management Company Adoption

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 are 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 without correction for multiple hypothesis testing. Results with adjustment for multiple hypothesis testing are shown in Figure 10. All models include year and facility-by-event fixed effects. Standard errors are clustered by facility.

D Related Party Financials

A unique feature of our setting is that Illinois requires facilities to submit cost and balance sheet data for related parties as well.[24] While Illinois' cost reports provide a uniquely detailed view of related party finances, they should still be interpreted cautiously. Even in Illinois, reporting on related party finances receives less scrutiny than reporting on nursing home finances. For example, we cannot easily observe outgoing transfers from the related party to owners or other sister entities. Still, related party reporting is likely to be particularly credible in the context of real estate, where line items such as interest and depreciation may be difficult to exaggerate. In this section, we use these data to examine how the related party utilizes the acquired property.

Figure D.1: Depreciation and Capital Improvements



(a) Depreciation

(b) Capital Improvements

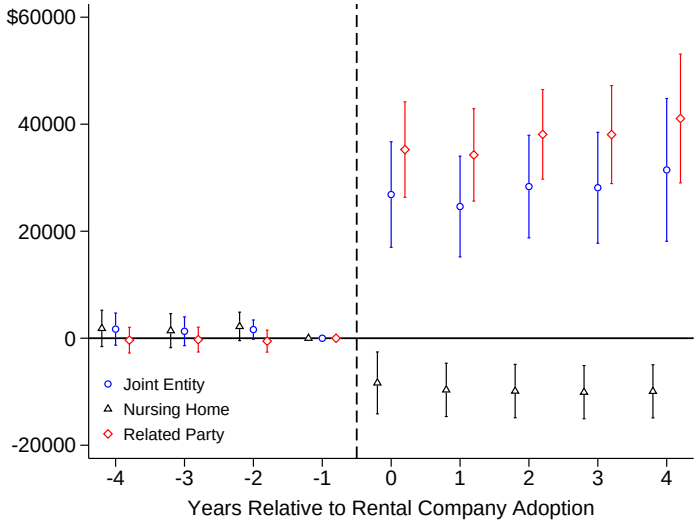
Notes: Figure presents event studies of depreciation and capital improvements. Panel (a) presents depreciation expenses, showing separate estimates for direct expenses incurred by the nursing home, expenses incurred by the related party, and expenses incurred by the consolidated entity including both the nursing home and the related party. Panel (b) presents capital improvements, which do not distinguish improvements made by the nursing home and by the related party. Each point corresponds to an estimate of the β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

Depreciation and Capital Improvements. Panel (a) of Figure D.1 shows how the amount of depreciation claimed by the nursing home and related party change after the sale-leaseback. Consistent with the related party taking over the direct costs of ownership, we see the depreciation claimed by nursing homes decrease and that claimed by related parties increase in approximately equal measure. As a result, the net change in depreciation claimed by the consolidated entity is small and statistically insignificant. This is most consistent with the related party simply acquiring

[24]Note that for balance sheets, providers report data for the nursing home entity as well as the consolidated entity (including any related parties). We infer related parties' balance sheets as the difference between these two.

the real estate on paper without making dramatic improvements that would substantially increase the property's cost-basis. We further examine this in panel (b) using cost report data on capital improvements. Unfortunately, these data do not distinguish the entity that made the capital improvements. We find that the year of sale-leaseback coincides with a modest, one-time $2,962 per-bed capital improvement.[25] Even if funded entirely by the related party, the value of these improvements is dwarfed by the $54,396 per-bed in asset value tunneled by the sale-leaseback. Likewise, the implied increase in annual depreciation is just $81 per bed, which is a small fraction of the $1,744 per bed in rental premium paid by the nursing home.

Figure D.2: 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 β^{τ} 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 1st and 99th percentiles. Standard errors are clustered by facility.

New Mortgages. Figure D.2 shows how mortgage liabilities for the nursing home and related party change after the sale-leaseback. While the nursing home pays off its existing mortgage, the related party takes on a new, much larger mortgage that likely reflects the property's increased market value. On average, this increases the total amount of debt collateralized against the property by $26,728 per bed. This suggests that owners use the sale-leaseback transaction as an opportunity to borrow substantial funds at low collateralized rates against the market value of the property.

[25] We cannot distinguish whether improvements were made by the nursing home or by the related party, nor can we distinguish whether it occurred prior to or after the date of the sale-leaseback. For example, these may represent minor improvements required to satisfy a mortgage underwriter as part of the sale and could be paid for by either party. They may also be improvements that significantly pre-date the sale that were simply identified and documented as part of the transaction process.

E Counterfactual Staffing Levels

From a regulatory standpoint, the hidden profits we estimate are quantitatively meaningful. One way to illustrate their magnitude is to calculate how many additional direct care staff hours each firm's tunneled profits could purchase.

Our approach is straightforward. For each facility, we calculate the number of additional RN and CNA hours respectively that their hidden profits π^*_{it} translate into. To do so, we calculate the market prices of RN and CNA hours using the 2019 HCRIS data for facilities in Illinois.[26] An RN hour costs an average of \$39.54, while a CNA hour costs \$18.99; these terms are inclusive of salary and fringe benefits, and include both direct and contract staff. Therefore, these values reflect the marginal cost to a firm of raising their staff hours, abstracting from any movements along the labor supply curve. Following convention, we normalize the number of staff hours by resident-days.

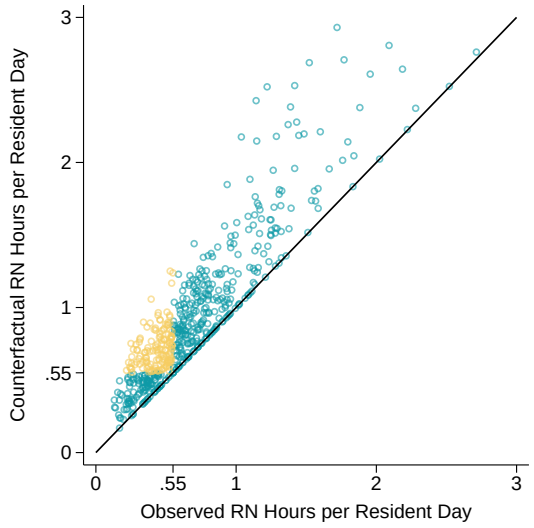
To compare the marginal staff hours gained under this allocation with their initial levels, we combine our estimates with data from the Payroll Based Journal (PBJ) program. These data contain administrative shift-level microdata for the near-universe of care workers at nursing homes.[27] We use the PBJ data to calculate the observed RN and CNA staffing ratios for all Illinois nursing homes in 2019. These results are summarized in Figure 7.

In addition, we also consider how these counterfactual staffing ratios would impact compliance with a previously proposed CMS minimum staffing rule. These results are summarized in Figure E.1, where we plot the joint distribution of observed staffing ratios by their counterfactual levels. If facilities instead reinvested their tunneled profits in 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 π^*_{it} were translated into either RNs or CNAs, and so overstates the share of firms that could easily comply.

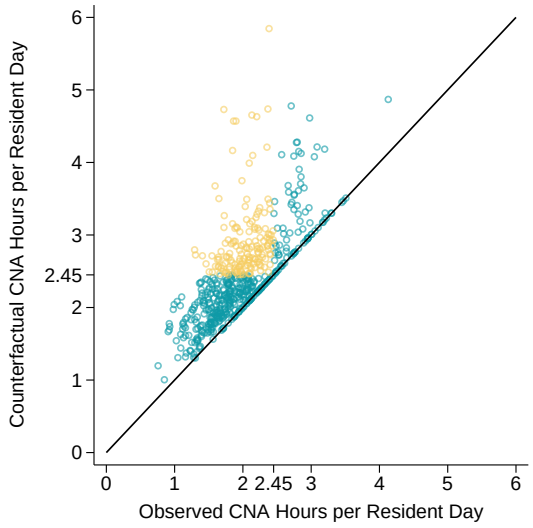
[26] We use the federal HCRIS data because the Illinois data do not break out nursing expenditure by staff type.

[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.

Figure E.1: Compliance with Federal Minimum Staffing Rule



(a) Observed and Counterfactual RN Staffing



(b) Observed and Counterfactual CNA Staffing

Notes: Figure presents the results of the staffing counterfactual calculations. Panel (a) presents a scatter plot of the observed RN staffing from 2019 by the counterfactual ratio under the counterfactual allocation. Panel (b) presents a corresponding scatter plot for CNA hours. Yellow points indicate firms whose compliance with proposed staffing minimums would flip under the counterfactuals.

F Details on Calculating the Internal Rate of Return

The internal rate of return (IRR) we aim to compute is the discount rate rationalizing the $100,000 per bed acquisition prices typical in recent years. Formally, when applying a discounted cash-flow analysis to an acquisition occurring at period 0 (without loss of generality), this is the r rationalizing:

$$V_0 = V_0^C + \sum_{t=0}^{\infty} \left(\frac{1}{1+r} \right)^t \mathbb{E}_0 \left[\Pi_t \right], \tag{6}$$

where V_0^C is the nursing home's "current assets" on its balance sheet in period 0, and Π_t is the cash flow received at t. Since current assets are highly liquid by definition, we model the value of current assets as being immediately accrued. On average, nursing homes in our sample hold $43,883 per bed in current assets. This fact explains a sizable fraction of the $100,000 per bed acquisition prices.

We model cash flows as deriving from two sources: the firm's operating profits, π_t, and its liquidation value, V_t^L. While the firm is operating, it receives both its operating profits and a benefit of κV_t^L from the ability to collateralize the liquidation value of the firm. This latter component aims to reflect the frequent practice of nursing home owners taking out large mortgages collateralized by the facility's real estate and other assets. Estimates from Luck and Santos (2024) indicate that, on average, such collateral would likely aid in obtaining rates that are 75.2 basis points more favorable.[28] Correspondingly, we let $\kappa = 0.00752$. When the facility closes, the owner receives a one-time liquidation cash flow of V_t^L and earns nothing thereafter. In summary, the cash flow, Π_t, is:

$$\Pi_t := \begin{cases} \pi_t + \kappa V_t^L & \text{if open at } t \\ V_t^L & \text{if closure occurs at } t \\ 0 & \text{if closure occurred before } t. \end{cases} \tag{7}$$

We assume that each period, the facility is liquidated with probability $1 - \delta$. We use $\delta = 0.99$ based on the empirical closure rate of approximately 1% each year in Olenski (2023). If the facility survives, future operating profits and liquidation values grow at rates g^π and g^L, respectively. We make the conservative assumption that $g^\pi = 2.16\%$, the geometric mean of inflation from 2000 through 2019. Likewise, we let $g^L = 2.04\%$, the geometric mean of real estate price growth in Illinois from 2000 through 2019.

[28] This uses the authors' estimate of the average effect of collateral for firms with less than $50M in assets. The authors' estimates indicate a 62.5 basis point improvement when considering real estate alone. Using this value yields similar results.

Under our assumptions, the discounted cash flow valuation of the facility at period 0 is:

$$V_0 = V_0^C + \sum_{t=0}^{\infty} \underbrace{\delta^t(1-\delta)}_{P(\text{death at } t)} \left(\underbrace{\sum_{\tau=0}^{t-1} \left(\frac{1}{1+r}\right)^{\tau} \left(\pi_\tau + \kappa V_\tau^L\right)}_{\text{pre-liquidation payoff}} + \underbrace{\left(\frac{1}{1+r}\right)^{t} V_t^L}_{\text{liquidation payoff}} \right) \tag{8}$$

$$= V_0^C + \delta \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t \delta^t (1+g^\pi)^t \pi_0 + \sum_{t=0}^{\infty} \left(\frac{1}{1+r}\right)^t \delta^t (1+g^L)^t \left(1-\delta+\delta\kappa\right) V_0^L \tag{9}$$

$$= V_0^C + \delta \sum_{t=0}^{\infty} \left(\frac{\delta(1+g^\pi)}{1+r}\right)^t \pi_0 + \left(1-\delta+\delta\kappa\right) V_0^L \sum_{t=0}^{\infty} \left(\frac{\delta(1+g^L)}{1+r}\right)^t \tag{10}$$

$$= V_0^C + \delta \frac{\pi_0}{1-\frac{\delta(1+g^\pi)}{1+r}} + \frac{\left(1-\delta+\delta\kappa\right) V_0^L}{1-\frac{\delta(1+g^L)}{1+r}} \tag{11}$$

where the final line follows from the geometric series, provided that $(1+r) > \delta(1+g^\pi)$ and $(1+r) > \delta(1+g^L)$.

In Section 7.1, we iteratively incorporate different sources of hidden profits and assets, recomputing the IRR at each step:

- **Reported Profits and Assets:** We assume $\pi_0 =$ \$1,311.21 and $V_0^L =$ \$40,101.84, the average reported per-bed profits and net long-term assets (total long-term assets net of all liabilities), respectively.
- **Incorporating Hidden Profits:** Incorporating the average \$2,770 per-bed of hidden profits increases annual per-bed profits to $\pi_0 =$ \$4,081.
- **Incorporating Tunneled Book Value:** Incorporating the \$32,827 per-bed of book value tunneled through the sale-leaseback increases the liquidation value to $V_0^L =$ \$72,929.
- **Incorporating Tunneled Market Value:** Book values are determined by depreciating the original purchase price of a property and therefore will not reflect any appreciation in the market value. To capture changes in the market price of assets over time, we inflate both original purchase prices and improvements using a real estate price index. To be conservative, we also similarly inflate depreciation. These adjustments increase the average liquidation value to $V_0^L =$ \$109,760.

G HCRIS Sample

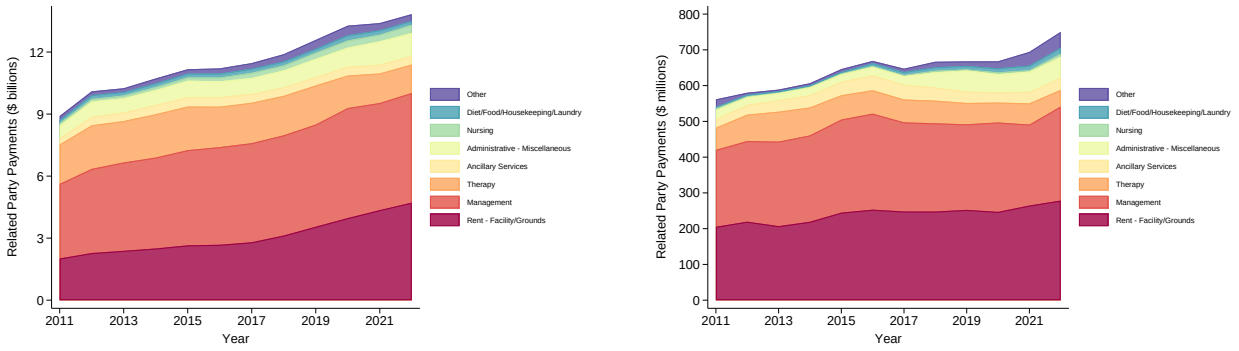
In this section, we describe the HCRIS sample used to investigate the changes in malpractice premiums and risk following real estate related party adoption in Section 8.

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 about 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 G.1: Amount Paid to Related Parties (HCRIS)



(a) National

(b) Illinois

Figure G.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 8.

[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.